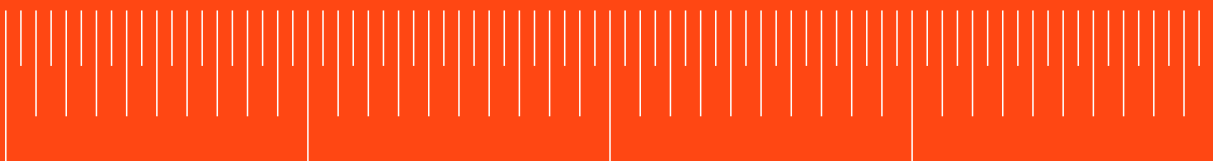


# Mitutoyo

UK-2020



## MEASURING INSTRUMENTS CATALOGUE





# Contents

Products are grouped in this catalogue as shown

A Data Management



A

B Micrometers | Micrometer Heads



B

C Holtest | Inside Micrometers | Bore Gauges



C

D Calipers | Height Gauges | Depth Gauges



D

E Gauge Blocks | Reference Gauges



E

F Digimatic Indicators | Dial Indicators | Dial Test Indicators | Instruments & Stands



F

G Linear Gauges | Laser Scan Micrometers



G

H Integrated Scale Units | Linear Scales | Multifunction Displays



H

J Microscopes | Profile Projectors



J

K Vision Measuring Systems



K

L Surftest | Formtracer | Contracer | Roundtest



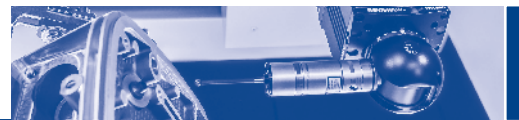
L

M Micro-Vickers, Vickers and Rockwell Hardness Testing Machines | Portable Hardness Testing Instruments



M

N Coordinate Measuring Machines



N

U Services & Support



U

INDEXES



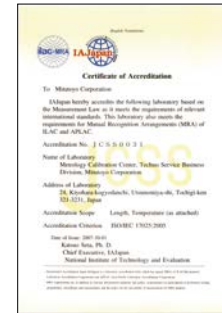
# Worldwide Calibration Services

Based on highest measurement capabilities of the same level as national standards

## Traceability System

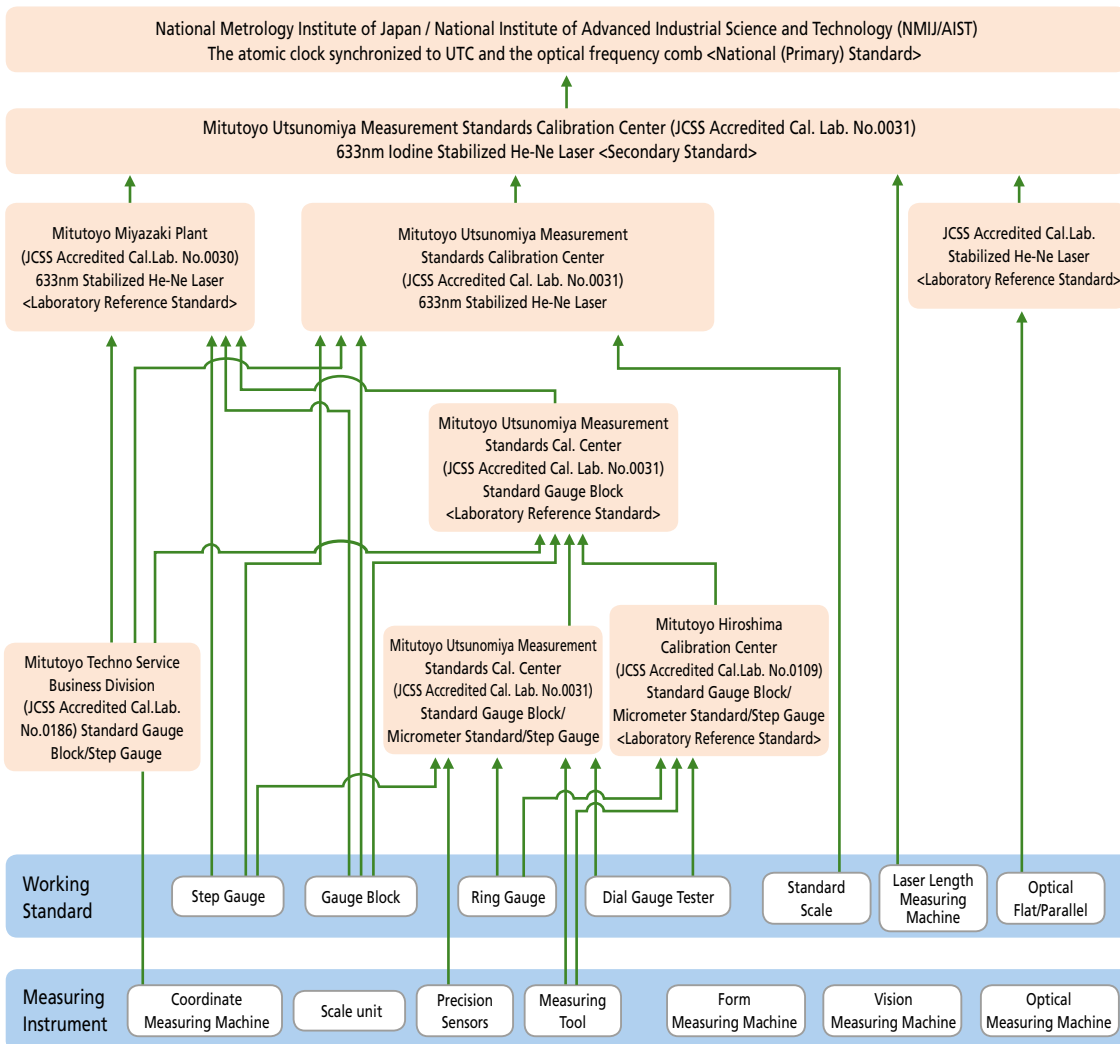
Mitutoyo has a traceability system made possible through an in-house calibration organization certified by the ISO/IEC 17025 international standard, with length standards directly related to national standards (atomic clock synchronized to UTC and the optical frequency comb) at the highest level.

National standards are mutually recognized by CIPM, and the certified calibration organization is mutually recognized by ILAC, so that the establishment and maintenance of traceability for Mitutoyo products is achieved both in Japan and overseas.

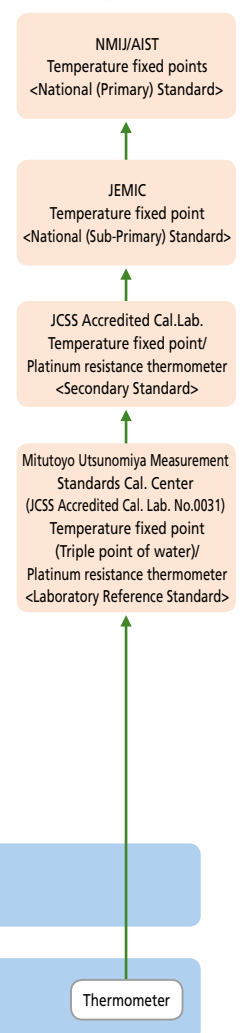


Certificate of JCSS accredited laboratory (Mitutoyo Utsunomiya Measurement Standards Calibration Center)

## Traceability of Length



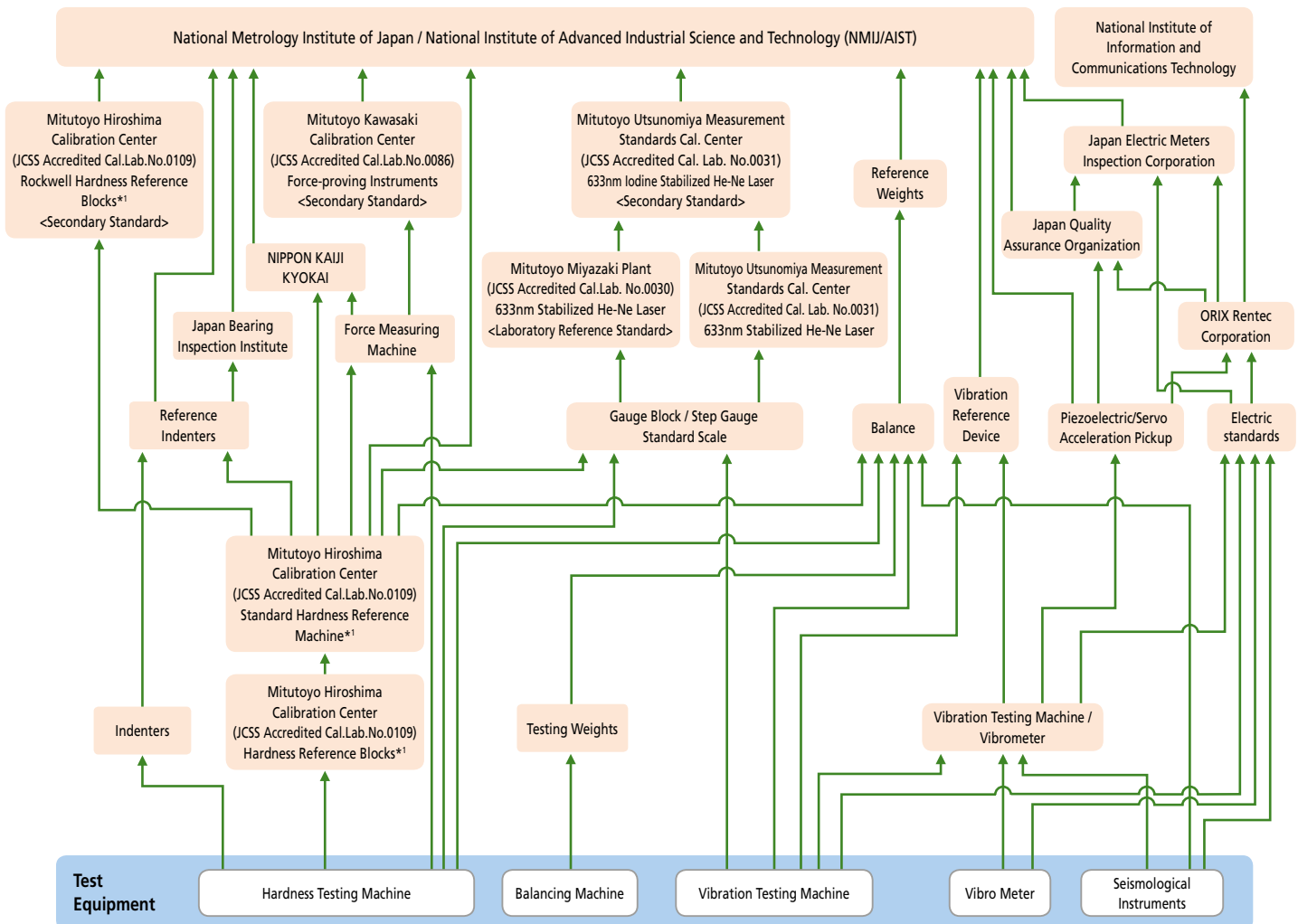
## Traceability of Temperature



Note: This chart is a simplified representation of Mitutoyo's overall traceability system. Detailed traceability charts are published for each product.



### Traceability of Test Equipment



\*1 The scope of JCSS accreditation is from 20HRC up to 65HRC in Rockwell Hardness Testing Machines and Hardness Reference Blocks.  
 Note: This chart is a simplified representation of Mitutoyo's overall traceability system. Detailed traceability charts are published for each product.

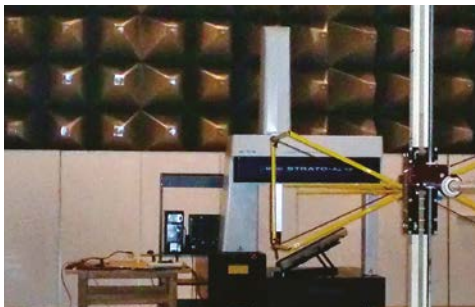
# Conformance

CE Marking, RoHS Directive, WEEE Directive and REACH Regulation



## Conformance to CE Marking

Mitutoyo's manufacturing plants throughout the world have programs to comply with the Machinery Directives, the EMC Directives, and the Low Voltage Directives. CE marking on a product indicates compliance with the essential requirements of the relevant European health, safety and environmental protection legislation.



## Response to RoHS Directive

The RoHS Directive\*<sup>1</sup> restricts the use of chemical substances in Europe.

Certain electronic equipment containing the specified 6 substances (lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ether (PBDE)) over the quantities determined in the Directive have been prohibited for sale in Europe since July 1, 2006.


The RoHS Directive was revised on July 1, 2011. We will continue to contribute to global environment protection and work so all of our products conform to the RoHS Directive.

\*<sup>1</sup> RoHS Directive: Directive 2011/65/EU of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

## Response to WEEE Directive

The WEEE Directive\*<sup>2</sup> is a directive that mandates appropriate collection and recycling of electrical and electronic equipment waste.

The purpose of this directive is to increase the reuse and recycling of these products, and seeks eco-friendly product design.

To differentiate between equipment waste and household waste, a crossed-out wheeled-bin symbol  is marked on a product.

We will promote eco-friendly design for our products.

\*<sup>2</sup> WEEE Directive: Directive 2012/96/EC of the European Parliament and of the Council on waste electrical and electronic equipment.

## Response to REACH Regulation

REACH Regulation\*<sup>3</sup> is a regulation governing registration, evaluation, authorization and restriction of chemical substances in Europe, and all products such as substances, mixtures and moulded products (including accessories and packaging materials) are regulated.

Chemical substances scientifically proven to be substances that are hazardous to human health and the global environment (a substance of very high concern (SVHC)) are prohibited to be sold or information concerning them disclosed is mandated in Europe.

We will actively disclose information about our products and provide replacement if we find our products contain any of the listed substances.

\*<sup>3</sup> REACH Regulation: Regulation (EC) No1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorization and Restriction of Chemicals

# Meaning of Symbols

Symbols associated with products in this catalogue indicate that those products possess the features described

## ABSOLUTE

### The ABSOLUTE Linear Encoder

This is an electronic measuring scale that provides a direct readout of absolute linear position when switched on, without needing to be zeroed or reset. Mitutoyo measuring instruments incorporating these scales provide the significant benefit of being always ready for measurement without the need of preliminary setting after switching on. Electrostatic, electromagnetic and a combination of electrostatic and optical methods are used in implementing this capability but the key enabling feature is Mitutoyo's patented technology of building absolute positional information into the scale so it can be read at start up. These linear encoders are widely used in Mitutoyo's measuring instruments as the in-built length standard and their use greatly contributes to the generation of highly reliable measurement data in industry, especially in harsh environments where contamination by cutting fluids, coolants and dust must not affect performance.

#### Advantages:

1. No count error occurs even if you move the slider (calipers, scales) or plunger (indicators) extremely rapidly.
2. You do not have to reset the system to zero when turning on the system after turning it off. \*<sup>1</sup>
3. As this type of encoder can operate with less power than the incremental encoder the battery life is prolonged to about 3.5 years (continuous operation of 20,000 hours)\*<sup>2</sup> under normal use.

\*<sup>1</sup>: Unless the battery is removed.

\*<sup>2</sup>: In the case of the ABSOLUTE Digimatic caliper (electrostatic capacitance model).



### IP Codes

These are codes that indicate the degree of protection provided (by an enclosure) for the electrical function of a product against the ingress of foreign bodies, dust and water as defined in IEC 60529: 2001 and JIS C 0920: 2003.



1st characteristic numeral	Degrees of protection against solid foreign objects	
	Brief description	Brief definition
0	Unprotected	—
1	Protected against solid foreign objects of $\geq 50$ mm and greater	A $\geq 50$ mm object probe shall not fully penetrate enclosure* <sup>3</sup>
2	Protected against solid foreign objects of $\geq 12.5$ mm and greater	A $\geq 12.5$ mm object probe shall not fully penetrate enclosure* <sup>3</sup>
3	Protected against solid foreign objects of $\geq 2.5$ mm and greater	A $\geq 2.5$ mm object probe shall not fully penetrate enclosure* <sup>3</sup>
4	Protected against solid foreign objects of $\geq 1.0$ mm and greater	A $\geq 1.0$ mm object probe shall not fully penetrate enclosure* <sup>3</sup>
5	Protected against dust	Ingress of dust is not totally prevented, but dust that does penetrate must not interfere with satisfactory operation of the apparatus or impair safety
6	Dustproof	No ingress of dust allowed
2nd characteristic numeral	Degrees of protection against water	
	Brief description	Brief definition
0	Unprotected	—
1	Protected against vertical water drops	Vertically falling water drops shall have no harmful effects
2	Protected against vertical water drops within a tilt angle of 15°	Vertically falling water drops shall have no harmful effects when the enclosure is tilted at any angle up to 15° on either side of the vertical
3	Protected against spraying water	Water sprayed against the enclosure at any angle up to 60° from the vertical shall have no harmful effects
4	Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effects
5	Protected against water jets	Water projected in jets against the enclosure from any direction shall have no harmful effects
6	Protected against powerful water jets	Water projected in powerful jets against the enclosure from any direction shall have no harmful effects
7	Protection against water penetration	Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed in water under standardized conditions of pressure and time
8	Protected against the effects of continuous immersion in water	Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is continuously immersed in water under conditions which shall be agreed between manufacturer and user but which are more severe than for IPX7

\*<sup>3</sup> For details of the test conditions used in evaluating each degree of protection, please refer to the original standard.



### Independent Confirmation of Compliance

IP65, IP66 and IP67 protection level ratings for applicable Mitutoyo products have been independently confirmed by the German accreditation organization, TÜV Rheinland.



### Measuring Instruments Shipped with Inspection Certificate

Mitutoyo guarantees product quality as a leading precision measuring instrument manufacturer and ships measuring instruments with an inspection certificate that includes inspection data so that customers can use them with confidence. Mitutoyo also calibrates the purchased measuring instrument and issues, for a fee, a calibration certificate that proves traceability to the relevant standard.

Note: For the meaning of the inspection mark shown at left, refer to the detailed description of each product.



### MeasurLink Enabled

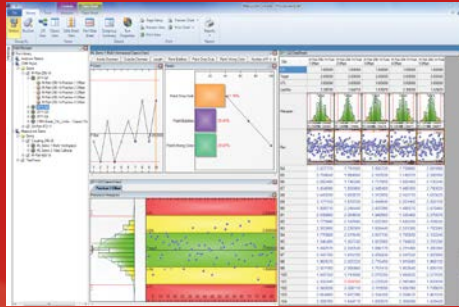
Products equipped with the measurement data output function can be connected to the measurement data network system MeasurLink. MeasurLink is a registered trademark of Mitutoyo Corporation in Japan and Mitutoyo America Corporation in the United States.

# DATA MANAGEMENT





### MeasurLink 9 Software



### U-WAVEfit Wireless Communication System



### Contents

Example of Data Management System Design	A-03
MeasurLink 9 Software	A-05
USB-ITPAK Measurement Data Collection Software	A-10
Digimatic Signal Cables	A-11
USB Input Tool Direct	A-12
U-WAVEfit Wireless Communication System	A-13
U-WAVE-T Wireless Communication System	A-15
U-WAVE-T Connecting Cables	A-16
Digimatic Input Tools	A-17
Digimatic Multiplexers	A-18
EC Counter (Digimatic Display Unit)	A-19
DigjStore Remote Data Collection Device	A-20
DP-1VA LOGGER Digimatic Mini-Processor	A-21

# Data Management

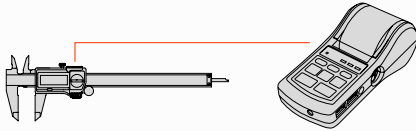
## Example of Data Management System Design

A typical example of a system for recording and analysing measurement results from various Mitutoyo measuring instruments for quality assurance purposes.

### Implementation Step 1

#### Recording measurement results

##### Eliminate handwriting

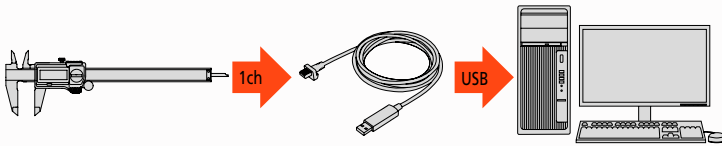


Measurement data can be printed easily. Data can be output to a PC for statistics calculations.

**DP-1VA LOGGER** see page **A-21**

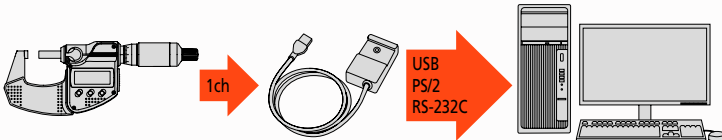
##### Direct data input to a PC

Connecting-cable-integrated USB-ITN.



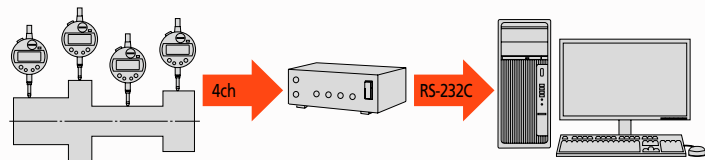
**USB Input Tool Series** see page **A-12**

A choice of three models with different output specifications IT-012U/IT-005D/IT-007R.



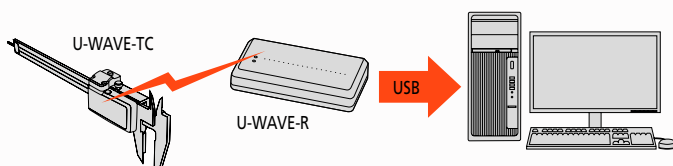
**Input Tool Series** see page **A-17**

Connectable to an RS-232C interface PC via a 4-channel multiplexer.



**Multiplexers** see page **A-18**

##### Wireless data input to a PC



**U-WAVE** see page **A-13**

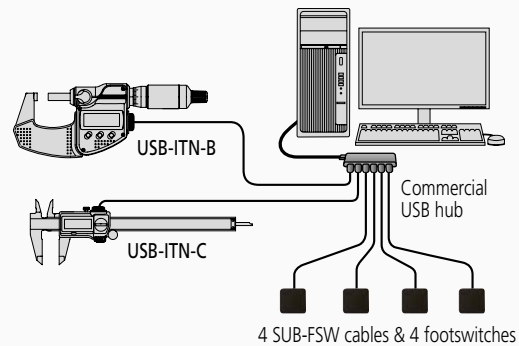
### Implementation Step 2

#### Software dedicated to inspection and quality control

##### Inspection certificate creation

	A	B	C	D	E	F
1	Setting	1	2	3	4	5
2	Dimension X	10.025	10.033	9.964	10.031	10.046
3	Dimension Y	9.982	10.017	10.008	9.996	10.027
4	Dimension H	29.97	30.02	30.07	29.96	30.04
5	External Appearance	OK	OK	NG		

Measurement data from calipers and micrometers are imported into an Excel spreadsheet.

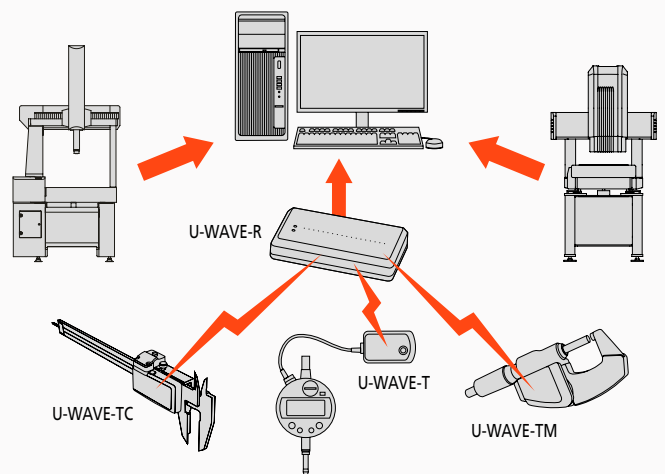


**USB-ITPAK** see page **A-10**

##### Statistical Process Control



GONO-GO judgement, process capability and control charts are displayed in real time.



**MeasurLink** see page **A-5**

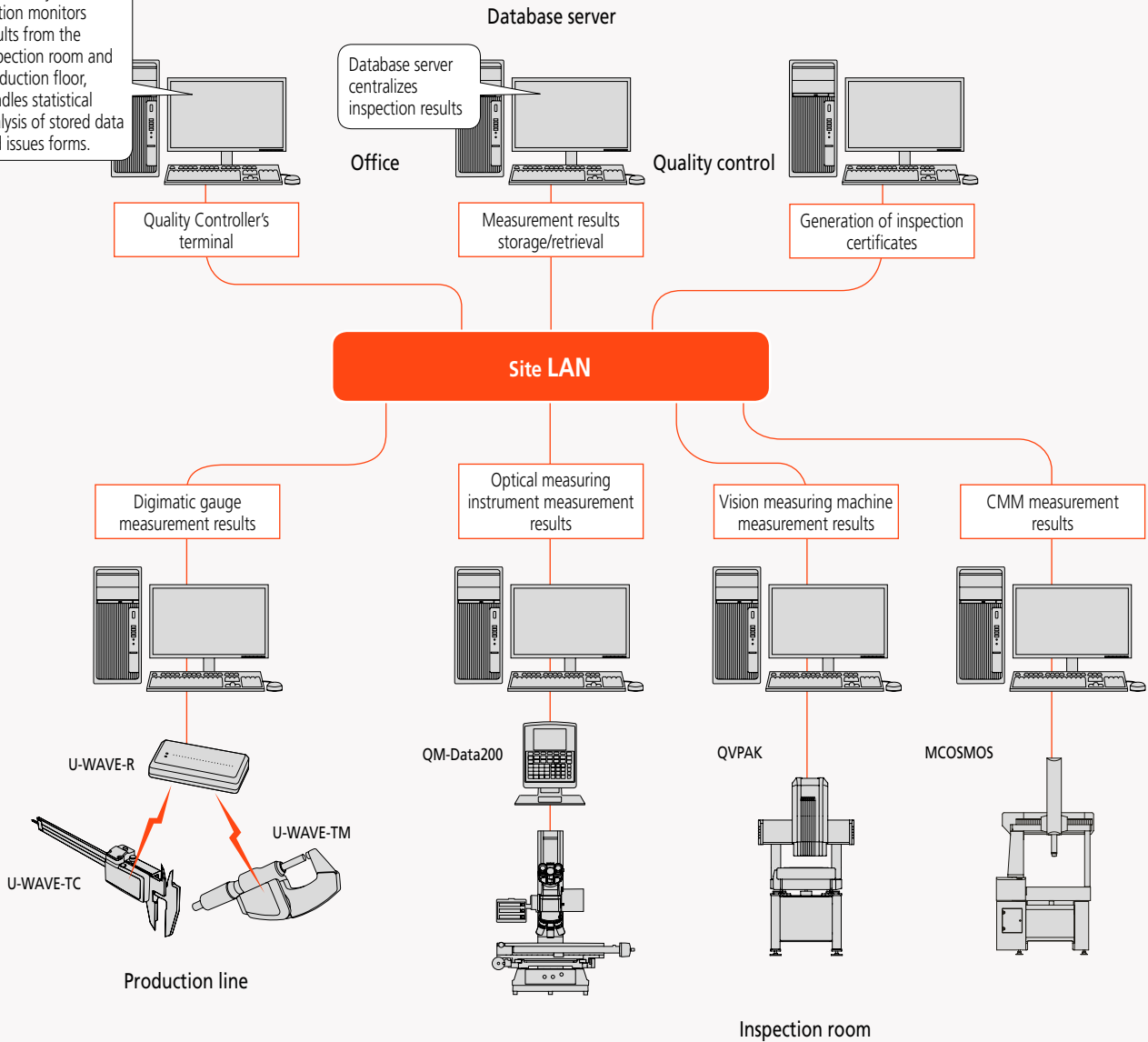
# Implementation Step 3

Creating a quality control network covering a wide area on site

## Unify management of the quality control function using the network

The Quality Control section monitors results from the inspection room and production floor, handles statistical analysis of stored data and issues forms.

Database server centralizes inspection results



MeasurLink see page A-5

# Data Management

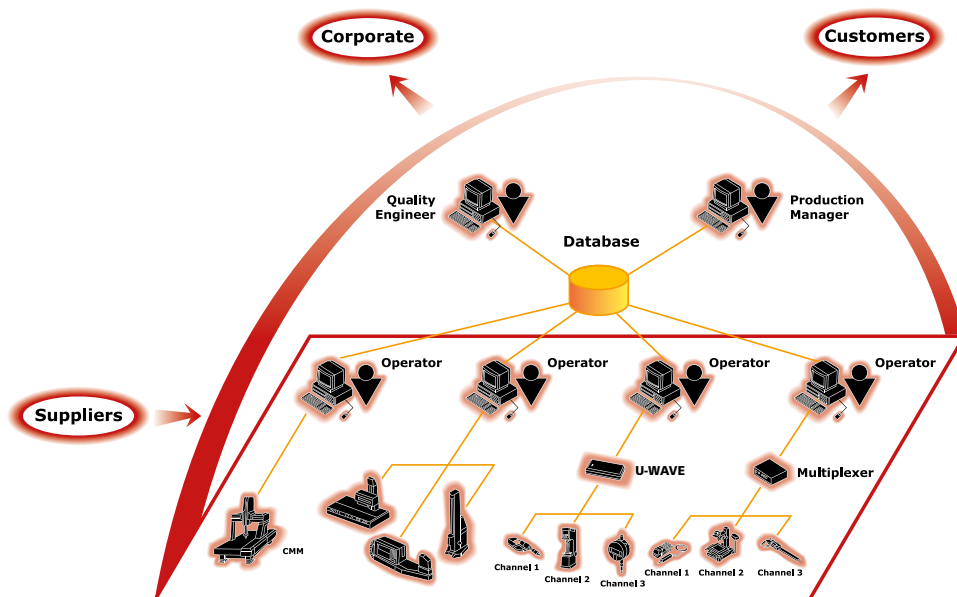
## MeasurLink 9 Software

Most of Mitutoyo's electronic instruments can output data via optional data cables or wireless transmitters and receivers in the form of Digimatic code. The Digimatic code can also be converted into RS-232C format by any of several available gauge multiplexers. In this way, digital data can be sent to PCs for data acquisition and advanced statistical analysis.

As a client/server application, MeasurLink gives you the performance you need through distributed processing. Combined with a multi-user relational database, MeasurLink delivers a safe and organized data warehousing system making quality data available for viewing and analysis by any member of the production, engineering, and managerial staff throughout your company. Inspection in the factory produces data for analysis, corrective action, and various reporting needs. As the backbone of your quality efforts, MeasurLink is guaranteed to reduce your production costs and increase profits.

### Scalable Network

MeasurLink is capable of linking and managing multiple *islands* of inspection into a common database of part information, statistical data, gauge information, processes, etc. Information is shared across an entire manufacturing facility.



### MeasurLink Suite of Software

MeasurLink is an easy to use, Windows-based family of quality data management software that combines real-time data acquisition, on-line statistical analysis, integrated networking, and quality information sharing into a comprehensive data management solution.

- **Real-Time:** On-line real-time data collection.
- **Process Analyzer:** Analysis of all data.
- **Process Manager:** Network monitoring.
- **Gage R&R:** Gauge repeatability and reproducibility.
- **Gage Management:** Gauge inventory and calibration control.
- **Report Scheduler:** Automatically outputs reports created by Real-Time or Process Analyzer on a user defined schedule.

Note: Upgrade packages are also available. Please contact our sales department for details.

### Technical Data

**Database Management System (DBMS) Requirements**  
MeasurLink 9 ships with a copy of Microsoft® SQL Server Express Edition 2017 or 2014 SP1 for Windows® 7 or 32-bit systems, which can be for a standalone or a network server installation. MeasurLink 9 also supports the following Microsoft® SQL Server versions:

- Microsoft® SQL Server 2017 Standard Edition
- Microsoft® SQL Server 2017 Enterprise Edition
- Microsoft® SQL Server 2016 Standard Edition
- Microsoft® SQL Server 2016 Enterprise Edition
- Microsoft® SQL Server 2014 Standard Edition
- Microsoft® SQL Server 2014 Business Intelligence Edition
- Microsoft® SQL Server 2014 Enterprise Edition

### Operating System Requirements

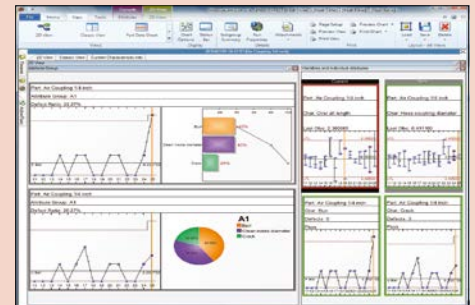
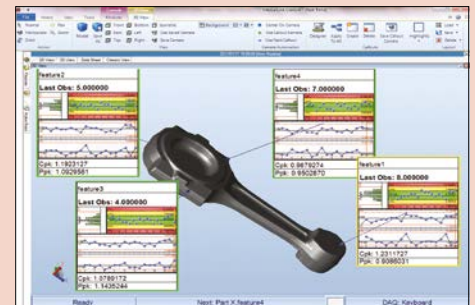
All MeasurLink 9 products are supported on the following Microsoft® Windows Operating System versions:

- Windows® 7 Service Pack 1.
  - All Windows® 8 and 8.1 (Windows® RT versions are not supported)
  - All Windows® 10 (Mobile and IoT versions are not supported)
  - Both 32-bit and 64-bit operating systems supported
- MeasurLink 9 is not supported under Windows® XP, 95, NT (NT4 or previous releases) or Vista.

### Hardware Requirements\*

Windows® 10:	1 GHz or faster 32-bit (x86) or 64-bit (x64) processor
Windows® 8:	4 GB RAM 32-bit or 8 GB RAM 64-bit
Windows® 7:	16 GB available hard disk space (32-bit) or 20 GB (64-bit) DirectX 9 graphics device with WDDM 1.0 or higher driver, DVD-ROM drive (optional)

\* These requirements are the minimum for the Windows® OS and may not provide optimum performance. In general, the more powerful the PC, the faster the response times.



### User Friendly

Click a gauge button and watch the charts update in real time. This helps the operator stay in control of the process. Begin collecting data in minutes with the newly designed Inspection Wizard.

### Data Acquisition

Collects data from digital micrometers, calipers, indicators, bore gauges, etc. Keyboard entry is quick and easy. Collect data for one or a million parts.

### Comprehensive SPC

Easy to use Control Charts, Histograms, Capability, Detailed statistics, Assignable Causes, Corrective Actions, and Traceability all make this software *best in class*.

### Variable Data

Collect dimensional data (length, width, height, outside diameter, inside diameter, weight, etc.). Supports derived features (calculations for run out, volume, true position, etc.).

### Attribute Data

Collect data from visual inspections (burrs, cracks, dents, missing holes, etc.) to determine the fitness of a part. Track failures using a GO/NO-GO style or count the defects on a characteristic to determine if a part is acceptable or not. There is complete flexibility to study characteristics individually or in groups.

### Engineering Specifications

Attach drawings to parts, routines or individual characteristics for viewing. Most file formats are supported as an attachment (e.g. Word, PDF, CAD).

### Multimedia Aids

Attach movies (AVI, MOV, MPG), sound (WAV) and images (BMP, JPG, TIF) to parts, routines or individual characteristics as instructional aides for an operator.

### Revision History

Track specification adjustments and preserve historical data.

### Mathematically Derived Features

Fully functioning real-time calculator with standard mathematical functions including square root, exponential, trigonometric, sum, average, max and min.

### Part Pictures

View scanned blueprints and digital photographs at a glance. On-screen guided sequencing keeps the operator moving to the right feature.

### Data Tests

Full support of Western Electric and Nelson Tests for pattern recognition in control charts (e.g. extreme point, trend, stratification, oscillation, etc.) along with various alerts for each failed test.

### Forced Assignable Cause

Forces Assignable Cause Tags on Inspector during collection if process is out of control. Empowers operator to build on existing pick list.

### Corrective Action Plans

Operators choose corrective action as applied to the part or process. Multiple corrective actions can be applied to any subgroup. Empowers operator to build on existing Corrective Action list.

### Sequenced and Random Gauge Input

Flexible data input. Collect data by feature, by part or randomly. Guided sequencing minimizes inspection errors.

### Time Stamped Data

All observation data is marked with the date and time from the computer clock.

### Flexible Reporting

Build report templates with company logos and free form text. Select and position chart types to customer specification.

### Mixed Variable/Attribute Data

Mix your dimensions and nonconformances in the same Inspection Routine. Track defects and defectives along with your dimensional data.

### Crystal Reports

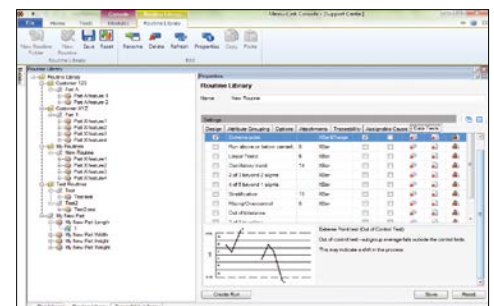
Create your own customised Crystal Reports for use with Part or Run data.

### FDA 21CFR Part II Support

Provides support for medical and pharmaceutical manufacturers electronic records, including audit trails, e-signatures (Process Analyzer Professional only) and advanced security.

### Inspection Wizard

Begin collecting data in minutes by defining features, tolerances and input method.



### Easy To Use

MeasurLink provides the most intuitive interface with complete SPC functionality to help you monitor and manage your manufacturing processes. With MeasurLink, you can easily manage the quality levels of parts, identify problem areas and apply corrective action to areas in need of attention.

# Data Management

## MeasurLink 9 Real-Time Professional Edition

Enables customers to connect and acquire data from Mitutoyo Coordinate Measuring Machines, Vision and Form Measuring Systems via native integration (DDE).

ASCII and QMD (xml-based) file import are also supported. In addition to the features above, this application also includes data filters and a full reporting tool complete with sample templates.

Supported data sources: keyboard, RS232 and USB devices, native Mitutoyo integration (DDE), ASCII and QMD (xml-based) file import.

### • Import Templates

Easily create an import template that maps data in a text file to MeasurLink information. Templates are saved to the database for everyone to use and can be added as data sources to data collection stations. An import template can be verified against the source file without adding data to the system.

### • Direct Data Transfer

Collect data into MeasurLink from Mitutoyo capital equipment running Mitutoyo Software that is MeasurLink enabled. This provides a tighter and more robust interface than importing data from files.

### • Filter Data

All data collected within a Real-Time run is related. Often, especially for runs containing a large volume of subgroups, requests are made for subsets of data that are further related from the entire run's population. MeasurLink provides robust filtering capabilities to comply with these requests.

### • Import Data

When set up as a data source, import templates are readily available to the operator, or periodic imports can be executed.

## Specifications

Code No.	Description
64AAB607R	MeasurLink 9 Real-Time Professional Edition

## MeasurLink 9 Real-Time Professional 3D Edition

Designed for customers who wish to collect data using Hoops 3D graphics view, in addition to all features offered by MeasurLink 9 Real-Time Professional Edition. Hoops 3D files can be exported from most CAD systems and provides the operator with a real view of the part. Camera angle and position can be saved for each characteristic, which provides for an intuitive, prompt-guided sequence for an inspector to follow.

Supported data sources: keyboard, RS232 and USB devices, native Mitutoyo integration (DDE), ASCII and QMD (xml-based) file import.

### • 3D View

True three-dimensional model support with Hoops streaming files (.HSF). Export your part's model from Catia, Solidworks or other CAD software and place callouts in the 3D space.

### • Flexible Callout Design

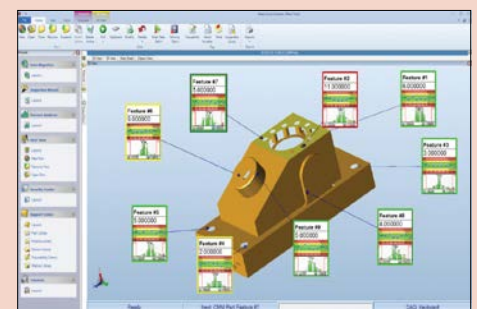
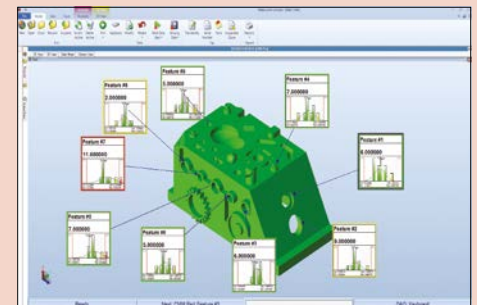
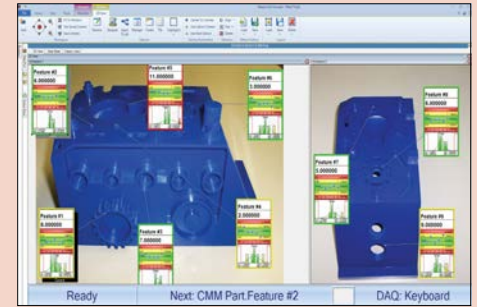
Callouts provide part acceptability at a glance. You can design them the same way as for the two-dimensional view to include charts or statistical information with the ability to size any element inside the callout.

### • Guided Sequence

The display can automatically change during data collection to show the next or last observation point, providing a simple guided sequence for the inspection procedure. By saving a different view for each characteristic to be inspected, you can have the model rotate, pan or zoom to show the operator details of the part.

## Specifications

Code No.	Description
64AAB608R	MeasurLink 9 Real-Time Professional 3D Edition





## MeasurLink 9 Process Analyzer Professional Edition

Process Analyzer is an invaluable tool for your quality team. It gives you the flexibility to analyse processes, identify problem areas and take corrective action to improve product quality. Inspection runs can be sorted by Inspection Station, Routine or Part, and are displayed with the look and feel of Windows Explorer. Inspection data can be merged, filtered, grouped, charted and printed in the way you want.

Designed for robust manipulation of Real-Time data in a networked environment using advanced features. It enables quality engineers to manipulate the data in meaningful ways that contribute to quality control initiatives. For larger installations that use different databases, the ability to switch the connection allows an engineer to analyse data from all sources. Full reporting template functionality is also provided.

- **Group, Search and Sort Data**

View data by part, routine, station, year, month, day. Apply saved filters to data and search for specific traceability or serial number criteria.

- **Merge Data**

Combine *lot based* or *just in time* collected data to get a bigger picture of process variation and production quality.

- **Scatter Plots**

Perform correlation studies to identify process interactions.

- **Electronic Signatures**

The e-signatures can be applied to runs only in Process Analyzer Professional. When combined with Audit Trails available in Real-Time, and security is implemented, then MeasurLink provides support for FDA requirements for Medical and Pharmaceutical Manufacturers.

- **What-If Scenarios**

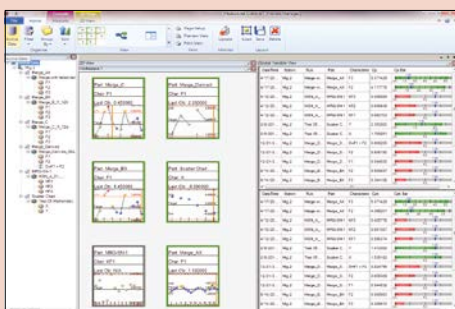
Run hypothetical scenarios in Process Analyzer. Scenarios include Tolerance changes, Data Tests and Derived Characteristics.

- **Windows Active Directory Support**

Integration supports Windows Users and Groups, AD Users get assigned MeasurLink and MCOSMOS rights and Single Sign On (SSO).

### Specifications

Code No.	Description
64AAB609R	MeasurLink 9 Process Analyzer Professional Edition



## MeasurLink 9 Process Manager Standard Edition

Real-time monitoring of data as it is collected. Provides the QC/Production Manager with the perfect tool to organise and maintain a shopwide quality program at a glance.

Process Manager provides a method for auditing the entire shop floor inspection activity from a single PC. Easily see process information without walking from one inspection area to another by viewing current production across all machines. Show clients your quality operation for the entire facility.

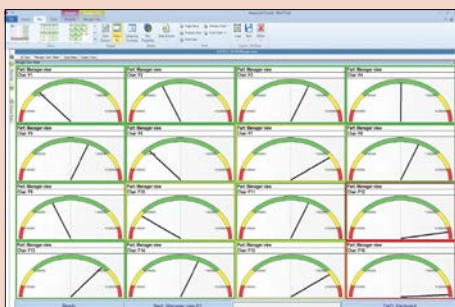
Quality Control personnel can choose to display only specific stations, parts, routines or even critical characteristics that they are responsible for. Establish Cpk thresholds for acceptability. Drill down for details on certain traceability, assignable cause, failed tests or serial numbers.

Various alerts are provided to recognise and stay up-to-the-minute on production problems. Display the easy-to-read charts and detailed statistics.

Displays snapshot windows of characteristics that are currently being collected in MeasurLink Real-Time. The data can be sorted by Station, Process, Capability or Timestamp.

### Specifications

Code No.	Description
64AAB610R	MeasurLink 9 Process Manager Standard Edition



# Data Management

## MeasurLink 9 Gage R&R Standard Edition

Determines the repeatability and reproducibility, linearity, bias and stability of inspection systems, allowing you to isolate gauging problems.

Graphical tools allow for isolation of gauging problems including inconsistencies in technique between operators or inspectors.

### • Study Wizard

User-guided study setup defines the study that needs to be performed in order to determine the measurement system's capabilities. All elements required for the selected study to be completed are captured before the study is created, and the user is prompted to provide any missing information before beginning the study.

### • Data Input

Data for the study can be collected directly from a gauge connected to the system or transferred from Mitutoyo Coordinate Measuring Machines or Vision and Form Measuring Systems via native integration (DDE). Users can also key in their data.

### • Group Studies

All studies in the database are visible and can be organised using various criteria.

### • Study Types

MeasurLink Gage R&R uses calculation methods based on AIAG's Measurement Systems Analysis, Fourth Edition (commonly known as MSA 4).

In addition to standard calculations, the software provides graphical tools for analysis of the measurement system. The Xbar and R chart can show whether there is adequate gauge discrimination to record part-to-part variation in production and if operators are consistent.

The Part-by-Appraiser plot can show if there is a lack of consistency between operator inspection techniques.

## Technical Data

The following study types are supported:

### Location

- Bias
- Linearity

### Reproducibility

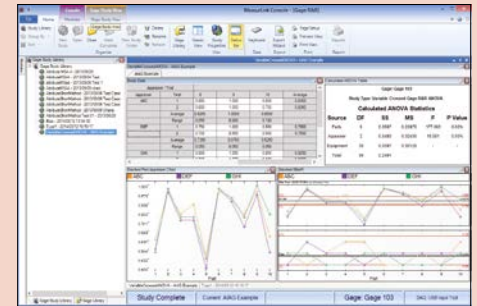
- Type I
- Variable Range Method

### Repeatability & Reproducibility

- Crossed ANOVA
- Crossed Average & Range
- Nested ANOVA
- Nested Average & Range

### Stability

- Stability



## Specifications

Code No.	Description
64AAB611R	MeasurLink 9 Gage R&R Standard Edition

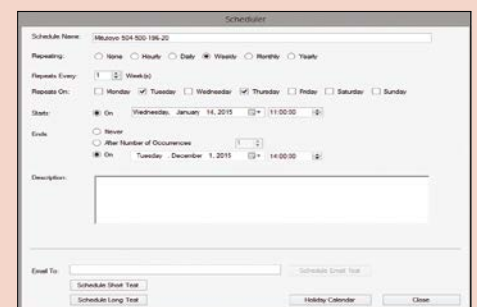
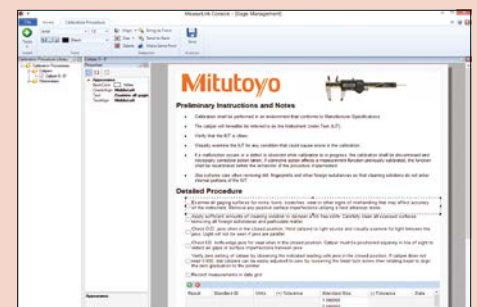
## MeasurLink 9 Gage Management Edition

Gauge management is essential for monitoring the calibration history of a gauge. Periodic adjustments may be required to bring a gauge into specification.

Gage Management is a Microsoft Windows-based gauge calibration tracking software that is networkable and shares the same database used by the rest of the MeasurLink software family. This assists users in developing, maintaining, organising and managing information about their gauges. Information such as gauge in-service dates, calibration recall dates, gauge R&R dates and general gauge event history is provided by an intuitive interface with complete reporting abilities. MeasurLink Gage Management also supports the creation of vendor contact and user lists, and comes equipped with a *smart* calendar that allows you to define working days.

### Features:

- Gauge inventory management
- Gauge calibration recall system
- Gauge calibration procedure
- Assessment and reporting
- Gauge vendor management
- Gauge location management
- Gauge R&R history



## Specifications

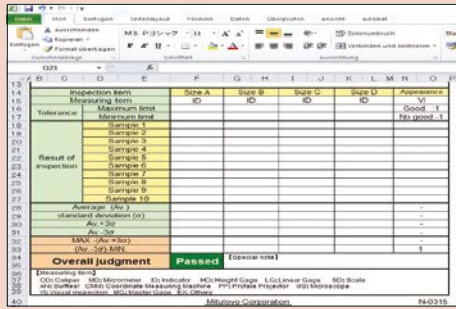
Code No.	Description
64AAB612R	MeasurLink 9 Gage Management Edition



## Technical Data

- OS compatibility: Windows® 7/8/10 (32-bit, 64-bit)  
 Applicable MS Excel version: Microsoft® Excel® 2000/2002/2003/2007/2010
- Functions:
- setting of Microsoft® Excel® input (workbook, worksheet, cell range a.s.o.)
  - data collection: USB Direct Input Tool, wireless communication system U-WAVE
  - selection of measuring input (sequential, simultaneous, individual)
  - control of data input (mouse, footswitch, keyboard)
  - character string input by footswitch
  - timer function
  - measurement time input
- Language for display: English, German, French, Italian, Spanish, Turkish, Czech, Polish, Hungarian, Swedish, Russian, Japanese, Korean, Simplified Chinese, Traditional Chinese

Supplied with USB dongle



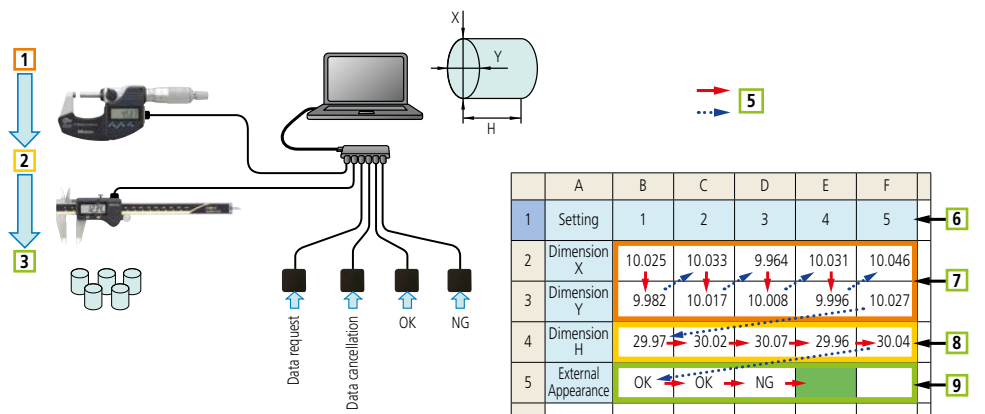
## SERIES 06AFM – USB-ITPAK Measurement Data Collection Software

- USB-ITPAK is a setting and data collection program for collecting data from measuring instruments with Digimatic output for entry to Microsoft® Excel®.
- A USB Direct Input Tool, U-WAVE Wireless communication system and USB Footswitch adapter can be used to send the data to a Microsoft® Excel® worksheet.



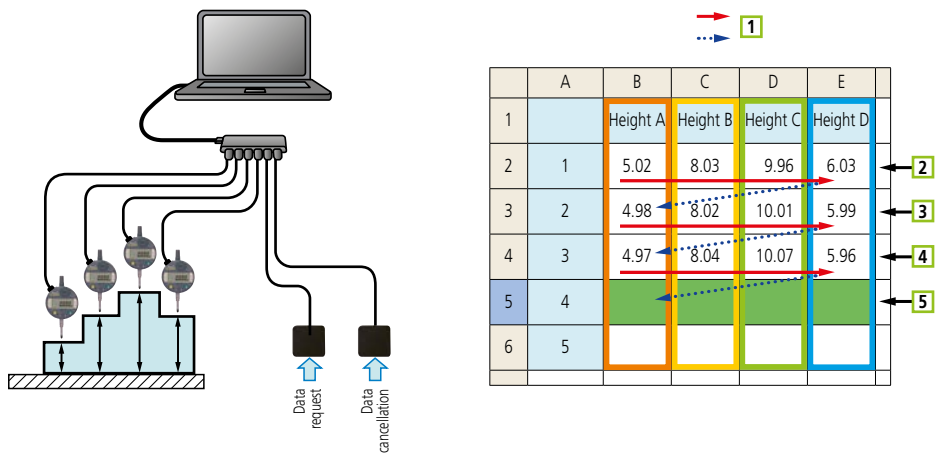
## Specifications

Code No.	Description	Price
06AFM386	Software USB-ITPAK with dongle	£240.00



## Sequential Measurement

1: Micrometer for diameters X and Y; 2: Caliper for height measurement H; 3: Inspection by attributes OK/NG with footswitch, e.g. scratches on the surface; 4: standard USB-Hub; 5: Measurement direction; 6: Workpiece No. 7: Measuring result XY; 8: Measuring result H; 9: OK/NG judgement (e.g. scratches)



## Simultaneous Measurement

1: Measurement direction; 2: First measurement: press footswitch once = 4 complete data batches; 3: Second measurement: press footswitch once = 4 complete data batches; 4: Third measurement: press footswitch once = 4 complete data batches; 5: Is waiting for the next batch measurement

# Data Management

## Digimatic Signal Cables

- These cables are used to connect Mitutoyo measuring instruments that feature a Digimatic interface.
- Mitutoyo's Digimatic interface not only allows connection of numerous additional devices such as printers, counters and the like, but also enables connection of one or more Digimatic measuring instruments to a PC by using a Mitutoyo transmitter, RS-232C input tool, multiplexer, USB input tool or USB input tool direct.
- Contact Mitutoyo's Sales Desk for more information.

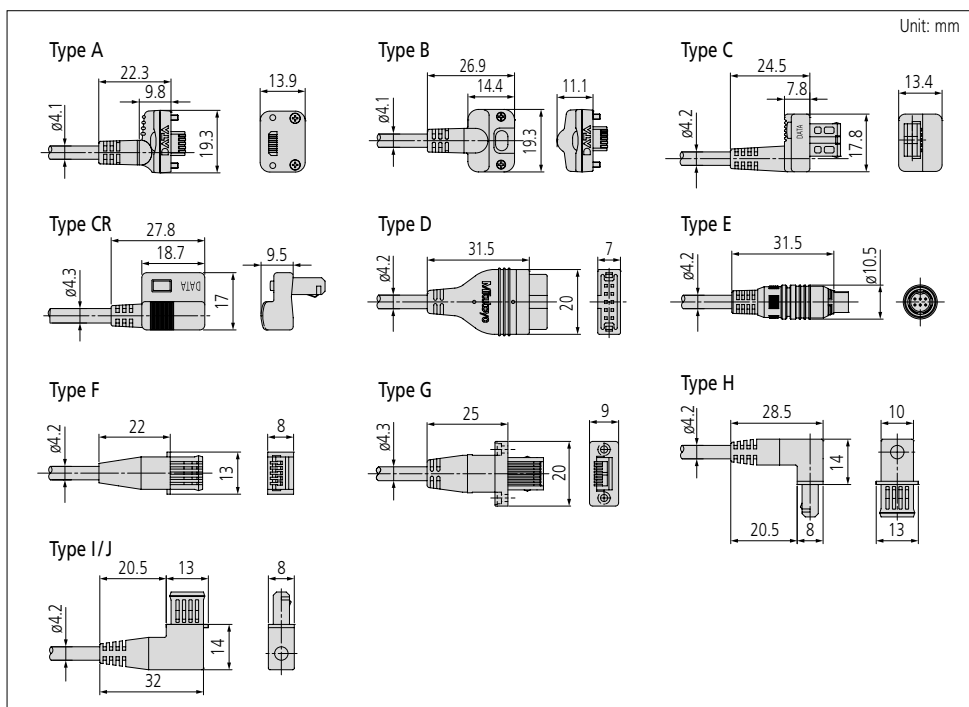


05CZA662

### Specifications

Code No.	Type	Water/dust -proof	Description	Length	Price
05CZA624	A	✓	Digimatic Signal Cable straight with data pushbutton and screws e.g. for IP67 ABSOLUTE Digimatic Caliper	1 m	£69.40
05CZA625				2 m	£83.50
05CZA662	B	✓	Digimatic Signal Cable rear mounting with data pushbutton e.g. for IP65 Digimatic Micrometer	1 m	£69.40
05CZA663				2 m	£83.50
959149	C	—	Digimatic Signal Cable straight with data pushbutton e.g. for Standard ABSOLUTE Digimatic Caliper	1 m	£35.70
959150				2 m	£40.60
04AZB512	CR	—	Digimatic Signal Cable L-type with data pushbutton e.g. for Digimatic Interchangeable Anvil Micrometer	1 m	£67.20
04AZB513				2 m	£71.70
936937	D	—	Digimatic Signal Cable with identical connectors on both ends e.g. for ID-H Digimatic Indicator	1 m	£33.90
965014				2 m	£49.80
937387	E	—	Digimatic Signal Cable round 6 pin e.g. for ABSOLUTE Digimatic Micrometers	1 m	£39.10
965013				2 m	£49.80
905338	F	—	Digimatic Signal Cable straight e.g. for ID-C Indicator	1 m	£33.90
905409				2 m	£38.00
21EAA194	G	✓	Digimatic Signal Cable straight e.g. for ID-N Indicator	1 m	£47.40
21EAA190				2 m	£53.40
21EAA210			Digimatic Signal Cable straight with zero-setting terminal e.g. for ID-N Indicator	1 m	£122.00
21EAA211				2 m	£137.00
905689	H	—	Digimatic Signal Cable rear mounting e.g. for ID-C Indicator	1 m	£33.90
905690				2 m	£46.60
905691	I	—	Digimatic Signal Cable right side e.g. for ID-C Indicator	1 m	£33.90
905692				2 m	£46.60
905693	J	—	Digimatic Signal Cable left side e.g. for ID-C Indicator	1 m	£33.90
905694				2 m	£46.60

### Dimensions



### Technical Data

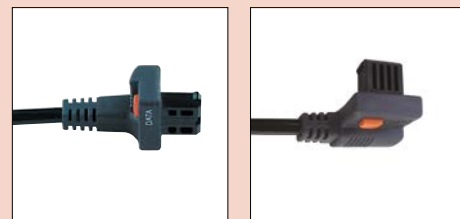
Digimatic measuring instruments require one of the following for initiating data transmission:

1. Footswitch
2. Data pushbutton on the instrument (if present)
3. Data request from the PC
4. Signal cables with data pushbutton (if connectable to the measuring instrument)



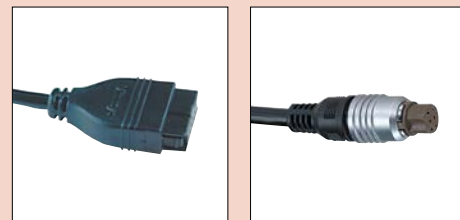
Type A.

Type B.



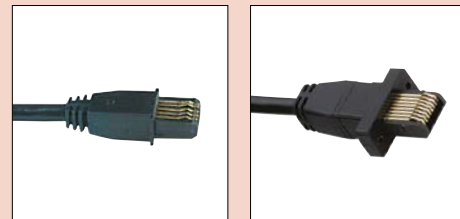
Type C.

Type CR.



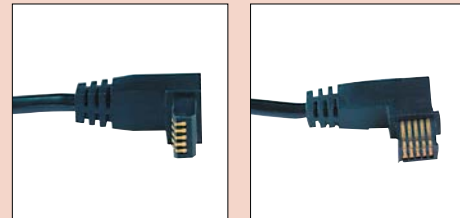
Type D.

Type E.



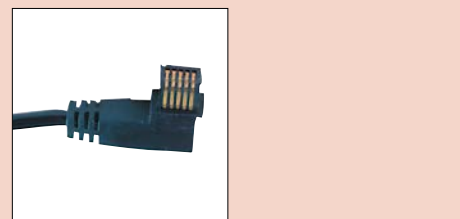
Type F.

Type G.



Type H.

Type I.



Type J.

## Technical Data

Cable length:	2 m
Output:	USB (HID/VCP)
OS compatibility:	Windows® 7/8/10 (32-bit, 64-bit)
Max. connectable devices:	20 devices

## Optional Accessories

Code No.	Description	Price
937179T	Footswitch	£46.70
06AEN846	Software USB-ITPAK with dongle	£240.00



Type A.



Type B.



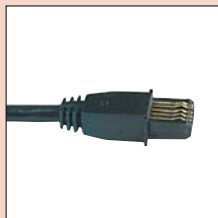
Type C.



Type D.



Type E.



Type F.



Type G.

## SERIES 06AFM – USB Input Tool Direct (Digimatic USB Cable)

- This input tool allows you to directly connect Digimatic measuring devices to a USB interface, without needing additional software.
- Measurement data is converted into keyboard codes, enabling interaction with any program working with keyboard entries.
- You can also connect to a USB with fixed COM assignment in Microsoft® Windows® as channel identification (VCP).
- The USB-ITPAK software lets you easily create Microsoft® Excel® worksheets.
- Multi-channel input for measurement values, Microsoft® Excel®.
- Cables can be cascaded via a standard USB hub.



06AFM380C

## Specifications

Code No.	Type	Water/dust-proof	Description	Price
06AFM380A	A	✓	USB Input Tool Direct Cable straight with data pushbutton (2 m) e.g. for IP67 ABSOLUTE Digimatic Caliper	£126.00
06AFM380B	B	✓	USB Input Tool Direct Cable rear mounting with data pushbutton (2 m) e.g. for IP65 Digimatic Micrometer	£126.00
06AFM380C	C	—	USB Input Tool Direct Cable straight with data pushbutton (2 m) e.g. for Standard ABSOLUTE Digimatic Caliper	£115.00
06AFM380D	D	—	USB Input Tool Direct Cable plain (2 m) e.g. for ID-H Indicator	£115.00
06AFM380E	E	—	USB Input Tool Direct Cable round (2 m) e.g. for Quick Micrometer	£115.00
06AFM380F	F	—	USB Input Tool Direct Cable straight (2 m) e.g. for ID-C Indicator	£115.00
06AFM380G	G	✓	USB Input Tool Direct Cable ID-N/ID-B (2 m)	£115.00

## Advantages of the Digimatic USB Connections

Application	Situation	Software USB-ITPAK	Data format	Remarks
Arbitrary software which expects a keyboard code	Only a USB Input tools signal cable required	Software is not needed.	Measured value as keyboard format (HID = Human Interface Device)	Footswitch cannot be connected
Commercial statistics software, such as Mitutoyo's MeasurLink	A USB input tools signal cable and the software USB ITPAK are required	For each measuring instrument (cable) a fixed assigned virtual COM-Port is generated once; afterwards Software USB IT PAK becomes inactive.	MUX-10 Specification (e.g. 01A+138.626) with fixed COM assignment as channel identification	—
Arbitrary software, which expects a keyboard code, e.g. Word, txt-format	—	- Connected measuring instruments and footswitches are selected and assigned. - Terminator is determined. - Procedure is registered as a part program	Transmission of a measured value in text format (VCP = as virtual COM port)	—
Microsoft® Excel®	—	- Connected measuring instruments and footswitches are selected and assigned. - Performs organization of the Microsoft® Excel®-table, i.e. the transferred measured values are written into the predefined cells	Measuring report Microsoft® Excel®-format and character sequence of max. 31 characters (e.g. text input)	—

# Data Management

## SERIES 264/02AZF/02AZD – U-WAVE fit Wireless Communication System

- With functions and performance inherited from U-WAVE-T, the compact and thinner design provides better fitting to an instrument and improved operability, which enables further improvement of efficiency.
- This wireless communication system transfers data directly from a Digimatic measuring instrument to a PC, thus avoiding the need for long cable runs.
- 20 metre communication distance (line of sight).
- Allows easy data export straight to Microsoft® Excel® or other applications, using the bundled data interface software.
- Data transfer is confirmed by the transmitter through a buzzer or LED.
- An IP67-rated transmitter is available.
- Up to 400,000 data transmissions with a single battery.
- USB-ITPAK V2.1 supports U-WAVE! Loading multiple measurement data into separate Excel sheets, or simultaneous measurement using the special event drive is now available without the need for macro programming yourself. (Automatic loading in a certain interval is available with a timer function.)

## U-WAVE fit

U-WAVE-TM



U-WAVE-TC



02AZF310



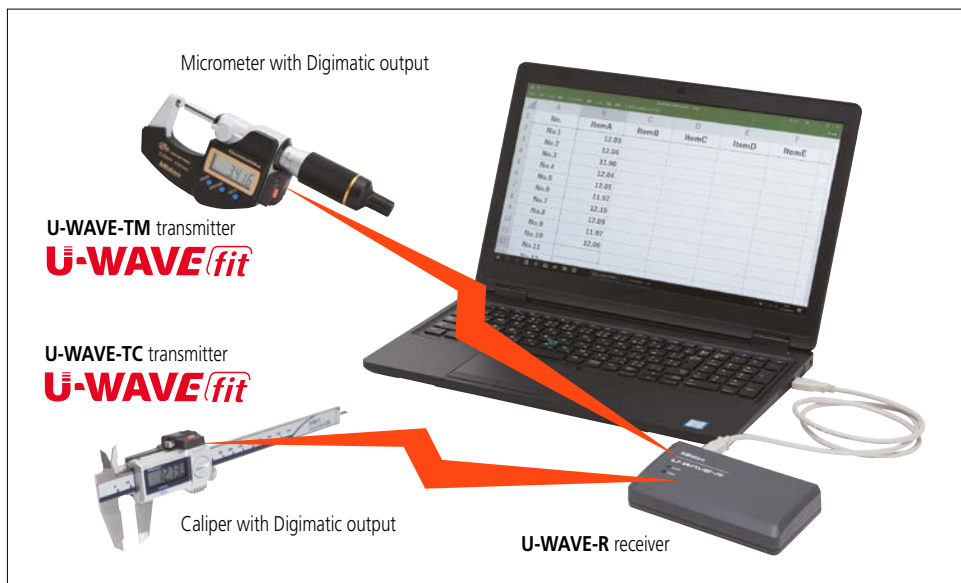
02AZF300



U-WAVE-TM transmitter fitted to a Digimatic micrometer.



U-WAVE-TC transmitter fitted to a Digimatic caliper.



U-WAVE-R receiver.

### Technical Data

Wireless communication protocol: IEEE 802.15.4  
 Modulation method: DS-SS (Direct Sequence Spread Spectrum)

### Communication

Distance: Approx. 20 m line of sight  
 Speed: 250 kbps  
 Frequency: 2.4 GHz (ISM: universal frequency band)








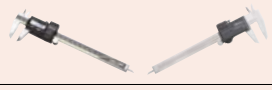



User band: 15 channels (2.405 to 2.475 GHz at intervals of 5 MHz)

### Consumable Spare

Code No.	Description	Price
055AA217	Lithium battery CR-2032	£3.80

## SERIES 264/02AZF/02AZD – U-WAVE fit Wireless Communication System

### Compatibility of Measuring Tool and Unit

Digimatic gauge	Type	U-WAVE fit		Assembled appearance (front/back)
		Connecting unit	Transmitter	
Micrometer	Standard	02AZF310 	U-WAVE-TM (buzzer type) 264-623 	
	Water/dust -proof		U-WAVE-TM (IP67 type) 264-622 	
Caliper	Standard	02AZF300 	U-WAVE-TC (buzzer type) 264-621 	
	Water/dust -proof	02AZF310 	U-WAVE-TC (IP67 type) 264-620 	

### Specifications for U-WAVE fit Transmitter

Code No.	264-620	264-621	264-622	264-623
Protection rating	IP67	—	IP67	—
Compatible measuring tool	IP67 caliper*	Standard caliper*	IP65 micrometer	Standard micrometer
Data reception indication	LED	LED and buzzer	LED	LED and buzzer
Power supply	Battery CR2032			
Battery life	Approx. 400,000 transmissions			
Dimensions (W x D x H)	41.9 x 12.9 x 38.8 mm		56 x 11.45 x 30.4 mm	
Mass	18 g			
Price	£193.00	£193.00	£193.00	£193.00

\* Compatible measuring ranges 0-150 mm, 0-200 mm, 0-300 mm.

### Specifications for U-WAVE fit Connection Unit

Code No.	02AZF300	02AZF310
Protection rating	—	IP67
Compatible transmitter	264-621	264-620/622/623
Mass	6 g	
Price	£62.00	£62.00

### Specifications for U-WAVE-R Receiver

Code No.	02AZD810D
Items included	U-WAVE-R + software
Software	U-WAVE PAK*
Number of U-WAVE-R units that can be connected to a PC	Up to 16
Number of U-WAVE fit units that can be connected	Up to 100
USB cable length	1 m
Power supply	USB bus power system
Dimensions (W x D x H)	140 x 80 x 31.6 mm
Mass	130 g
Price	£320.00

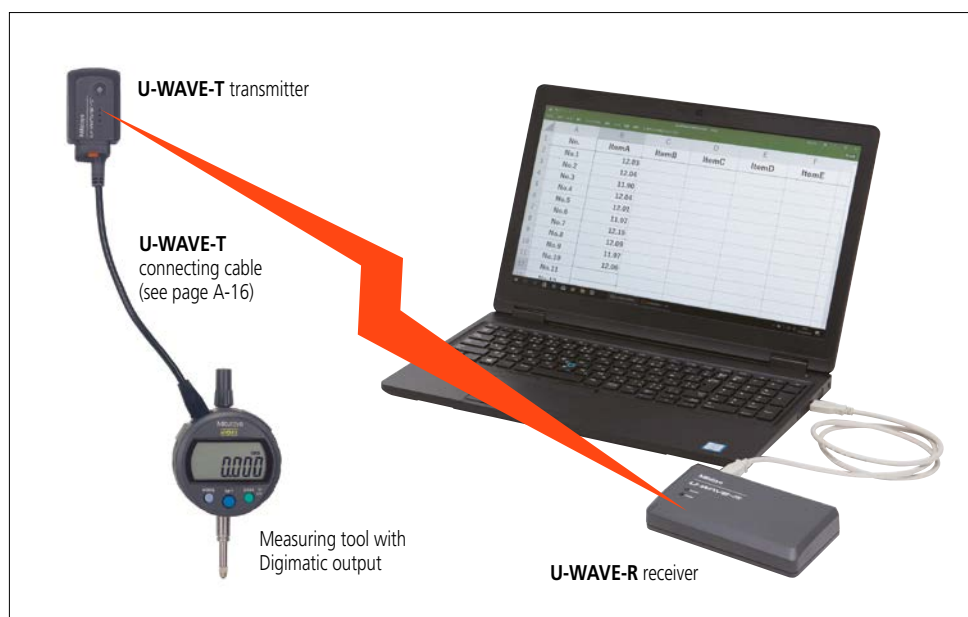
\* Optional U-WAVE PAK Event Drive software available (allows data request from the PC).



# Data Management

## SERIES 02AZD – U-WAVE-T Wireless Communication System

- This wireless communication system transfers data directly from a Digimatic measuring instrument to a PC, thus avoiding the need for long cable runs.
- 20 metre communication distance (line of sight).
- Allows easy data export straight to Microsoft® Excel® or other applications, using the bundled data interface software.
- Data transfer is confirmed by the transmitter through a buzzer or LED.
- An IP67-rated transmitter is available.
- Up to 400,000 data transmissions with a single battery.



### Specifications for U-WAVE-T Transmitter

Code No.	02AZD730G	02AZD880G
Protection rating	IP67	—
Data reception indication	LED	LED and buzzer
Power supply	Battery CR2032	
Battery life	400,000 transmissions	
Dimensions (W x D x H)	44 x 29.6 x 18.5 mm	
Mass	23 g	
U-WAVE cable included*	✓	✓
<b>Price</b>	<b>£193.00</b>	<b>£193.00</b>

\* Required cable type needs to be specified at time of purchase.

### Specifications for U-WAVE-R Receiver

Code No.	02AZD810D
Items included	U-WAVE-R + software
Software	U-WAVE PAK*
Number of U-WAVE-R units that can be connected to a PC	Up to 16
Number of U-WAVE-T units that can be connected	Up to 100
USB cable length	1 m
Power supply	USB bus power system
Dimensions (W x D x H)	140 x 80 x 31.6 mm
Mass	130 g
<b>Price</b>	<b>£320.00</b>

\* Optional U-WAVE PAK Event Drive software available (allows data request from the PC).

### Technical Data

Wireless communication protocol:	IEEE 802.15.4
Modulation method:	DS-SS (Direct Sequence Spread Spectrum)
Communication Distance:	Approx. 20 m line of sight
Speed:	250 kbps
Frequency:	2.4 GHz (ISM: universal frequency band)
User band:	15 channels (2.405 to 2.475 GHz at intervals of 5 MHz)
OS compatibility:	Windows® 7/8/10 (32-bit, 64-bit)

### Standard Accessory for U-WAVE-T

Supplied with a U-WAVE cable (required type needs to be specified at time of purchase).

### Optional Accessories

Code No.	Description	Price
<b>937179T</b>	Footswitch	<b>£46.70</b>
<b>02AZE200</b>	Holder for U-WAVE-T. Contents: support plate, fixing pads, screws	<b>£21.30</b>



### Consumable Spare

Code No.	Description	Price
<b>055AA217</b>	Lithium battery CR-2032	<b>£3.80</b>



Digimatic Indicator ID-H with 02AZD790D cable.



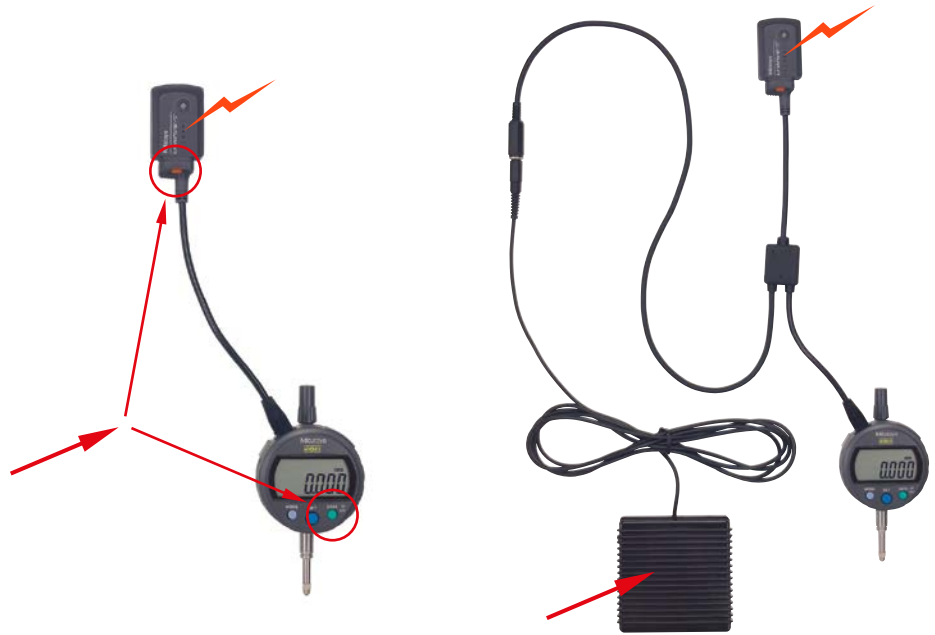
Digimatic Height Gauge with 02AZD790F cable.



ABSOLUTE Digimatic Indicator ID-N with 02AZD790G cable.

## SERIES 02AZD/02AZE – U-WAVE-T Connecting Cables

- This is a short cable that connects a measuring tool to its U-WAVE-T unit. Choose the appropriate cable for your measuring tool from the seven types below, A to G.

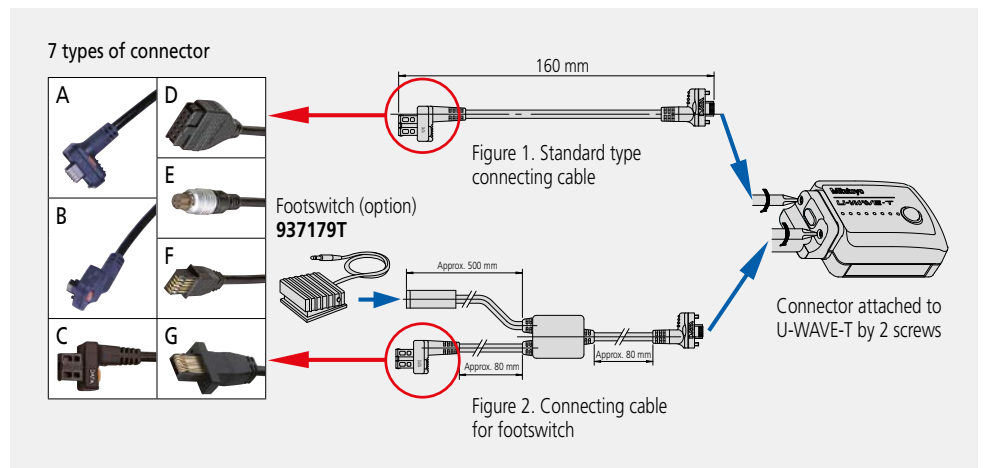


Cable without footswitch connection

Cable with footswitch connection (footswitch optional accessory)

### Specifications

Code No.	Type	Water/dust -proof	Description	Price
<b>Without footswitch connection</b>				
02AZD790A	A	✓	Data cable, straight with pushbutton	£62.00
02AZD790B	B	✓	Data cable, rear mounting with pushbutton	£62.00
02AZD790C	C	—	Data cable, straight with pushbutton	£62.00
02AZD790D	D	—	Data cable, plain	£62.00
02AZD790E	E	—	Data cable, round	£62.00
02AZD790F	F	—	Data cable, straight	£62.00
02AZD790G	G	✓	Data cable, straight	£62.00
<b>With footswitch connection</b>				
02AZE140A	A	✓	Data cable, straight with pushbutton	£142.00
02AZE140B	B	✓	Data cable, rear mounting with pushbutton	£142.00
02AZE140C	C	—	Data cable, straight with pushbutton	£127.00
02AZE140D	D	—	Data cable, plain	£127.00
02AZE140E	E	—	Data cable, round	£127.00
02AZE140F	F	—	Data cable, straight	£127.00
02AZE140G	G	✓	Data cable, straight	£127.00



# Data Management

## SERIES 264 – Digimatic Input Tools

- An input tool is an interface enabling you to easily input measurement data from a Mitutoyo gauge, equipped with the Digimatic output feature, to your PC. USB and RS-232C compatible types are available.
- This USB input tool is a keyboard Interface for transmitting data from measuring instruments equipped with Digimatic interfaces to a PC. Measurement data is converted into keyboard codes, allowing easy transfer to any program working with keyboard entries, regardless of the operating system. The USB and data conversation interfaces also allow you to directly input measurement data into a spreadsheet.
- The RS-232C communication type IT-007R allows serial communication control with a PC (data request command from PC).



264-016-10



264-007

### Specifications

Code No.	Data input	Data output	Output decimal mark	Footswitch connector	Power supply	Price
264-016-10	1 x Digimatic	USB keyboard signal (HID)	Point	Yes	5V from USB cable	£220.00
264-007		RS-232C			12V from PC bus	£320.00

### Technical Data

Cable length: 0.9 m  
 Dimensions (WxDxH): 72 x 44 x 23.5 mm  
 OS compatibility: Windows® 7/8/10 (32-bit, 64-bit)

### Optional Accessory

Code No.	Description	Price
937179T	Footswitch	£46.70





## Technical Data

Data output:	Via RS-232C interface / USB
Default Configuration	
Data length:	8 bits
Start bit:	1 bit
Stop bit:	1 bit
Parity check:	None
Baud rate:	9600

## Optional Accessory

Code No.	Description	Price
264-000-271	Footswitch	£95.00

## SERIES 264 – Digimatic Multiplexers

- Digimatic Multiplexers are used to concentrate streams of measurement data from several instruments into a single stream feeding into a dedicated processor or PC for storage and processing.
- Models are available for handling 4 or 8 inputs (it is possible to obtain more inputs by linking multiple units together).
- Supplied with RS-232C and USB cables.



64AAB387



64AAB386



## Specifications

Code No.	Type	Data output	Number of input channels	Price
64AAB387	MIG-4USB	RS-232C and USB	4	£690.00
64AAB386	MIG-8USB		8	£1090.00

# Data Management

## SERIES 542 – EC Counter, Low-Cost Modular Display Unit

- A Display Unit of the single-function type for connection to Digimatic measuring instruments.
- Employs DIN size (96 x 48 mm) panel-mount configuration to facilitate system integration.
- Able to produce tolerance judgement and Digimatic measurement data output.



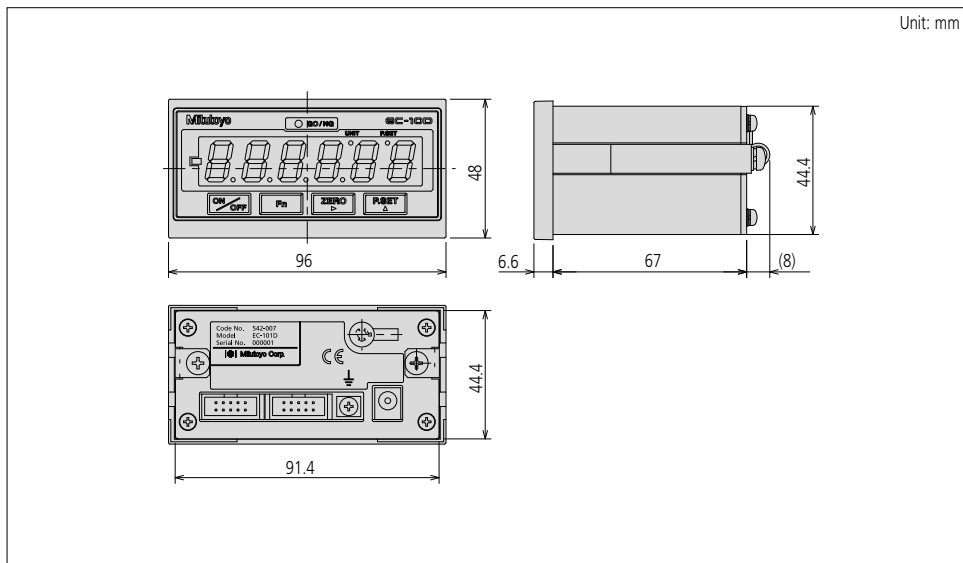
542-007E



### Specifications

<b>Code No.</b>	<b>542-007E</b>
Applicable input	Digimatic code (SPC)
Number of gauge inputs	1
Resolution	0.01, 0.001 mm (automatically set depending on the gauge)
Display	6-digit and a negative [-] sign LED (amber, green, red)
<b>Price</b>	<b>£280.00</b>

### Dimensions



### Technical Data

Functions: Preset, GO/±NG judgement  
 Output (selectable)  
 Tolerance judgement: -NG, OK, +NG (open collector)  
 Data: Digimatic code  
 External control signal  
 input: Preset, data hold  
 Power supply: Via AC adapter

### Optional Accessories

Code No.	Description	Price
<b>214938</b>	DC plug PJ-2	<b>£4.80</b>
<b>C162-155</b>	I/O cable	<b>£46.40</b>



## Technical Data

Communications interface:	USB 2.0 compatible
Power supply:	Internal Li-ion 3.6 V battery
Battery charging:	Via USB port
Charge time:	8 hours
Data retention:	Indefinite (EEPROM)

## Required Accessory

Code No.	Description	Price
264-000-277	USB hardware dongle	£483.00



USB data output to PC (top) and Digimatic data input from measuring tool (bottom).

## SERIES 264 – DigiStore Remote Data Collection Device

- Reads and stores measurement data from a Mitutoyo Digimatic instrument for subsequent processing.
- Ideal for collecting measurement data at a remote location.
- Robust construction and very compact, easily fits in a pocket.
- Easy upload of data to a Windows-based PC via USB and the DigiStore PC software.\*
- Simple operator interface.
- Long-term data retention (non-volatile).
- Battery powered — recharges via USB connection.
- Extra DigiStores can be used with one PC.
- Extra Dongles allow one DigiStore to be shared by more than one PC, or a number of DigiStores to be shared by a number of PCs (one Dongle required per PC).

\* USB hardware dongle (264-000-277) is required.



264-000-272

## Specifications

Code No.	264-000-272	
Interface to measuring device	Mitutoyo Digimatic	
Storage capacity	More than 1000 measurements (including timestamp)	
Timestamp	Measurement date/timestamp uses internal real-time clock	
Recording	Pushbutton initiated on DigiStore or via a programmable interval	
Uploading	Via the DigiStore PC data collection software (in Dongle) that outputs data directly to a PC running Mitutoyo's MeasurLink, or as a CSV file.	
Indicators (LED)	When connected to a Digimatic measuring instrument	Green: measurement taken and stored Red: reading not taken, memory nearly full
	When connected to a PC	Green: battery is charging Red: data transfer in progress
Price	£495.00	

# Data Management

## SERIES 264 – DP-1VA LOGGER Digimatic Mini-Processor

- In addition to the conventional (DP-1VR) printing and statistical calculation functions, data logging and USB output functions are added and enhanced.
- Mitutoyo's DP-1VA LOGGER is so compact it fits right in your palm. But with this powerful little device you can print data from calipers, micrometers and any other measuring devices equipped with a Digimatic port, and even perform statistical evaluations.
- The versatile DP-1VA LOGGER printer not only prints measurement data but performs a variety of statistical analyses, draws histograms and D-charts and also performs complex operations on X-bar R control charts.
- The data logger function allows storage of up to 1,000 pieces of data in memory and batch transfer of stored data to an Excel-format inspection certificate, etc., by connecting to a PC via a USB cable.
- Easy printing function. The print speed is excellent from a one-touch start and with the built-in thermal printer there's almost no noise.
- The thermosensitive paper has outstanding durability and chemical resistance for long-term storage and excellent readability due to large character print.
- Clock function for loading measurement data.
- Processing capacity for up to 9,999 data groups.

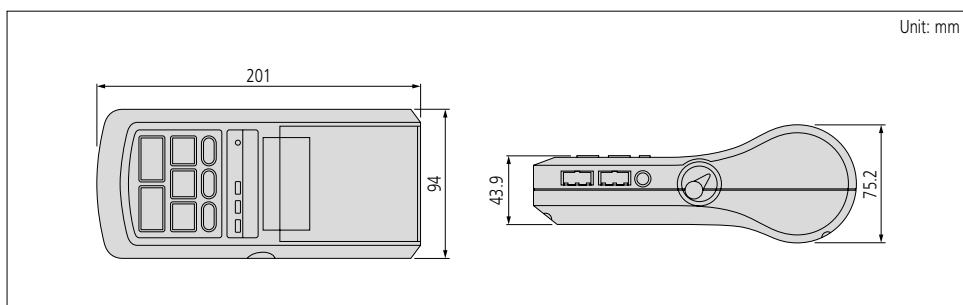


264-505E

### Specifications

<b>Code No.</b>	<b>264-505E</b>	
Printer type	Thermal line printer	
Printing method	384 dot (8 dot / mm)	
Print speed	6.5 mm/s (using AC adapter)	
Processing capacity	Modes 1/2/3	9,999 data subgroups
	Mode 0	100,000 data subgroups
Output function	RS-232C or GO/±NG judgement	
Input timer	0.25 s; 1 s; 5 s; 30 s; 1 min; 30 min; 60 min (0.25 s only statistical function)	
Mass	390g	
<b>Price</b>	<b>£406.00</b>	

### Dimensions



### Technical Data

Printing paper:	48 m per roll
Capacity:	ca. 6,500 lines for large characters, 12,000 lines for normal characters
Printable data:	Measurement data, GO/±NG judgement, number of data, maximum/minimum value, range, average, standard deviation, number of defective, fraction defective, process capability index, histogram, D-chart, control chart generation for Xd-bar and control limit data, date and time
Power:	AC adapter, Battery LR6 x 4 (alkaline), NiMH (rechargeable, battery is not charged in the device)

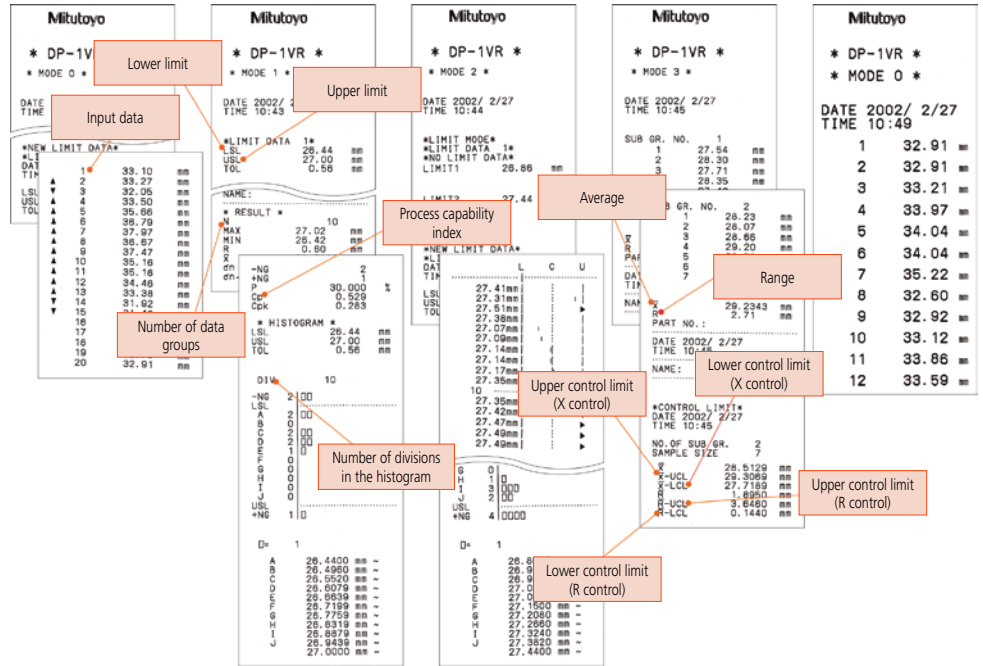


## Optional Accessories

Code No.	Description	Price
937179T	Footswitch	£46.70
965516	GO±NG cable	£79.00
09EAA084	RS-232C signal cable 1 m (9 pin) for connecting DP-1VA to a PC	£208.00

## Consumable Spare

Code No.	Description	Price
09EAA069D	Printer paper (1 roll)	£9.70



## Key Functions

PRINTER	Mode 0	Mode 1, 2	Mode 3	
			Subgroup in measurement	Subgroup after measurement
CL	Only measurement data clear. Press before setting limit		Re-entering from data No. 1	Only clear measurement data
CE	Cancel the previous measurement data		Cancel previous measurement data	Cancel previous subgroup
TOL. LIMIT	Press before entering or finish the upper/lower measurement mode. Cancel measurement mode.		Exit the measurement	Go to next subgroup measurement
STAT	Do not operate	Making histogram to printout the calculation result via statistical analysis.	Finish the subgroup measurement and print out the X-R calculation result.	Print out and calculate the control limit value from each subgroup to complete.
FEED	Printer paper is fed when this key is pressed			
DATA	Enter data via measuring devices			
PRINTER	Controls the printer's ON/OFF status			
POWER	Power ON/OFF			

# MICROMETERS MICROMETER HEADS

B



# B

## Micrometers Micrometer Heads

### Micrometers



### Micrometer Heads



### Contents

#### Micrometers

High Accuracy Micrometer	B-03
QuantuMike Fast Action Micrometer	B-05
Micrometers	B-07
Quickmike Micrometer	B-11
Adjustable Measuring Force Micrometer	B-12
Ratchet Thimble Micrometer	B-13
Economy Micrometers	B-14
Mechanical Counter Micrometer	B-17
Non-Rotating Spindle Micrometer	B-18
Interchangeable Anvil Micrometers	B-19
Anvil Extension Collar Micrometers	B-22
Caliper Anvil Micrometers	B-25
Interchangeable Anvil Universal Micrometer	B-27
Screw Thread Micrometer	B-28
Interchangeable Anvil Screw Thread Micrometers	B-29
Three-Wire Units	B-31
Paper Thickness Micrometer	B-32
Disc Micrometers	B-33
Interchangeable Anvil Gear Tooth Micrometers	B-35
Non-Rotating Spindle Disc Micrometers	B-37
Sheet Metal Micrometers	B-39
Tube Micrometers	B-41
Spline Micrometers	B-44
Point Micrometers	B-46
V-Anvil Micrometers	B-48
Blade Micrometers	B-51
Can Seam Micrometers	B-53
Hub/Wire Micrometers	B-54
Crimp Height Micrometers	B-55
Uni-Mike Interchangeable Anvil Micrometers	B-56
Indicating Micrometer	B-57
Dial Snap Meter	B-58
Groove Micrometers	B-59
Quick-Mini	B-61
Small Hole Gauge Set	B-62
Telescoping Gauge Set	B-63
Optional Accessories	B-64

#### Micrometer Heads

Selection Guide	B-71
Rotatable Display Micrometer Head	B-72
Micrometer Head	B-73
Differential Screw Micrometer Head	B-74
Small Micrometer Heads	B-75
Adjustable Thimble Small Standard Micrometer Head	B-78
Locking Screw Micrometer Head	B-79
Carbide Tipped Spindle Micrometer Heads	B-80
ø8 mm Spindle Medium Standard Micrometer Head	B-82
Large Diameter Thimble Micrometer Head	B-83
XY-Stage Micrometer Head	B-84
Non-Rotating Spindle Micrometer Head	B-85
Large Diameter Thimble High Accuracy Micrometer Head	B-86
Large Diameter Thimble Non-Rotating Micrometer Head	B-87
Micro Jack	B-88

# Micrometers

## SERIES 293 – ABSOLUTE Digimatic High-Accuracy Micrometer

- A world-leading 0.1 µm resolution makes this micrometer ideal for customers who need to make highly accurate measurements with a hand-held tool.
- The High-Accuracy Digimatic Micrometer utilizes Mitutoyo's innovative 0.1 µm resolution ABS (absolute) rotary sensor\*1 and high-accuracy screw machining technology to reduce the instrumental error to ±0.5 µm, delivering higher accuracy without sacrificing operability.
- A highly rigid frame and high-performance constant-force mechanism\*1 enable more stable measurement, while the clicks emitted while the workpiece is being measured assure the operator that measurement is proceeding normally.
- Transfer of body heat to the instrument is reduced by a (removable) heat shield, minimizing error caused by thermal expansion of the frame when performing handheld measurements.
- The ABS sensor also eliminates the need to perform origin setting each time the power is turned on, letting you start measuring straight away. With no possibility of overspeed errors, this micrometer also delivers a higher level of reliability.
- A range of features enables flexible measurement, including switchable resolution (0.0001/0.0005 mm), function lock and preset.

\*1 Patent pending in Japan, the United States of America, the European Union, and China.

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Data Management Software by Mitutoyo

**ABSOLUTE**



293-130-10

### Specifications

Code No.	Range	Resolution	Accuracy*2	Measuring surface	Mass	Price
293-130-10	0 - 1" (0 - 25.4 mm)	.000005" / .00002" (0.0001 / 0.0005 mm) switchable	±.00002" (±0.5 µm)	ø3.2 mm	400 g	£1570.00

\*2 Excluding quantizing error.

### Technical Data

Measuring force:	7 to 9 N
Power supply:	Lithium battery (CR2032) x 1
Battery life:	Approx. two years when used under normal conditions

### Functions

**Preset** (ABS measurement system):

The measurement origin can be preset to any value within the display range for convenience in measuring.

**Zero-setting** (INC measurement system):

The display can be zeroed at any position of the spindle, making comparison measurement easier. Returning to the absolute-measurement mode is easily accomplished.

**Hold:**

Pressing the HOLD button freezes the current value in the display. This function is useful for preserving a measurement in situations of poor visibility when the instrument must be moved away from the workpiece before the reading can be recorded.

**Resolution switching:**

The resolution of the display can be switched. If 0.1 µm measurement is not required, the resolution can be switched to 0.5 µm.

**Function lock:**

Functions such as preset or zero-set can be locked to avoid inadvertently changing the origin position.

**On/off:**

The power can be turned off after measurement is complete. Even after the power is turned off, the origin or last zero-set position remains in the memory.

**Auto power off:**

Even if the power is left on, the power turns off automatically if the micrometer is not used within a 20-minute period.

**Measurement data output:**

Measurement data can be output, allowing easy incorporation of this instrument into a statistical process control or measurement system.

**Error alarm:**

In the unlikely event of a display overflow or calculation error, an error message is displayed and measurement stops. Measurement cannot continue until the error is corrected. Also, if the battery voltage drops below a certain point, the battery indicator will turn on before measurement becomes impossible, warning the user that the battery needs to be replaced.



Function lock (circled red).



## Standard Accessories

- 04AAB969B:** Heat shield
- CR2032:** Lithium battery
- 200877:** Spanner
- 04AAB985:** Screwdriver
- Lens paper (for the display)
- Inspection certificate



Heat shield (Patent pending in Japan, the United States of America, the European Union, and China).

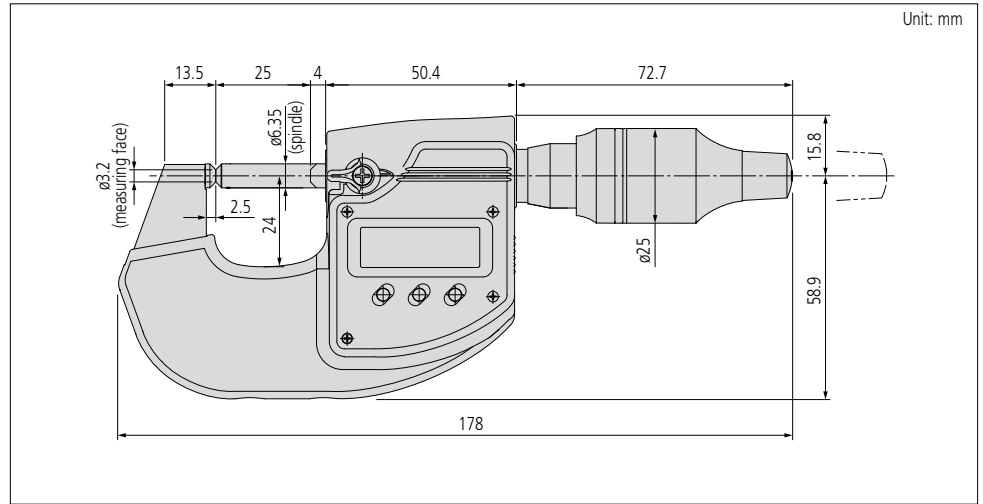


With heat shield attached.

## Optional Accessories

Code No.	Description	Price
<b>02AZD730G</b>	U-WAVE-T transmitter	<b>£193.00</b>
<b>02AZD790B</b>	U-WAVE-T data cable (160 mm)	<b>£62.00</b>
<b>02AZE140B</b>	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	<b>£142.00</b>
<b>05CZA662</b>	SPC data cable with pushbutton (1 m)	<b>£69.40</b>
<b>05CZA663</b>	SPC data cable with pushbutton (2 m)	<b>£83.50</b>
<b>06AFM380B</b>	USB input tool direct USB-ITN-B (2 m)	<b>£126.00</b>

## Dimensions

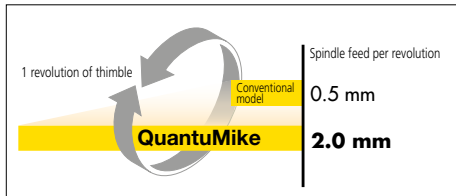


B

# Micrometers

## SERIES 293 – QuantuMike Fast Action Waterproof Digimatic Micrometer

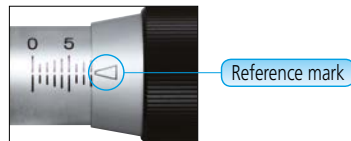
- Advanced pioneering technology has created the next generation of micrometer, the most revolutionary advance in micrometer technology since James Watt invented the instrument.
- Faster measurement is achieved by using a coarser thread which feeds the spindle by 2 mm per revolution of the thimble. This increase in thread lead has been made possible thanks to new high precision thread-cutting and testing techniques.



- QuantuMike is equipped with a function lock feature to prevent the origin point being moved by mistake during measurement.



- A graduated scale is provided on the sleeve for use with a reference mark on the thimble so that every millimetre displacement can be checked to provide extra confidence.



- Those models that provide data output allow easy incorporation of this instrument into a statistical process control or measurement system.
- There is a choice of convenient Interface Input Tools which enable the conversion of measurement data to keyboard signals for direct input to cells in off-the-shelf spreadsheet software such as Excel.
- Excellent resistance against oil, water and dust (IP65 protection level) enables this product to be used in machining situations that include splashing coolant fluid.
- Measuring faces: carbide.

MeasurLink<sup>®</sup> ENABLED  
Data Management Software by Mitutoyo

IP65

TUV Rheinland  
CERTIFIED  
www.tuv.com  
ID 1419032586



### Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy*1	Flatness	Parallelism	Price
With SPC data output						
293-180-30	0-1" (0-25.4 mm)	.00005" (0.001 mm)	±.00005" (±1 μm)	.000012" (0.3 μm)	.00004" (1 μm)	£295.00
293-181-30	1-2" (25.4-50.8 mm)				£315.00	
293-182-30	2-3" (50.8-76.2 mm)				.00008" (2 μm)	£354.00
293-183-30	3-4" (76.2-101.6 mm)				£393.00	
Without SPC data output						
293-185-30	0-1" (0-25.4 mm)	.00005" (0.001 mm)	±.00005" (±1 μm)	.000012" (0.3 μm)	.00004" (1 μm)	£198.00
293-186-30	1-2" (25.4-50.8 mm)				£248.00	
293-187-30	2-3" (50.8-76.2 mm)				.00008" (2 μm)	£289.00
293-188-30	3-4" (76.2-101.6 mm)				£317.00	

\*1 Excluding quantizing error.

### Technical Data

Dust/Water protection level:	IP65 (IEC60529)*2
Measuring force:	7 to 12 N
Length standard:	Electromagnetic rotary sensor
Battery life:	Approx. 1.2 years under normal use
Standard accessories:	Setting standard 1 pc (except for 0-1" models) Button type silver oxide battery (SR44, <b>938882</b> ), 1 pc Spanner ( <b>301336</b> ), 1 pc

\*2 Anti-corrosion treatment is required after use.

### Functions

**Origin point setting** (ABS measurement system):  
Pressing the ORIGIN button resets the ABS origin at the current spindle position.

**Zero setting** (INC measurement system):  
A brief press on the ZERO/ABS button sets display to zero at the current spindle position and switches to the incremental (INC) measuring mode. A longer press resets to the ABS measuring mode.

**Hold:**  
Pressing the HOLD button freezes the current value in the display. This function is useful for preserving a measurement in situations of poor visibility when the instrument must be moved away from the workpiece before the reading can be recorded.

**Function lock:**  
This function allows the ORIGIN (origin point setting) function and the ZERO (zero setting) function to be locked to prevent these points being reset accidentally.

**Auto power ON/OFF:**  
The reading on the LCD disappears after this instrument is idle for approx. 20 minutes, but the origin point is retained. Turning the spindle causes the reading to reappear.

**Data output:**  
Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

**Error alarm:**  
In the unlikely event of a display overflow or calculation error, an error message is displayed and measurement stops. Measurement cannot continue until the error is corrected. Also, if the battery voltage drops below a certain point, the battery indicator will turn on before measurement becomes impossible, warning the user that the battery needs to be replaced.



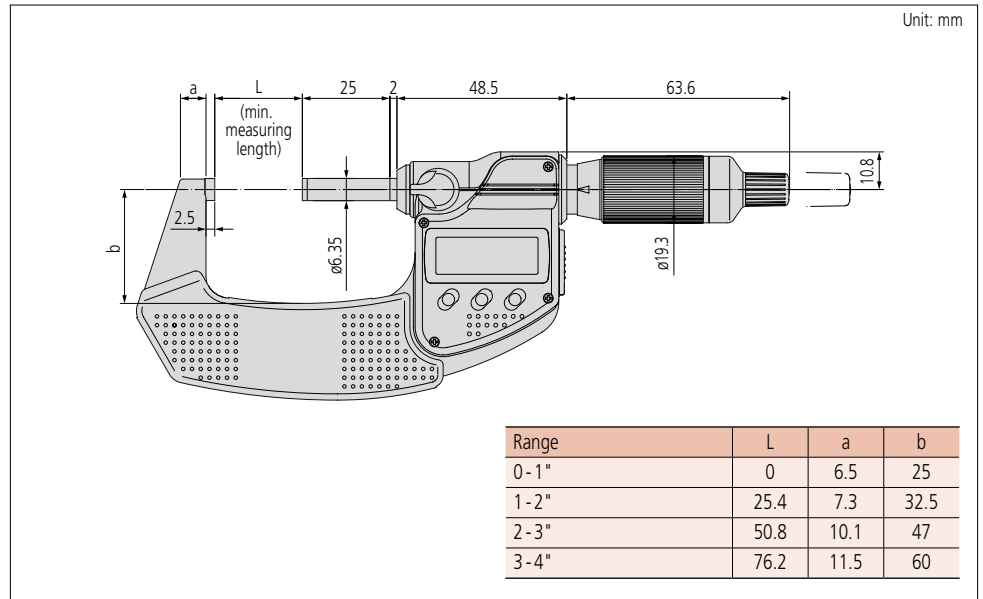
## Optional Accessories\*1

Code No.	Description	Price
264-622	U-WAVE-TM transmitter	£193.00
02AZF310	U-WAVE-TM connection unit	£62.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB input tool direct USB-ITN-B (2 m)	£126.00

\*1 Only for models with data output function.



## Dimensions



## Patented ratchet thimble mechanism\*2

The patented ratchet thimble mechanism helps ensure repeatable results by transmitting micro-vibrations along the spindle to the contact face to provide a constant measuring force and encourage good contact with the workpiece. The ratchet works from the thimble as well as the speeder so it is always easy to use – even when making measurements one handed. The sound of the ratchet provides the user with a sense of confidence and the speeder enables the rapid spindle feed needed when measuring widely different dimensions.

\*2 Patent registered (Japan, USA, China, Germany, UK and France).



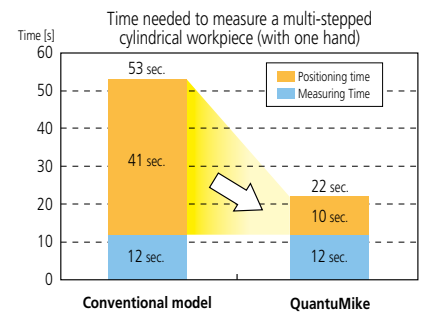
Ratchet-induced micro-vibrations along the spindle help ensure repeatable measurements.

## Measuring time on a multi-stepped workpiece with one hand



Thanks to the quick movement, positioning times are reduced by around 75%\*3 resulting in a reduction in measuring cycle times of about 60%\*3 compared with a conventional micrometer.

\*3 According to Mitutoyo's comparison test data for measuring time on typical workpieces.



# Micrometers

## SERIES 293 – IP65 Digimatic Micrometer

- Based on new waterproof structural technology, this micrometer provides IP65 protection levels, enabling use in environments that include cutting oil or coolant.\*<sup>1</sup>
- $\pm 1 \mu\text{m}$  instrumental error (75 mm/3" or less measuring range models).
- Measuring data output function is available with a water-resistant data cable to maintain the IP65 protection level.
- Oil-resistant materials are used in all plastic components.
- Auto power ON/OFF function.
- Further-Increased operability thanks to easy-to-read LCD with 30% more character area.
- Models equipped with a Digimatic output port can form part of a statistical process control or networked measurement system.
- Interface Input Tools are available that enable the conversion of measurement data to keyboard signals that are then directly input to cells in off-the-shelf spreadsheet software such as Excel.
- Two types of constant-force devices are available: Ratchet Stop and Ratchet Thimble.
- Measuring faces: carbide.

\*<sup>1</sup> Anti-corrosion treatment is required after use.

**MeasurLink** ENABLED  
Data Management Software by Mitutoyo



293-230-30



293-334-30



### Technical Data

Flatness:	.000012" / 0.3 $\mu\text{m}$
Dust/water protection level:	IP65 (IEC60529) * <sup>2</sup>
Measuring force:	5 to 10N
Battery life:	Approx. 1.2 years under normal use
Standard accessories:	Setting standard, 1 pc (except for 0-25 mm (0-1") models) Button type silver oxide battery (SR44, <b>938882</b> ), 1 pc Spanner ( <b>301336</b> ), 1 pc

\*<sup>2</sup> Anti-corrosion treatment is required after use.

### Functions

**Origin point setting** (ABS measurement system):  
Resets the ABS origin at the current spindle position to the minimum value of the measuring range and switches to ABS mode.

**Zero setting** (INC measurement system):  
A brief press on the ZERO/ABS button sets display to zero at the current spindle position and switches to the incremental (INC) measuring mode. A longer press resets to the ABS measuring mode.

**Hold:**  
Pressing the HOLD button freezes the current value in the display. This function is useful for preserving a measurement in situations of poor visibility where the instrument must be moved away from the workpiece before the reading can be recorded.

**Data output:**  
Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

**Auto power ON/OFF:**  
The reading on the LCD disappears after this instrument is idle for about 20 minutes, but the reading and measurement mode are retained. Turning the spindle causes the reading to reappear.

**Error alarm:**  
In the unlikely event of a display overflow or calculation error, an error message is displayed and measurement stops. Measurement cannot continue until the error is corrected. Also, if the battery voltage drops below a certain point, the battery indicator will turn on before measurement becomes impossible, warning the user that the battery needs to be replaced.

**Function lock**\*<sup>3</sup>:  
This function allows the ORIGIN (origin point setting) function and the ZERO (zero-setting) function to be locked to prevent these points being reset accidentally.

\*<sup>3</sup> All-digit preset type only.



293-354-30

### Optional Accessories\*1

Code No.	Description	Price
264-622	U-WAVE-TM transmitter	£193.00
02AZF310	U-WAVE-TM connection unit	£62.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB input tool direct USB-ITN-B (2 m)	£126.00

\*1 Only for models with data output function.



Range	L	a	b	c
0-1"	0	2.8	9	25
1-2"	25.4	2.8	9.8	32
2-3"	50.8	2.8	12.6	47
3-4"	76.2	2.8	14	60
4-5"	101.6	5.3	16.7	76
5-6"	127.0	5.7	18.8	90
6-7"	152.4	6.1	19.1	102
7-8"	177.8	6.3	18.2	115
8-9"	203.2	6.7	16.8	127
9-10"	228.6	5.5	18	139
10-11"	254.0	6.5	18	152
11-12"	279.4	6.5	18	166

### Specifications

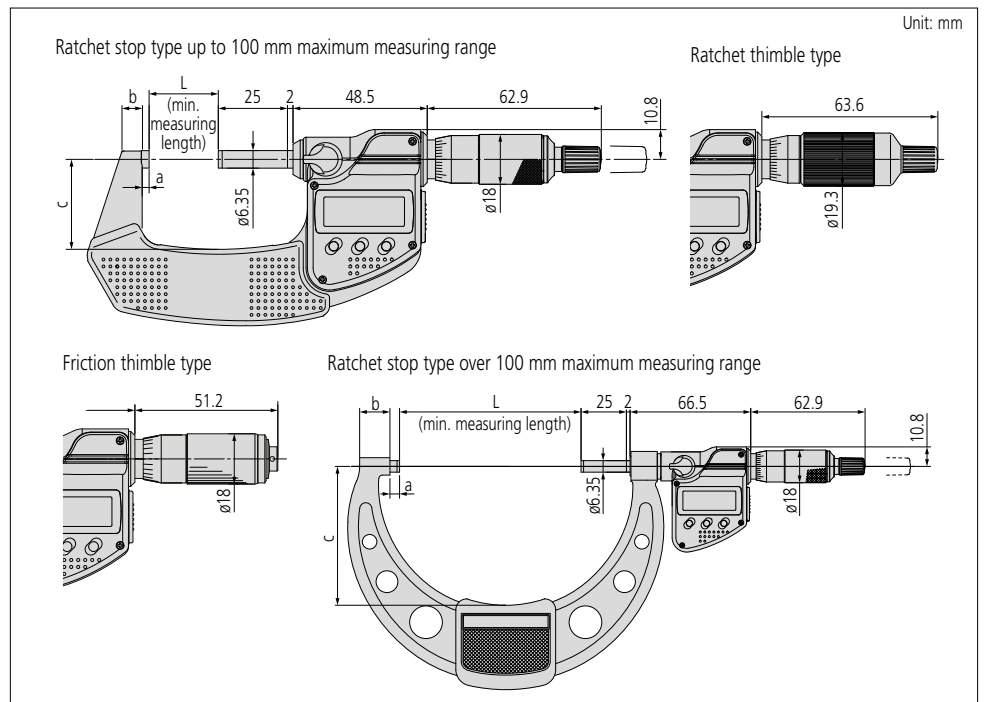
Metric							
Code No.	Range	Resolution	Accuracy*2	Parallelism	Constant-force device	Mass	Price
With SPC data output							
293-230-30	0-25 mm	0.001 mm	±1 µm	1 µm	Ratchet stop	270 g	£246.00
293-231-30	25-50 mm					330 g	£261.00
293-232-30	50-75 mm			470 g		£298.00	
293-233-30	75-100 mm		±2 µm	2 µm		625 g	£322.00

Inch/Metric							
Code No.	Range	Resolution	Accuracy*2	Parallelism	Constant-force device	Mass	Price
With SPC data output							
293-330-30	0-1" (0-25.4 mm)	.00005" (0.001 mm)	±.00005" (±1 µm)	.00004" (1 µm)	Ratchet stop	270 g	£246.00
293-331-30	1-2" (25.4-50.8 mm)			.00008" (2 µm)		330 g	£261.00
293-332-30	2-3" (50.8-76.2 mm)			.00012" (3 µm)		470 g	£298.00
293-333-30	3-4" (76.2-101.6 mm)		±.0001" (±2 µm)	.00012" (3 µm)		625 g	£322.00
293-350-30	4-5" (101.6-127.0 mm)	.0001" (0.001 mm)	±.00015" (±3 µm)	.00016" (4 µm)	Ratchet stop	600 g	£493.00
293-351-30	5-6" (127.0-152.4 mm)					740 g	£499.00
293-352-30	6-7" (152.4-177.8 mm)					800 g	£510.00
293-353-30	7-8" (177.8-203.2 mm)			970 g		£522.00	
293-354-30	8-9" (203.2-228.6 mm)			1100 g		£534.00	
293-355-30	9-10" (228.6-254.0 mm)			1270 g		£545.00	
293-356-30	10-11" (254.0-279.4 mm)		±.0002" (±4 µm)	.0002" (5 µm)		1340 g	£558.00
293-357-30	11-12" (279.4-304.8 mm)					1540 g	£595.00
293-334-30	0-1" (0-25.4 mm)		±.00005" (±1 µm)	.00004" (1 µm)	Ratchet thimble	275 g	£246.00
293-335-30	0-1" (0-25.4 mm)	.00005" (0.001 mm)			Friction thimble	275 g	£260.00
293-336-30	1-2" (25.4-50.8 mm)					335 g	£295.00

Without SPC data output							
Code No.	Range	Resolution	Accuracy*2	Parallelism	Constant-force device	Mass	Price
293-340-30	0-1" (0-25.4 mm)	.00005" (0.001 mm)	±.00005" (±1 µm)	.00004" (1 µm)	Ratchet stop	270 g	£186.00
293-341-30	1-2" (25.4-50.8 mm)					.00008" (2 µm)	330 g
293-342-30	2-3" (50.8-76.2 mm)			.00012" (3 µm)		470 g	£273.00
293-343-30	3-4" (76.2-101.6 mm)		±.0001" (±2 µm)	.00004" (1 µm)		625 g	£307.00
293-344-30	0-1" (0-25.4 mm)		±.00005" (±1 µm)	.00004" (1 µm)	Ratchet thimble	275 g	£196.00
293-345-30	1-2" (25.4-50.8 mm)			.00008" (2 µm)		335 g	£232.00
293-346-30	2-3" (50.8-76.2 mm)					475 g	£273.00
293-347-30	3-4" (76.2-101.6 mm)		±.0001" (±2 µm)			639 g	£307.00
293-348-30	0-1" (0-25.4 mm)		±.00005" (±1 µm)	.00004" (1 µm)	Friction thimble	275 g	£198.00

\*2 Excluding quantizing error.  
Note: All-Digit preset type – models over 125 mm (5") measuring range.

### Dimensions



# Micrometers

## SERIES 293 – Digimatic Micrometer

- Easily integrated into a statistical process control or networked measurement system.
- Constant-force device: ratchet stop.
- Interface Input Tools are available that enable the conversion of measurement data to keyboard signals that are then directly input to cells in off-the-shelf spreadsheet software such as Excel.
- Measuring faces: carbide.

**MeasurLink<sup>®</sup> ENABLED**  
Data Management Software by Mitutoyo



293-782

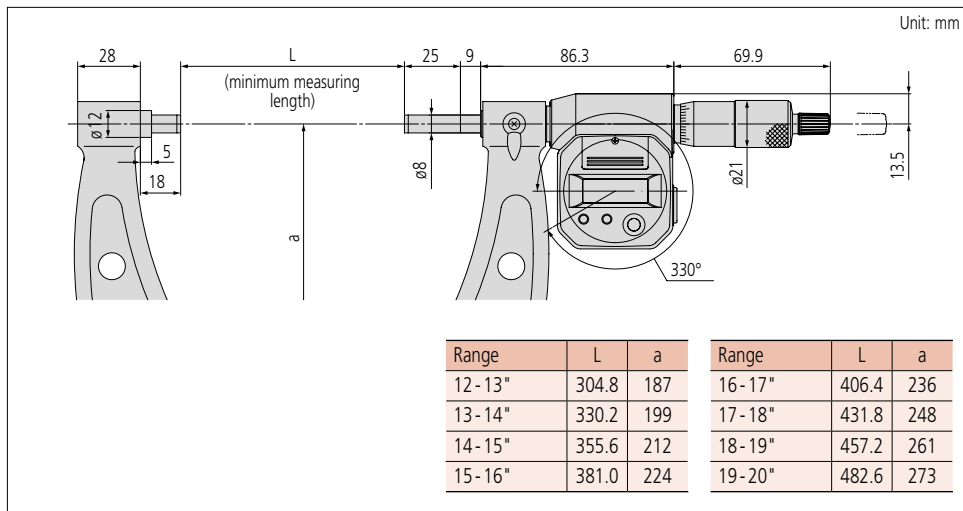
### Specifications

Inch/Metric

Code No.	Range	Accuracy*1	Flatness	Parallelism	Price
293-782	12 - 13" (304.8 - 330.2 mm)	±.0003" (±6 μm)	.000024" (0.6 μm)	.0002" (5 μm)	£711.00
293-783	13 - 14" (330.2 - 355.6 mm)				£714.00
293-784	14 - 15" (355.6 - 381.0 mm)	±.00035" (±7 μm)		.00024" (6 μm)	£730.00
293-785	15 - 16" (381.0 - 406.4 mm)				£738.00
293-786	16 - 17" (406.4 - 431.8 mm)	±.0004" (±8 μm)		.00028" (7 μm)	£748.00
293-787	17 - 18" (431.8 - 457.2 mm)				£764.00
293-788	18 - 19" (457.2 - 482.6 mm)	±.0004" (±8 μm)		.00028" (7 μm)	£777.00
293-789	19 - 20" (482.6 - 508.0 mm)				£782.00

\*1 Excluding quantizing error.

### Dimensions



### Technical Data

Resolution:	.0001" (0.001 mm)
Measuring force:	10 to 15 N
Battery:	SR44 (2 pcs) <b>938882</b>
Battery life:	Approx. 1.8 years under normal use

### Functions

**Origin point setting** (ABS measurement system):  
Resets the ABS origin at the current spindle position to the minimum value of the measuring range and switches to ABS mode.

**Zero setting** (INC measurement system):  
A brief press on the ZERO/ABS button sets display to zero at the current spindle position and switches to the incremental (INC) measuring mode. A longer press resets to the ABS measuring mode.

**Hold:**  
Pressing the HOLD button freezes the current value in the display. This function is useful for preserving a measurement in situations of poor visibility where the instrument must be moved away from the workpiece before the reading can be recorded.

**Function lock:**  
This function allows the ORIGIN (origin point setting) function and the ZERO (zero-setting) function to be locked to prevent these resets being reset accidentally.

**Auto power ON/OFF:**  
The reading on the LCD disappears after this instrument is idle for about 20 minutes, but the reading and measurement mode are retained. Turning the spindle causes the reading to reappear.

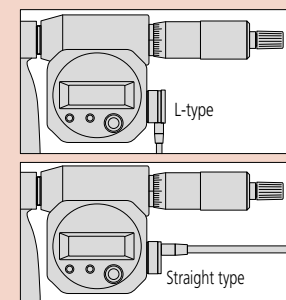
**Data output:**  
Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

**Error alarm:**  
In the unlikely event of a display overflow or calculation error, an error message is displayed and measurement stops. Measurement cannot continue until the error is corrected. Also, if the battery voltage drops below a certain point, the battery indicator will turn on before measurement becomes impossible, warning the user that the battery needs to be replaced.

### Optional Accessories

Code No.	Description	Price
959149	SPC data cable with pushbutton*2 (1 m)	£35.70
959150	SPC data cable with pushbutton*2 (2 m)	£40.60
02AZD790E	U-WAVE-T data cable (160 mm)	£62.00
04AZB512	SPC data cable L-type with pushbutton (1 m)	£67.20
04AZB513	SPC data cable L-type with pushbutton (2 m)	£71.70

\*2 May interfere with operating the thimble.



## Technical Data

Measuring force: 5 to 10N  
 Battery: SR44 (1 pc) **938882**  
 Battery life: Approx. 2.4 years under normal use

## Functions

### Zero setting:

A brief press on the ORIGIN button sets display to zero at the current spindle position (zero-setting), which allows easy comparison measurement.

### Auto power ON/OFF:

The reading on the LCD disappears after this instrument is idle for about 20 minutes, but the reading is retained. Turning the spindle causes the reading to reappear.

## SERIES 293 – Digital Micrometer

- Simple design, such as not incorporating data output, achieves low cost.
- Provided only with an origin-set button for easy origin setting.
- Increased operability thanks to easy-to-read LCD with 30% more character display area than previous model.
- Equipped with Ratchet Stop for constant measuring force.
- Measuring faces: carbide.



293-821-30



293-832-30

## Specifications

### Metric

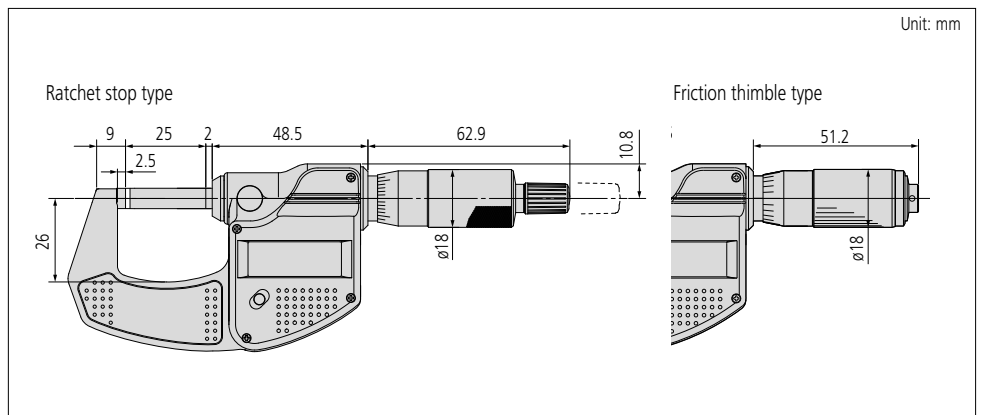
Code No.	Range	Resolution	Accuracy*	Constant-force device	Price
293-821-30	0-25 mm	0.001 mm	±2 μm	Ratchet stop	£145.00

### Inch/Metric

Code No.	Range	Resolution	Accuracy*	Constant-force device	Price
293-831-30	0-1" (0-25.4 mm)	.00005" (0.001 mm)	±.0001" (±2 μm)	Ratchet stop	£145.00
293-832-30				Friction thimble	£145.00

\* Excluding quantizing error.

## Dimensions



B

# Micrometers

## SERIES 293 – ABSOLUTE Digimatic Quickmike Micrometer

- The Quickmike provides a speedy spindle feed of 10 mm per thimble rotation, which enables widely differently sized features to be measured quickly.
- Set the origin only once. The absolute linear scale maintains the origin throughout the life of the battery, meaning no more zero setting (presetting) or overspeed error.
- Measuring faces: carbide.
- Supplied with a Ratchet Thimble for constant measuring force.

**MeasurLink<sup>®</sup> ENABLED**  
Data Management Software by Mitutoyo



293-676-20

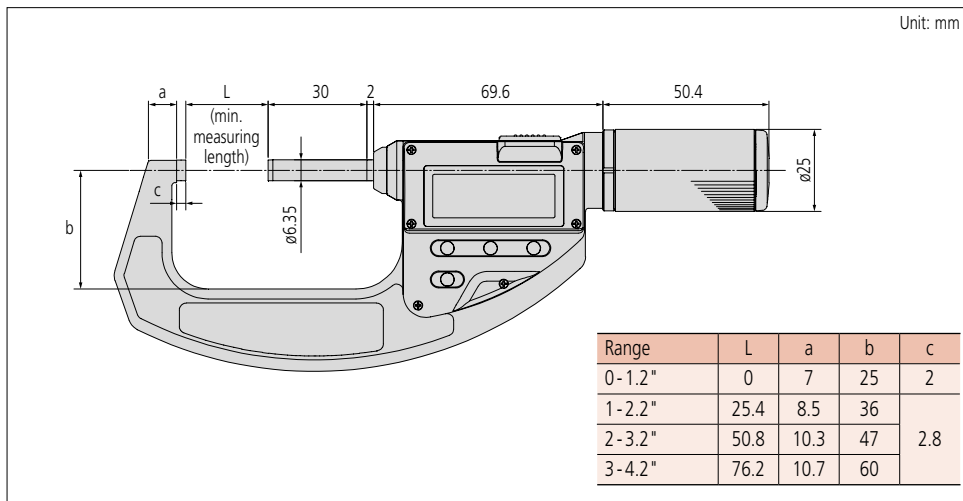
### Specifications

Inch/Metric

Code No.	Range	Accuracy*	Flatness	Parallelism	Mass	Price	
293-676-20	0-1.2" (0-30.48 mm)	±.0001" (±2 μm)	±.000012" 0.3 μm	.00008" (2 μm)	275 g	£430.00	
293-677-20	1-2.2" (25.4-55.8 mm)						
293-678-20	2-3.2" (50.8-81.28 mm)	±.00015" (±3 μm)			.00012" (3 μm)	480 g	£490.00
293-679-20	3-4.2" (76.2-106.68 mm)					585 g	£510.00

\* Excluding quantizing error.

### Dimensions

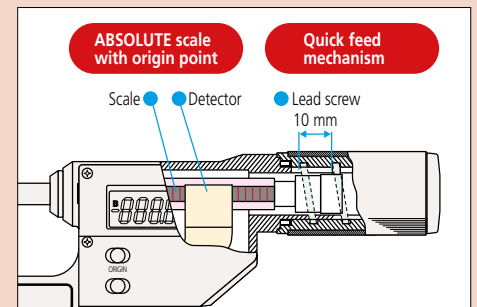


### Technical Data

Resolution:	.00005" (0.001 mm)
Accuracy:	Refer to the list of specifications
Measuring force:	5 to 15 N
Battery:	SR44 (1 pc) <b>938882</b>
Battery life:	Approx. 3 years under normal use
Max. response speed:	Without limit

### Optional Accessories

Code No.	Description	Price
02AZD790B	U-WAVE-T data cable with pushbutton (160 mm)	£62.00
02AZE140B	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	£142.00
05CZA662	SPC data cable (1 m)	£69.40
05CZA663	SPC data cable (2 m)	£83.50
06AFM380B	USB input tool direct USB-ITN-B (2 m)	£126.00



### Non-rotating spindle

The non-rotating spindle enables even inexperienced operators to perform measurements repeatably and accurately.





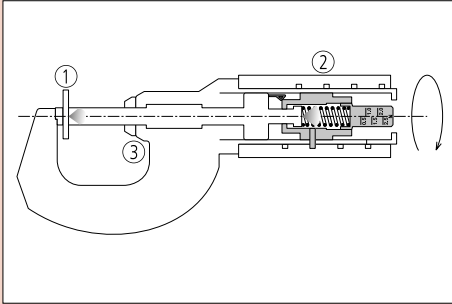
## Technical Data

Flatness:	.000012" (0.3 μm)
Parallelism:	.00008" (2 μm)
Measurement posture:	Horizontal orientation only (recommended spindle inclination: within ±3°)
Battery:	SR44 (1 pc), <b>938882</b>
Battery life:	Approx. 3 years under normal use (1 year for 227-213/16/17-20)

## Functions

Adjustable measuring force mechanism, hold, origin point setting, ABS measurement system, low voltage alarm, data output, presetting (227-213/16/17-20).

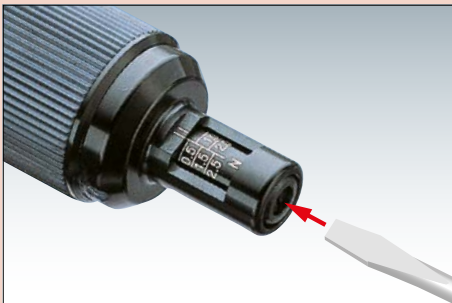
## Operation



- ① Measuring force is generated by the action of trapping a workpiece between the spindle face and the anvil.
- ② The constant-force unit applies the specified measuring force.
- ③ When the preset measuring force is reached, the value on the LCD is automatically held and the hold symbol appears. (To cancel the hold, reverse the thimble more than 1/10 revolution and press the hold button.)

## Optional Accessories

Code No.	Description	Price
<b>02AZD790B</b>	U-WAVE-T data cable with pushbutton (160 mm)	<b>£62.00</b>
<b>02AZE140B</b>	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	<b>£142.00</b>
<b>05CZA662</b>	SPC data cable (1 m)	<b>£69.40</b>
<b>05CZA663</b>	SPC data cable (2 m)	<b>£83.50</b>
<b>06AFM380B</b>	USB input tool direct USB-ITN-B (2 m)	<b>£126.00</b>



## Adjustable measuring force

To preset the measuring force, adjust the measuring force setting scale on the thimble with the screwdriver supplied.



## SERIES 227 – ABSOLUTE Digimatic Adjustable Measuring Force Micrometer

- Digimatic micrometer dedicated to applications requiring a constant/low measuring force such as measuring wire, paper, and plastic/rubber parts.
- Ratchet mechanism in the thimble applies constant force to workpiece.
- Measuring force is adjustable (in steps) to suit various kinds of workpiece.
- High-accuracy measurement can be performed even by unskilled operators due to the repeatability of the automatically applied measuring force.
- Compact and easy to handle.
- Non-rotating spindle.
- Measuring faces: carbide.

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**ABSOLUTE**



227-211-20

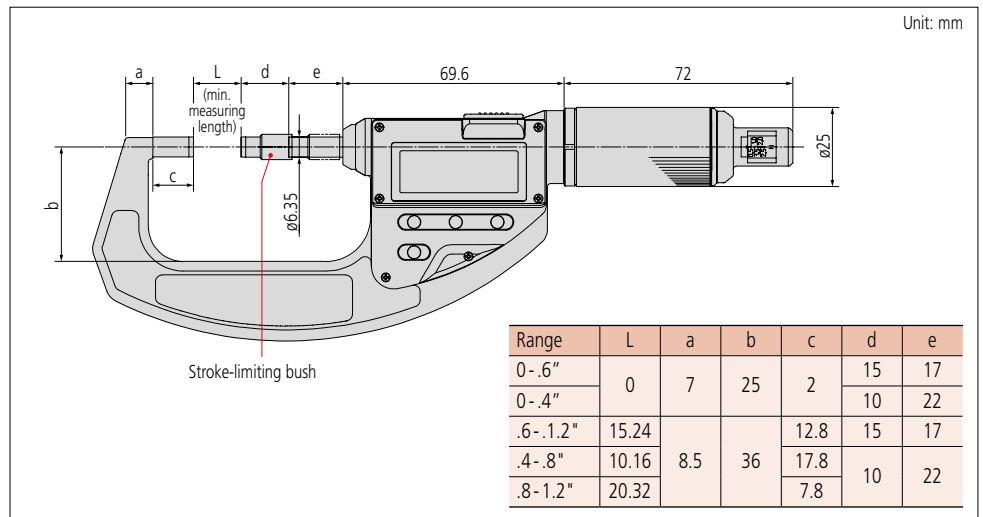
## Specifications

Inch/Metric					
Code No.	227-211-20	227-213-20	227-215-20	227-216-20	227-217-20
Range	0-.6" (0-15.24 mm)	.6-.1.2" (15.24-30.48 mm)	0-.4" (0-10.16 mm)	.4-.8" (10.16-20.32 mm)	.8-1.2" (20.32-30.48 mm)
Measuring force range	0.5-2.5 N		2-10 N		
Resolution	.00005" (0.001 mm)				
Accuracy*1	±.0001" (±2 μm)				
Measuring force	0.5, 1.0, 1.5, 2.0, 2.5 N		2, 4, 6, 8, 10 N		
Accuracy of the selected measuring force*2	± (0.1 + the selected measuring force/10) N		± (0.4 + the selected measuring force/10) N		
Repeatability of measuring force*2	Within 0.1 N		Within 0.4 N		
Mass	300 g	380 g	345 g	425 g	415 g
Price	<b>£790.00</b>	<b>£840.00</b>	<b>£830.00</b>	<b>£870.00</b>	<b>£920.00</b>

\*1 Excluding quantizing error.

\*2 These values are guaranteed when used in a horizontal orientation (within ±3 degrees).

## Dimensions

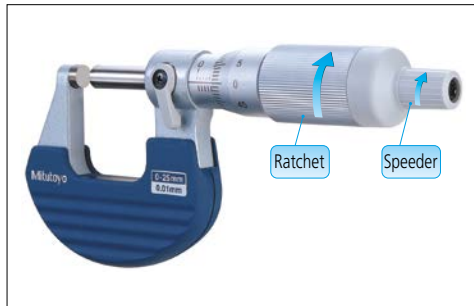
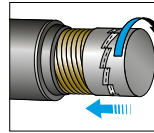


# Micrometers

## SERIES 102 – Ratchet Thimble Micrometer

- More accurate in one-handed operation: inexperienced operators measure significantly more accurately with this micrometer.
- Heat-insulated frame.
- Ratchet function works both from the thimble and the speeder.

- Rotating the thimble/speeder when the workpiece is between the anvil and spindle causes the ratchet mechanism to operate and apply a constant measuring force to the workpiece.
- Clearly audible ratchet operation for reassurance that measurement is being performed at constant, preset force.
- The speeder is always available for quick rotation of spindle.
- A simple mechanism, which requires neither parts maintenance nor special technique, is employed in the constant-force device.
- Measuring faces: carbide.



102-701

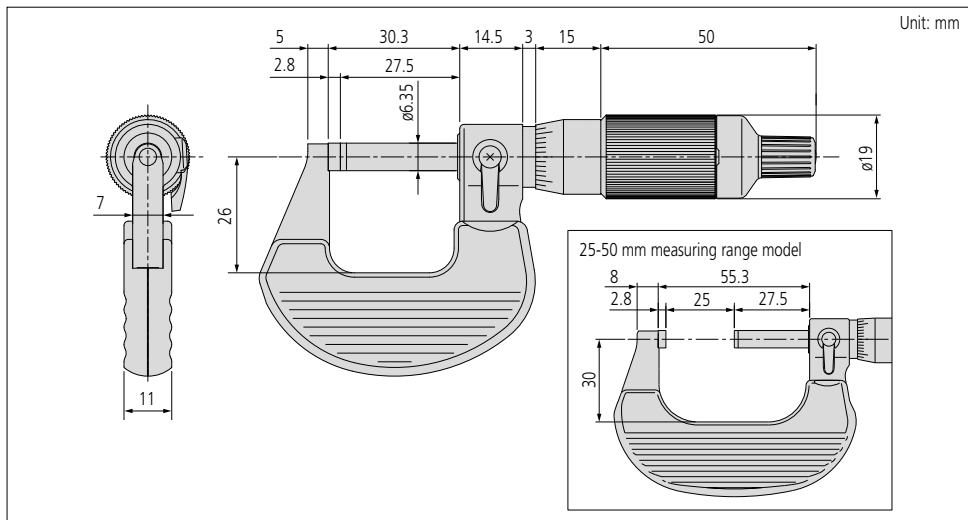
### Specifications

Metric					
Code No.	Range	Graduation	Accuracy	Mass	Price
102-701	0 - 25 mm	0.01 mm	±2 μm	180 g	£64.00
102-707		0.001 mm			£71.40
102-702	25 - 50 mm	0.01 mm		270 g	£73.20
102-708		0.001 mm		£102.00	

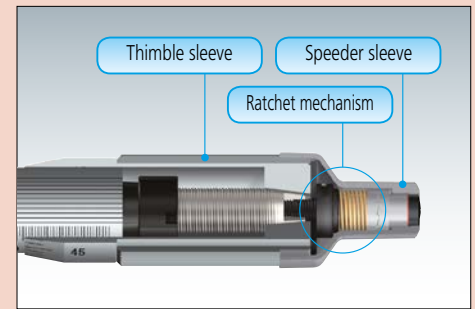
Inch					
Code No.	Range	Graduation	Accuracy	Mass	Price
102-717	0 - 1"	.0001"	±.0001"	180 g	£71.40
102-718	1 - 2"			270 g	£102.00

### Dimensions

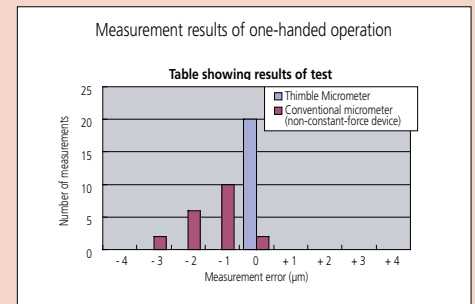


### Technical Data

Flatness: 0.6 μm / .000024"  
 Parallelism: 2 μm / .00008"  
 Measuring force: 5-10N



Internal structure.



### Greatly improved accuracy and repeatability

A beginner performed a test by measuring a workpiece 20 times using a conventional micrometer and a Ratchet Thimble Micrometer.





Internal structure.



## SERIES 102 – Economy Micrometer

- Cut-away frame (behind anvil) for measuring in hard-to-reach places.
- Heat-insulated frame.
- Measuring faces: carbide.

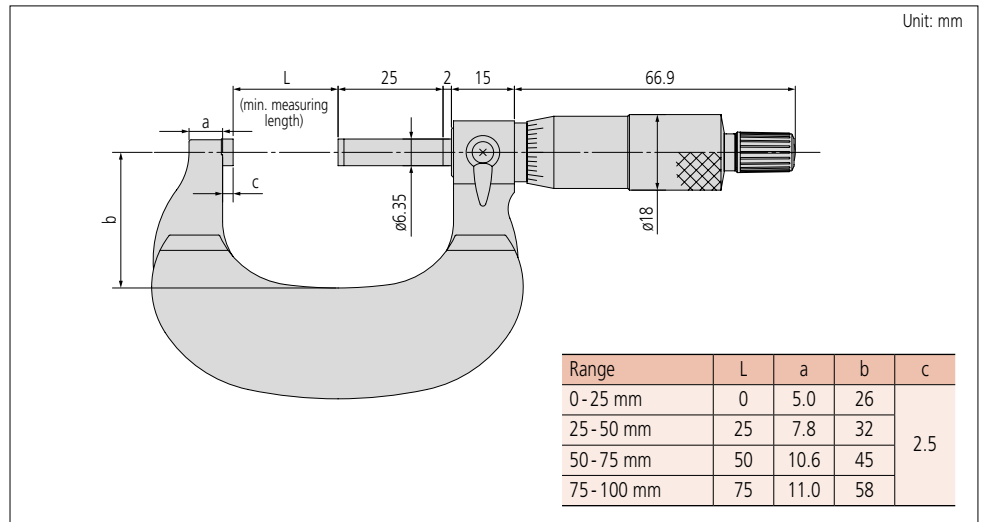


102-301

### Specifications

Metric							
Code No.	Range	Graduation	Accuracy	Flatness	Parallelism	Constant-force device	Price
102-301	0 - 25 mm	0.01 mm	$\pm 2 \mu\text{m}$	$0.6 \mu\text{m}$	$2 \mu\text{m}$	Ratchet stop	£64.00
102-311		0.001 mm	$\pm 1 \mu\text{m}$	$0.3 \mu\text{m}$	$1 \mu\text{m}$		£116.00
102-302	25 - 50 mm	0.01 mm	$\pm 2 \mu\text{m}$	$0.6 \mu\text{m}$	$2 \mu\text{m}$		£73.20
102-312		0.001 mm	$\pm 1 \mu\text{m}$	$0.3 \mu\text{m}$	$1 \mu\text{m}$		£124.00
102-303	50 - 75 mm	0.01 mm	$\pm 2 \mu\text{m}$	$0.6 \mu\text{m}$	$2 \mu\text{m}$		£94.30
102-304	75 - 100 mm		$\pm 3 \mu\text{m}$		$3 \mu\text{m}$		£107.00

### Dimensions



# Micrometers

## SERIES 103 – Economy Micrometer

- Baked-enamel-finished frame.
- Equipped with Ratchet Stop for constant measuring force.
- Measuring faces: carbide.
- Setting standard included on models measuring above 25 mm / 1" maximum measuring range.



103-138

### Specifications

Metric					
Code No.	Range	Graduation	Accuracy	Price	
With ratchet stop					
103-137	0 - 25 mm	0.01 mm	±2 µm	£47.90	
103-129		0.001 mm		£55.10	
103-138	25 - 50 mm	0.01 mm		£64.30	
103-130		0.001 mm		£71.40	
103-139-10	50 - 75 mm	0.01 mm		£84.70	
103-140-10	75 - 100 mm			£95.00	
103-141-10	100 - 125 mm			±3 µm	£105.00
103-142-10	125 - 150 mm			£117.00	
103-143-10	150 - 175 mm			±4 µm	£127.00
103-144-10	175 - 200 mm				£146.00
103-145-10	200 - 225 mm				£158.00
103-146-10	225 - 250 mm			±5 µm	£180.00
103-147-10	250 - 275 mm				£190.00
103-148-10	275 - 300 mm			£200.00	
103-149	300 - 325 mm			±6 µm	£240.00
103-150	325 - 350 mm		£260.00		
103-151	350 - 375 mm		£280.00		
103-152	375 - 400 mm		±7 µm	£310.00	
103-153	400 - 425 mm			£340.00	
103-154	425 - 450 mm	£360.00			
103-155	450 - 475 mm	±8 µm	£390.00		
103-156	475 - 500 mm		£420.00		
103-157	500 - 525 mm		£460.00		
103-158	525 - 550 mm	±9 µm	£490.00		
103-159	550 - 575 mm		£510.00		
103-160	575 - 600 mm		£530.00		
103-161	600 - 625 mm	±10 µm	£616.00		
103-162	625 - 650 mm		£640.00		
103-163	650 - 675 mm		£676.00		
103-164	675 - 700 mm	±11 µm	£700.00		
103-165	700 - 725 mm		£724.00		
103-166	725 - 750 mm		£735.00		
103-167	750 - 775 mm	±12 µm	£806.00		
103-168	775 - 800 mm		£830.00		
103-169	800 - 825 mm		£866.00		
103-170	825 - 850 mm	±13 µm	£889.00		
103-171	850 - 875 mm		£924.00		
103-172	875 - 900 mm		£948.00		
103-173	900 - 925 mm	±14 µm	£984.00		
103-174	925 - 950 mm		£1020.00		
103-175	950 - 975 mm		£1070.00		
103-176	975 - 1000 mm	±15 µm	£1090.00		

Inch					
Code No.	Range	Graduation	Accuracy	Price	
With ratchet stop					
103-177	0 - 1"	.001"	±.0001"	£47.90	
103-131		.0001"		£55.10	
103-178	1 - 2"	.001"		£64.30	
103-132		.0001"		£71.40	
103-179	2 - 3"	.001"		£84.70	
103-180	3 - 4"			£95.00	
103-181	4 - 5"			±.00015"	£105.00
103-182	5 - 6"			£117.00	
103-183	6 - 7"			±.0002"	£127.00
103-184	7 - 8"				£146.00
103-185	8 - 9"				£158.00
103-186	9 - 10"			±.00025"	£180.00
103-187	10 - 11"				£190.00
103-188	11 - 12"			£200.00	
103-189	12 - 13"			±.0003"	£240.00
103-190	13 - 14"		£260.00		
103-191	14 - 15"		£280.00		
103-192	15 - 16"		±.00035"	£310.00	
103-193	16 - 17"			£340.00	
103-194	17 - 18"	£360.00			
103-195	18 - 19"	±.0004"	£390.00		
103-196	19 - 20"		£420.00		
103-197	20 - 21"		£460.00		
103-198	21 - 22"	±.00045"	£490.00		
103-199	22 - 23"		£510.00		
103-200	23 - 24"		£530.00		
103-201	24 - 25"	±.0005"	£616.00		
103-202	25 - 26"		£640.00		
103-203	26 - 27"		£676.00		
103-204	27 - 28"	±.00055"	£700.00		
103-205	28 - 29"		£724.00		
103-206	29 - 30"		£735.00		
103-207	30 - 31"	±.0006"	£806.00		
103-208	31 - 32"		£830.00		
103-209	32 - 33"		£866.00		
103-210	33 - 34"	±.00065"	£889.00		
103-211	34 - 35"		£924.00		
103-212	35 - 36"		£948.00		
103-213	36 - 37"	±.0007"	£984.00		
103-214	37 - 38"		£1020.00		
103-215	38 - 39"		£1070.00		
103-216	39 - 40"	±.00075"	£1090.00		

With friction thimble				
Code No.	Range	Graduation	Accuracy	Price
103-135	0 - 1"	.001" *1	±.0001"	£63.90
103-136	1 - 2"			£91.50

\*1.0001 reading is obtained with vernier.

### Technical Data

Flatness: 0.6 µm / .000024" for models up to 300 mm / 12", 1 µm / .00004" for models over 300 mm / 12"

Parallelism\*2: (2+R/100) µm / [.00008+.00004 (R/4)]"

\*2 R = max. range (mm/inch)

Note: Fractions rounded down



103-904-10



103-905-10



103-906

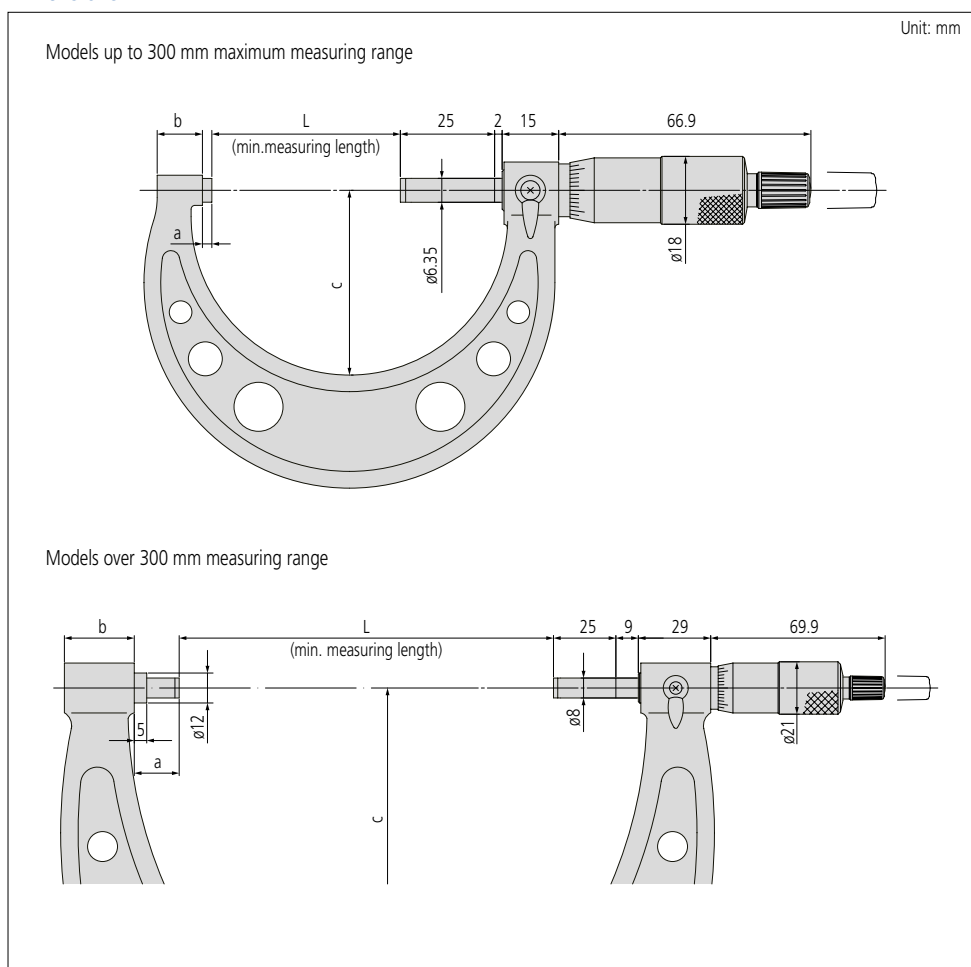


## Set Specifications

Metric			
Code No.	Range	Models included	Price
103-927-10	0 - 75 mm (3 pcs./set)	103-137, 103-138, 103-139-10, 2 micrometer setting standards	£242.00
103-913-50	0 - 150 mm (6 pcs./set)	103-137, 103-138, 103-139-10, 103-140-10, 103-141-10, 103-142-10, 5 micrometer setting standards	£569.00
103-915-10	150 - 300 mm (6 pcs./set)	103-143-10, 103-144-10, 103-145-10, 103-146-10, 103-147-10, 103-148-10, 6 micrometer setting standards	£1170.00
103-914-50	0 - 300 mm (12 pcs./set)	All micrometers in 103-913-50 and 103-915-10 in one set, 11 micrometer setting standards	£1650.00
Inch			
Code No.	Range	Models included	Price
103-929	0 - 3" (3 pcs./set)	103-177, 103-178, 103-179, 2 micrometer setting standards	£242.00
103-904-10	0 - 6" (6 pcs./set)	103-177, 103-178, 103-179, 103-180, 103-181, 103-182, 5 micrometer setting standards	£569.00
103-906	6 - 12" (6 pcs./set)	103-183, 103-184, 103-185, 103-186, 103-187, 103-188, 6 micrometer setting standards	£1170.00
103-905-10	0 - 12" (12 pcs./set)	All micrometers in 103-904-10 and 103-906 in one set, 11 micrometer setting standards	£1650.00

## Dimensions

Range	L	a	b	c	
0 - 25 mm	0	2.5	9	28	
25 - 50 mm	25		10	38	
50 - 75 mm	50		12	49	
75 - 100 mm	75		14	60	
100 - 125 mm	100	5.3	16.7	79	
125 - 150 mm	125	5.7	18.8	94	
150 - 175 mm	150	6.1	19.1	106	
175 - 200 mm	175	6.3	18.2	118	
200 - 225 mm	200	6.7	16.8	130	
225 - 250 mm	225	5.5	18	143	
250 - 275 mm	250	6.5		156	
275 - 300 mm	275	6.5		169	
300 - 325 mm	300	18	18	187	
325 - 350 mm	325			199	
350 - 375 mm	350			212	
375 - 400 mm	375			224	
400 - 425 mm	400			236	
425 - 450 mm	425			248	
450 - 475 mm	450			261	
475 - 500 mm	475			273	
500 - 525 mm	500			40	307
525 - 550 mm	525			15	28
550 - 575 mm	550	40	355		
575 - 600 mm	575	15	382		
600 - 625 mm	600	40	405		
625 - 650 mm	625	15	430		
650 - 675 mm	650	40	455		
675 - 700 mm	675	15	480		
700 - 725 mm	700	40	505		
725 - 750 mm	725	15	530		
750 - 775 mm	750	40			
775 - 800 mm	775	15			
800 - 825 mm	800	40	530		
825 - 850 mm	825	15			
850 - 875 mm	850	40			
875 - 900 mm	875	15			
900 - 925 mm	900	40			
925 - 950 mm	925	15			
950 - 975 mm	950	40			
975 - 1000 mm	975	15			



# Micrometers

## SERIES 193 – Mechanical Counter Micrometer

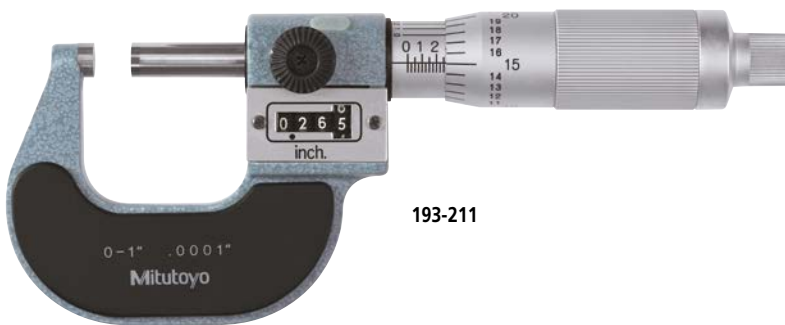
- Mechanical digit counter with 0.01 mm or .001" resolution for quick and error-free reading.
- Measuring faces: carbide.
- Equipped with Ratchet Stop for constant measuring force.

### Technical Data

Counter reading: 0.01 mm or .001"  
 Flatness: 0.6  $\mu\text{m}$  (.000024")  
 Parallelism\*: (2+R/100)  $\mu\text{m}$ , [.00008+.00004 (R/4)]"  
 \* R = max. range (mm/inch).  
 Note: Fractions rounded down.



193-111



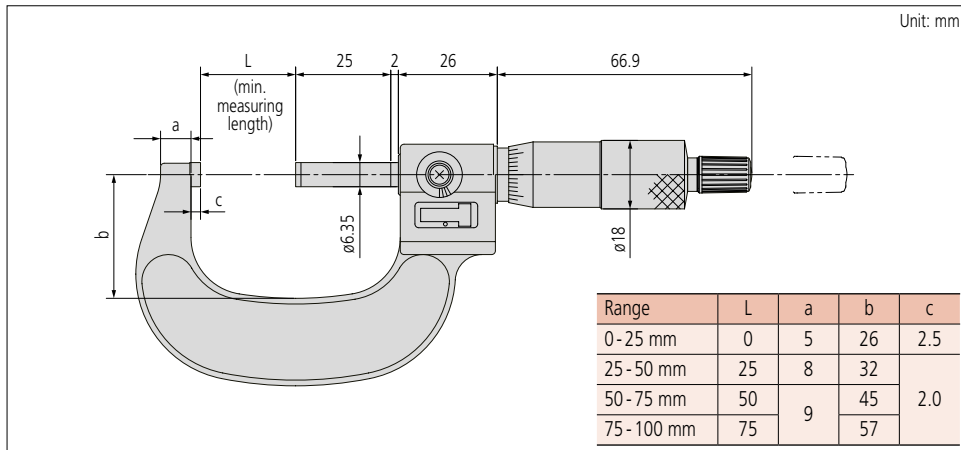
193-211

### Specifications

Metric				
Code No.	Range	Graduation	Accuracy	Price
With ratchet stop				
193-101	0 - 25 mm	0.01 mm	$\pm 2 \mu\text{m}$	£137.00
193-111		0.001 mm		£151.00
193-102	25 - 50 mm	0.01 mm		£165.00
193-112		0.001 mm		£176.00
193-103	50 - 75 mm	0.01 mm		£185.00
193-113		0.001 mm		£189.00
193-104	75 - 100 mm	0.01 mm	$\pm 3 \mu\text{m}$	£186.00
193-114		0.001 mm	£205.00	

Inch				
Code No.	Range	Graduation	Accuracy	Price
With friction thimble				
193-211	0 - 1"	.0001"	$\pm .0001$ "	£151.00
193-212	1 - 2"			£176.00
With ratchet stop				
193-213	2 - 3"	.0001"	$\pm .0001$ "	£189.00
193-214	3 - 4"		$\pm .00015$ "	£205.00

### Dimensions



## Technical Data

Battery: SR44 (1 pc) 938882

## Optional Accessories

Code No.	Description	Price
264-623	U-WAVE-TM transmitter	£193.00
02AZF310	U-WAVE-TM connection unit	£62.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB input tool direct USB-ITN-B (2 m)	£126.00



## SERIES 406 – Digimatic Non-Rotating Spindle Micrometer

- Non-rotating spindle.
- Equipped with Ratchet Stop for constant measuring force.

**MeasurLink** ENABLED  
Data Management Software by Mitutoyo



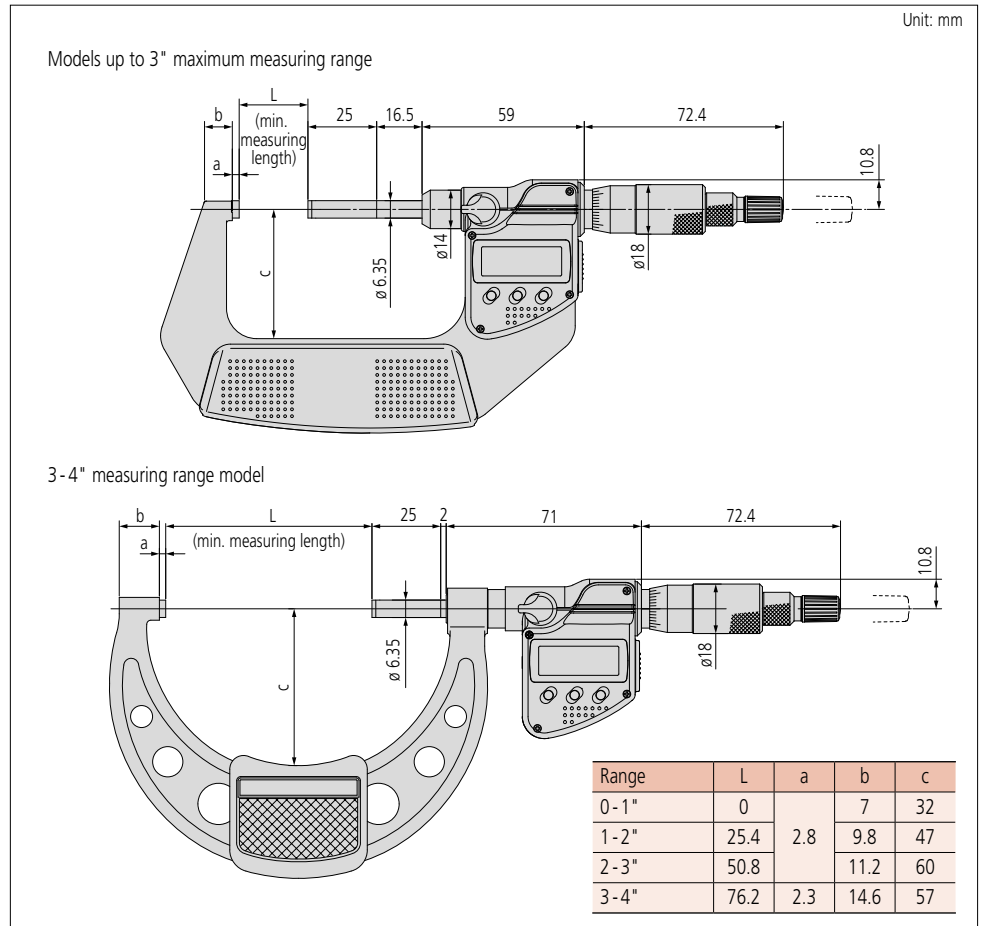
## Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy*	Flatness	Parallelism	Price
406-350-30	0 - 1" (0 - 25.4 mm)	.00005" (0.001 mm)	±.00015" (±3 μm)	.000012" (0.3 μm)	.00012" (3 μm)	£655.00
406-351-30	1 - 2" (25.4 - 50.8 mm)					£711.00
406-352-30	2 - 3" (50.8 - 76.2 mm)					£740.00
406-353-30	3 - 4" (76.2 - 101.6 mm)					£774.00

\* Excluding quantizing error.

## Dimensions



# Micrometers

## SERIES 340 – Digimatic Interchangeable Anvil Micrometer

- Wide measuring range with interchangeable anvils.
- Measuring face of the spindle is carbide tipped (standard model).
- IP65 water/dust protection.\*<sup>1</sup>
- Equipped with Ratchet Stop for constant measuring force.

\*<sup>1</sup> Only models with a maximum measuring range up to 300 mm.

**MeasurLink** ENABLED  
Data Management Software by Mitutoyo



340-351-30

### Specifications

Inch/Metric

Code No.	Range	Resolution	Interchangeable anvils	Setting standards	Micrometer head stroke	Price
<b>IP65 rated</b>						
340-351-30	0 - 6" (0 - 152.4 mm)	.00005" (0.001 mm)	6 pcs.	5 pcs.	1" (25 mm)	£691.00
340-352-30	6 - 12" (152.4 - 304.8 mm)	.0001" (0.001 mm)		6 pcs.		£884.00
<b>Unrated</b>						
340-720	12 - 18" (304.8 - 457.2 mm)	.0001" (0.001 mm)	6 pcs.	6 pcs.	1" (25 mm)	£1150.00
340-721	18 - 24" (457.2 - 609.6 mm)					£1260.00
340-722	24 - 30" (609.6 - 762.0 mm)					£1420.00
340-723	30 - 36" (762.0 - 914.4 mm)					£1510.00

### Technical Data

Flatness:	.000024" (0.6 µm) for models up to 12", .00004" (1.0 µm) for models over 12"
Parallelism:	.00008" (2 µm) for models up to 3", .00012" (3 µm) for models up to 6", ±[.00008" + .00004 (R/4)]" * <sup>2</sup> / (2+R/100) µm * <sup>2</sup> for models over 6"
Accuracy* <sup>3</sup> :	±[.00016" + .00004(R/3)]" * <sup>2</sup> / ±(4+R/75) µm * <sup>2</sup>
Battery:	SR44 (1 pc), <b>938882</b>

Note: Fractions rounded down.

\*<sup>2</sup> R = max. range (mm/inch).

\*<sup>3</sup> Excluding quantizing error.

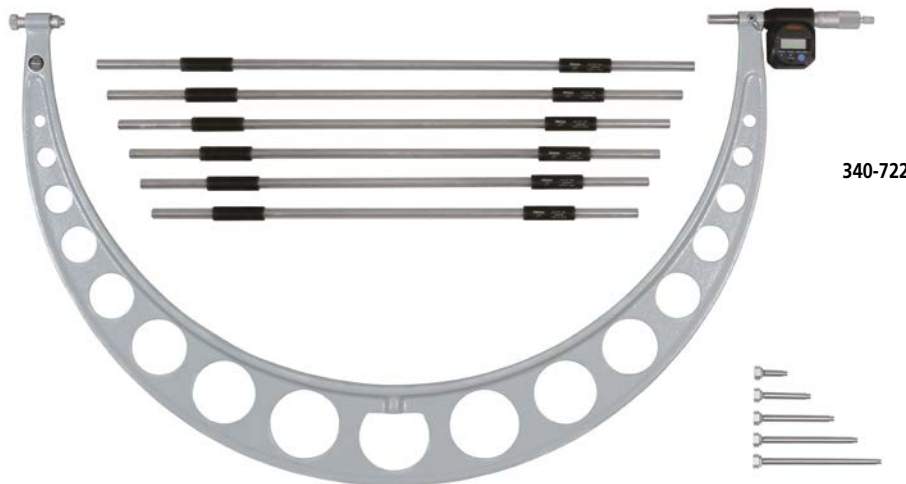
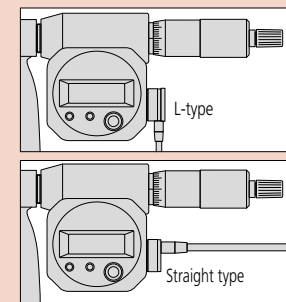
### Dimensions

See page B-21

### Optional Accessories

Code No.	Description	Price
264-622	U-WAVE-TM transmitter	£193.00
02AZF310	U-WAVE-TM connection unit	£62.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB input tool direct USB-ITN-B (2 m)	£126.00
<b>Connecting cables for 340-720/21/22/23</b>		
04AZB512	SPC data cable L-type with pushbutton (1 m)	£67.20
04AZB513	SPC data cable L-type with pushbutton (2 m)	£71.70
02AZD790C	U-WAVE-T data cable (160 mm)	£62.00
959149	SPC data cable with pushbutton (1 m)* <sup>4</sup>	£35.70
959150	SPC data cable with pushbutton (2 m)* <sup>4</sup>	£40.60

\*<sup>4</sup> May interfere with operating the thimble.



340-722



## Technical Data

Flatness:	0.6 $\mu\text{m}$ (.000024") for models up to 300 mm (12"), 1.0 $\mu\text{m}$ (.00004") for models over 300 mm (12")
Parallelism:	2 $\mu\text{m}$ (.00008") for models up to 75 mm (3"), 3 $\mu\text{m}$ (.00012") for models up to 150 mm (6"), (2+R/100) $\mu\text{m}$ * / $\pm[.00008''+.00004(R/4)]''$ * for models over 150 mm (6")
Accuracy:	$\pm(4+R/75)$ $\mu\text{m}$ * / $\pm[.00016''+.00004(R/3)]''$ *

\* R = max. range (mm/inch).  
Note: Fractions rounded down.

## Dimensions

See page B-21

## SERIES 104 – Interchangeable Anvil Micrometer

- Wide measuring range with interchangeable anvils.
- Measuring face of the spindle is carbide tipped (standard model).
- Equipped with Ratchet Stop for constant measuring force.



## Specifications

Metric						
Code No.	Range	Graduation	Interchangeable anvils	Setting standard	Micrometer head stroke	Price
104-139A	0 - 100 mm	0.01 mm	4 pcs.	3 pcs.	25 mm	£250.00
104-135A	0 - 150 mm		6 pcs.	5 pcs.		£368.00
104-161A	50 - 150 mm		4 pcs.	4 pcs.		£370.00
104-140A	100 - 200 mm		6 pcs.	6 pcs.		£332.00
104-136A	150 - 300 mm		4 pcs.	4 pcs.		£490.00
104-141A	200 - 300 mm		6 pcs.	6 pcs.		£402.00
104-142A	300 - 400 mm		4 pcs.	4 pcs.		£501.00
104-143A	400 - 500 mm		6 pcs.	6 pcs.		£582.00
104-144A	500 - 600 mm		4 pcs.	4 pcs.		£790.00
104-145A	600 - 700 mm		6 pcs.	6 pcs.		£870.00
104-146A	700 - 800 mm		4 pcs.	4 pcs.		£984.00
104-147A	800 - 900 mm		6 pcs.	6 pcs.		£1160.00
104-148A	900 - 1000 mm		4 pcs.	4 pcs.		£1330.00

Inch						
Code No.	Range	Graduation	Interchangeable anvils	Setting standard	Micrometer head stroke	Price
104-149	0 - 4"	.001"	4 pcs.	3 pcs.	1"	£250.00
104-137	0 - 6"		6 pcs.	5 pcs.		£368.00
104-162	2 - 6"		4 pcs.	4 pcs.		£370.00
104-150	4 - 8"		6 pcs.	6 pcs.		£332.00
104-138	6 - 12"		4 pcs.	4 pcs.		£490.00
104-151	8 - 12"		6 pcs.	6 pcs.		£402.00
104-152	12 - 16"		4 pcs.	4 pcs.		£501.00
104-201	12 - 18"		6 pcs.	6 pcs.		£667.00
104-153	16 - 20"		4 pcs.	4 pcs.		£582.00
104-202	18 - 24"		6 pcs.	6 pcs.		£795.00
104-154	20 - 24"		4 pcs.	4 pcs.		£790.00
104-155	24 - 28"		6 pcs.	6 pcs.		£870.00
104-203	24 - 30"		4 pcs.	4 pcs.		£842.00
104-156	28 - 32"		6 pcs.	6 pcs.		£984.00
104-204	30 - 36"		4 pcs.	4 pcs.		£1110.00
104-157	32 - 36"		6 pcs.	6 pcs.		£1160.00
104-158	36 - 40"		4 pcs.	4 pcs.		£1330.00
104-205	36 - 42"		6 pcs.	6 pcs.		£1390.00

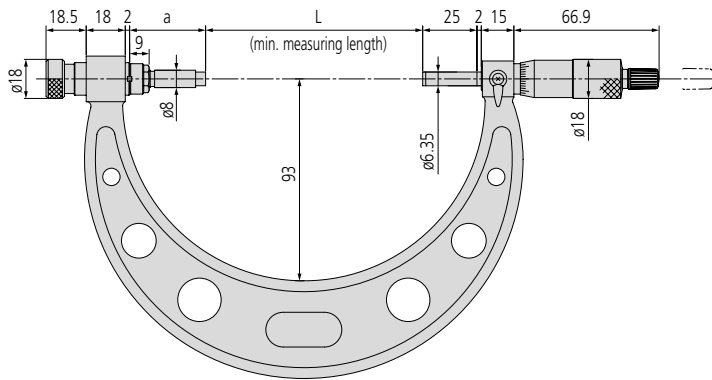
# Micrometers

## SERIES 340, 104 – Interchangeable Anvil Micrometer

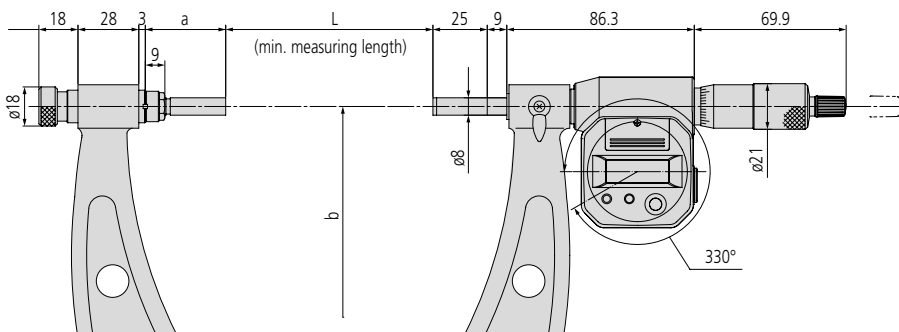
### Dimensions

Unit: mm

104-135A



Models from 400 to 1000 mm measuring range



### Interchangeable anvils

		L : range (mm)					
Range	0 to 150 mm models	0 - 25	25 - 50	50 - 75	75 - 100	100 - 125	125 - 150
	150 to 300 mm models	150 - 175	175 - 200	200 - 225	225 - 250	250 - 275	275 - 300
	<b>Code No.</b>	<b>303950</b>	<b>303951</b>	<b>303952</b>	<b>303953</b>	<b>303954</b>	<b>303955</b>
	a: overall length (mm)	135	110	85	60	35	10
	Interchangeable anvil	M1	M2	M3	M4	M5	M6

		L : range (mm)				b
Range	300 to 400 mm models	300 - 325	325 - 350	350 - 375	375 - 400	224
	400 to 500 mm models	400 - 425	425 - 450	450 - 475	475 - 500	273
	500 to 600 mm models	500 - 525	525 - 550	550 - 575	575 - 600	332
	600 to 700 mm models	600 - 625	625 - 650	650 - 675	675 - 700	382
	700 to 800 mm models	700 - 725	725 - 750	750 - 775	775 - 800	430
	800 to 900 mm models	800 - 825	825 - 850	850 - 875	875 - 900	480
	900 to 1000 mm models	900 - 925	925 - 950	950 - 975	975 - 1000	530
	<b>Code No.</b>	<b>304001</b>	<b>304002</b>	<b>304003</b>	<b>304004</b>	
	a: overall length (mm)	87	62	37	12	
	Interchangeable anvil	M3	M4	M5	M6	

## Technical Data

Flatness: 1.3  $\mu\text{m}$   
Parallelism\*: (2+R/100)  $\mu\text{m}$   
Accuracy\*:  $\pm(6+R/75)$   $\mu\text{m}$

\* R = max. range (mm).

Note: Fractions rounded down.

## Anvil Extension Collar



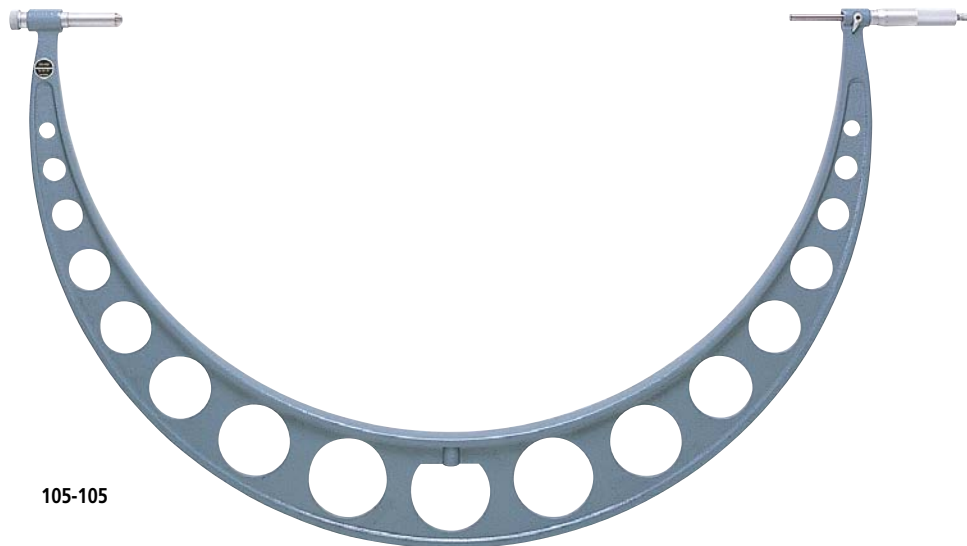
Measuring range 700 to 750 mm with **105-105**.



Measuring range 750 to 800 mm with **105-105**.

## SERIES 105 – Anvil Extension Collar Micrometer

- Wide measuring range with anvil extension collars.
- 50 mm spindle stroke.
- Measuring faces: carbide.
- Equipped with Ratchet Stop for constant measuring force.



105-105

## Specifications

Metric					
Code No.	Range	Graduation	Extension collars	Setting standard	Price
105-103	500 - 600 mm	0.01 mm	1 pc (50 mm)	2 pcs.	£980.00
105-104	600 - 700 mm				£1020.00
105-105	700 - 800 mm				£1080.00
105-106	800 - 900 mm				£1190.00
105-107	900 - 1000 mm				£1380.00

# Micrometers

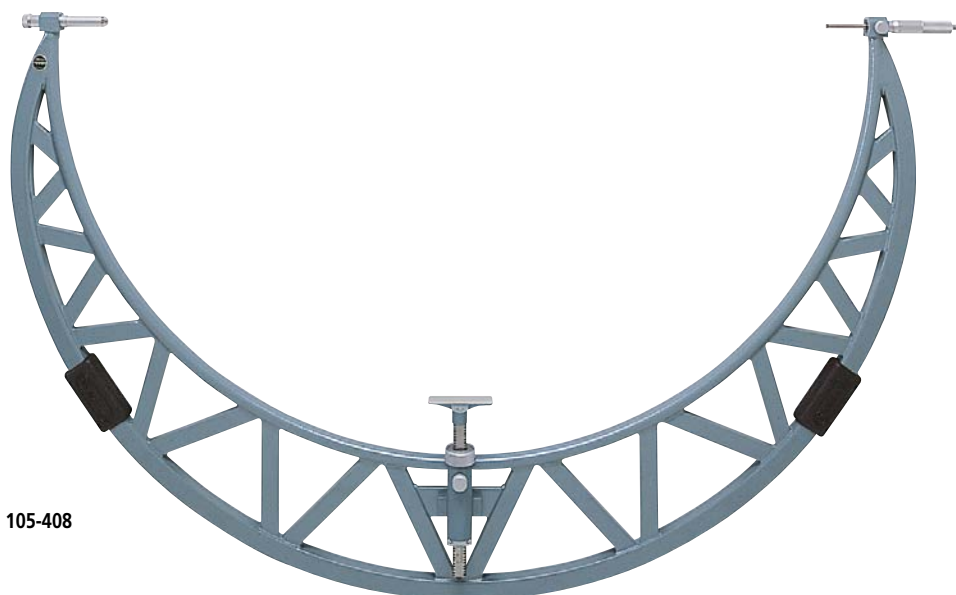
## SERIES 105 – Anvil Extension Collar Micrometer

- Wide measuring range with anvil extension collars.
- 50 mm/2" spindle stroke.
- Measuring faces: carbide.
- Equipped with Ratchet Stop for constant measuring force.

### Technical Data

Flatness:	1.3 $\mu\text{m}$ / .000052"
Parallelism*:	(2+R/100) $\mu\text{m}$ / [.00008+.00004(R/4)]"
Accuracy*:	$\pm(6+R/75)$ $\mu\text{m}$ / $\pm[.0003+.00005(R/3)]$ "

\* R = max. range (mm/inch).  
Note: Fractions rounded down.



105-408

### Specifications

#### Metric

Code No.	Range	Graduation	Extension Collars	Setting Standards	Price
100 mm span models					
105-408	1000 - 1100 mm	0.01 mm	1 pc (50 mm)	2 pcs	£2250.00
105-409	1100 - 1200 mm				£2280.00
105-410	1200 - 1300 mm				£2330.00
105-411	1300 - 1400 mm				£2400.00
105-412	1400 - 1500 mm				£2450.00
105-413	1500 - 1600 mm				£2800.00
105-414	1600 - 1700 mm				£2970.00
105-415	1700 - 1800 mm				£3210.00
105-416	1800 - 1900 mm				£3550.00
105-417	1900 - 2000 mm				£3860.00

#### 200 mm span models

105-418	1000 - 1200 mm	0.01 mm	2 pcs (50 mm, 100 mm)	4 pcs	£2490.00
105-419	1200 - 1400 mm				£3080.00
105-420	1400 - 1600 mm				£3710.00
105-421	1600 - 1800 mm				£4240.00
105-422	1800 - 2000 mm				£4880.00

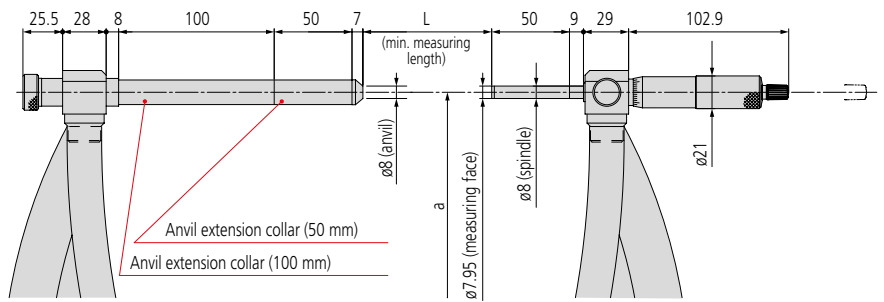
#### Inch

Code No.	Range	Graduation	Extension Collars	Setting Standards	Price
105-428	40 - 44"	.001"	1 pc (2")	2 pcs	£2250.00
105-429	44 - 48"				£2280.00
105-430	48 - 52"				£2330.00
105-431	52 - 56"				£2400.00
105-432	56 - 60"				£2450.00
105-433	60 - 64"				£2800.00
105-434	64 - 68"				£2970.00
105-435	68 - 72"				£3210.00
105-436	72 - 76"				£3550.00
105-437	76 - 80"				£3860.00

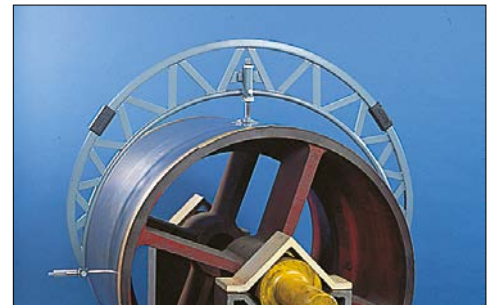
## Dimensions

Unit: mm

Over 1200 mm up to 2000 mm maximum measuring range



Range	L	a
1000 - 1200 mm	1000	500 - 600
1200 - 1400 mm	1200	600 - 700
1400 - 1600 mm	1400	700 - 800
1600 - 1800 mm	1600	800 - 900
1800 - 2000 mm	1800	900 - 1000



# Micrometers

## SERIES 343 – Digimatic Caliper Anvil Micrometer

- Effective for measuring workpiece features where access is difficult.
- Measuring faces: carbide.
- Equipped with Ratchet Stop for constant measuring force.

**MeasurLink** ENABLED  
Data Management Software by Mitutoyo



343-350-30

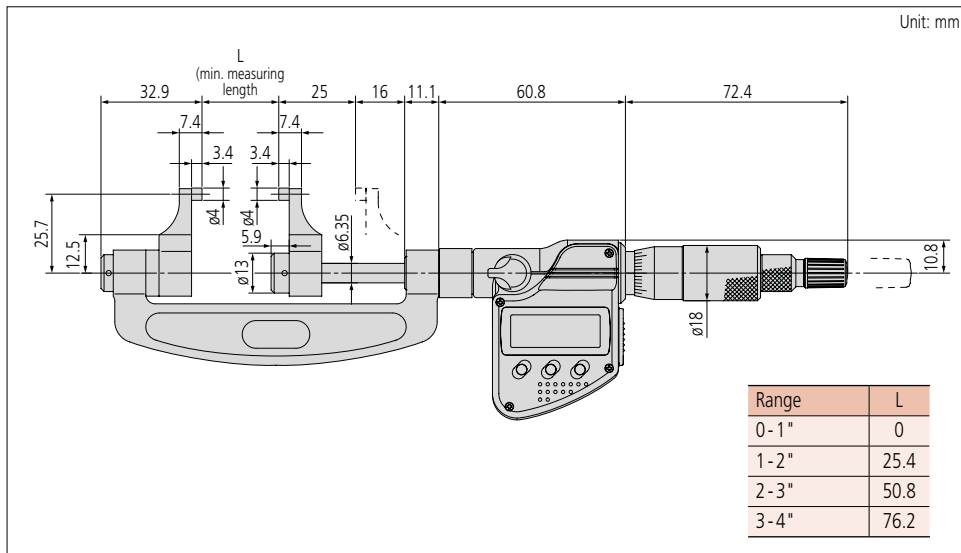
### Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy*	Price
343-350-30	0-1" (0-25.4 mm)	.00005" (0.001 mm)	±.00025" (±5 μm)	£580.00
343-351-30	1-2" (25.4-50.8 mm)		±.0003" (±6 μm)	£610.00
343-352-30	2-3" (50.8-76.2 mm)		±.00035" (±7 μm)	£638.00
343-353-30	3-4" (76.2-101.6 mm)		±.0004" (±8 μm)	£676.00

\* Excluding quantizing error.

### Dimensions



### Technical Data

Flatness: 0.000012" (.3 μm)  
Parallelism\*: [.00012+.00004(R/3)]", (3+R/75) μm

Battery: SR44 (2 pcs) **938882**

\* R = max. range (mm/inch).

Note: Fractions rounded down.

### Functions

**Origin point setting** (ABS measurement system):

Resets the ABS origin at the current spindle position to the minimum value of the measuring range and switches to ABS mode.

**Zero setting** (INC measurement system):

A brief press on the ZERO/ABS button sets display to zero at the current spindle position and switches to the incremental (INC) measuring mode. A longer press resets to the ABS measuring mode.

**Hold:**

Pressing the HOLD button freezes the current value in the display. This function is useful for preserving a measurement in situations of poor visibility where the instrument must be moved away from the workpiece before the reading can be recorded.

**Auto power ON/OFF:**

The reading on the LCD disappears after this instrument is idle for about 20 minutes, but the reading and measurement mode are retained. Turning the spindle causes the reading to reappear.

**Data output:**

Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

**Error alarm:**

In the unlikely event of a display overflow or calculation error, an error message is displayed and measurement stops. Measurement cannot continue until the error is corrected.

Also, if the battery voltage drops below a certain point, the battery indicator will turn on before measurement becomes impossible, warning the user that the battery needs to be replaced.

### Optional Accessories

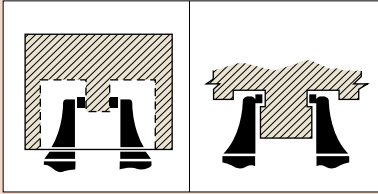
Code No.	Description	Price
264-623	U-WAVE-TM transmitter	£193.00
02AZF310	U-WAVE-TM connection unit	£62.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB input tool direct USB-ITN-B (2 m)	£126.00



### Technical Data

Flatness: 0.3  $\mu\text{m}$  / .000012"  
 Parallelism\*: (3+R/75)  $\mu\text{m}$  /  
 [.00012+.00004(R/3)]"

\* R = max. range (mm/inch).  
 Note: Fractions rounded down.



### SERIES 143 – Caliper Anvil Micrometer

- Effective for measuring workpiece features where access is difficult.
- Measuring faces: carbide.
- Equipped with Ratchet Stop for constant measuring force.



143-101

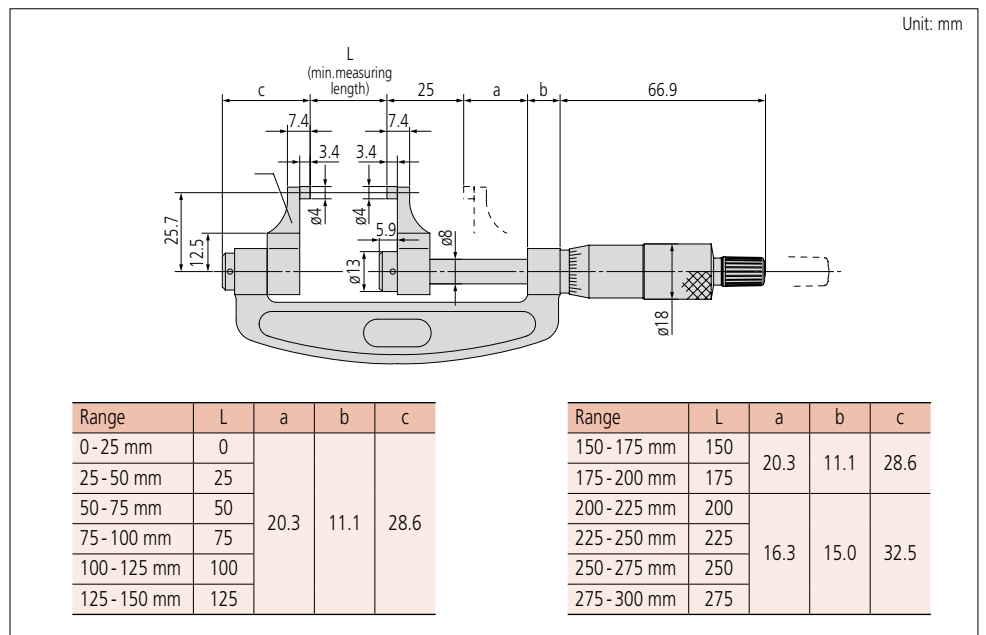
### Specifications

Metric				
Code No.	Range	Graduation	Accuracy	Price
143-101	0 - 25 mm	0.01 mm	$\pm 5 \mu\text{m}$	£252.00
143-102	25 - 50 mm		$\pm 6 \mu\text{m}$	£269.00
143-103	50 - 75 mm		$\pm 7 \mu\text{m}$	£274.00
143-104	75 - 100 mm		$\pm 8 \mu\text{m}$	£287.00
143-105	100 - 125 mm		$\pm 9 \mu\text{m}$	£334.00
143-106	125 - 150 mm		$\pm 9 \mu\text{m}$	£367.00
143-107	150 - 175 mm		$\pm 10 \mu\text{m}$	£391.00
143-108	175 - 200 mm		$\pm 10 \mu\text{m}$	£422.00
143-109	200 - 225 mm		$\pm 11 \mu\text{m}$	£434.00
143-110	225 - 250 mm		$\pm 11 \mu\text{m}$	£445.00
143-111	250 - 275 mm		$\pm 12 \mu\text{m}$	£493.00
143-112	275 - 300 mm		$\pm 12 \mu\text{m}$	£525.00

Inch				
Code No.	Range	Graduation	Accuracy	Price
143-121	0 - 1"	.001"	$\pm .00025"$	£252.00
143-122	1 - 2"		$\pm .0002"$	£269.00
143-123	2 - 3"		$\pm .00035"$	£274.00

### Dimensions



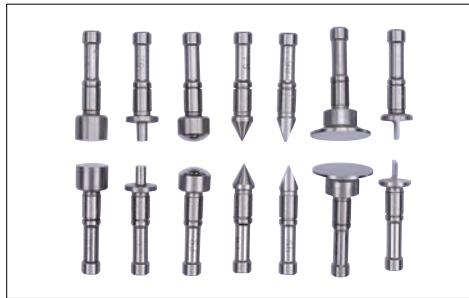
# Micrometers

## SERIES 116 – Interchangeable Anvil Universal Micrometer

- Non-rotating spindle type which accepts seven forms of optional interchangeable contact points (flat, spline, spherical, point, knife-edge, disc, and blade) for a wide range of applications.
- Equipped with Ratchet Stop for constant measuring force.
- Optional interchangeable contact points for screw thread measurement (matching V and cone) are also available.



116-101



Interchangeable contact points (optional).

### Specifications

#### Metric

Code No.	Range	Graduation	Accuracy	Price
116-101	0 - 25 mm	0.01 mm	±4 μm	£263.00
116-102	25 - 50 mm			£346.00

#### Inch

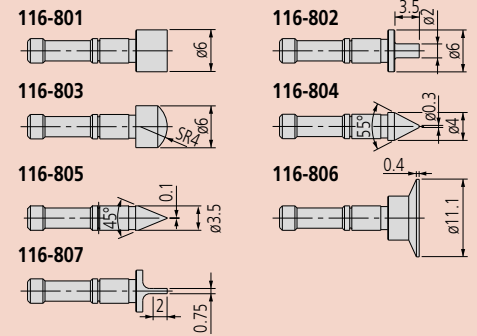
Code No.	Range	Graduation	Accuracy	Price
116-105	0 - 1"	.001"	±.0002"	£263.00
116-106	1 - 2"			£346.00

Note: 116-102 is provided with a plain setting standard (167-101) and a 60°-thread setting standard (167-261) for adjusting the minimum range point according to the application.

### Technical Data

Spindle feed error: 3 μm / .00015"

### Optional Accessories



### Interchangeable contact points (pair)

Code No.	Description	Price
116-801	Flat	£53.60
116-802	Spline	£53.60
116-803	Spherical	£53.60
116-804	Point	£53.60
116-805	Knife-edge	£53.60
116-806	Disc	£53.60
116-807	Blade	£53.60

### Interchangeable contact points set

Code No.	Description	Price
116-800	Consists of 116-801 to 116-807	£321.00

### Thread-measuring interchangeable contact points (pair)

Code No.	Metric	UNF	Price
116-831	0.4 - 0.5 mm	64 - 48 TPI	£53.60
116-832	0.6 - 0.9 mm	44 - 28 TPI	£53.60
116-833	1 - 1.75 mm	24 - 14 TPI	£53.60
116-834	2 - 3 mm	13 - 9 TPI	£53.60
116-835	3.5 - 5 mm	8 - 5 TPI	£53.60
116-836	5.5 - 7 mm	4.5 - 3.5 TPI	£53.60

### Thread-measuring interchangeable contact points set

Code No.	Description	Price
116-830	Consists of 116-831 to 116-836	£275.00





## Technical Data

Accuracy\*:  $\pm(2+R/75) \mu\text{m}$

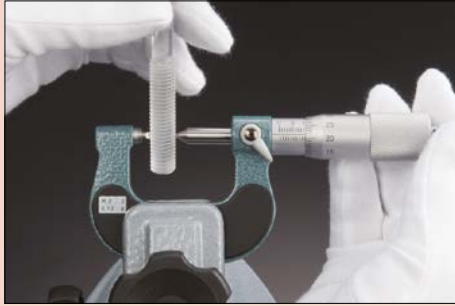
Spindle feed error:  $3 \mu\text{m}$

\* R = max. range (mm/inch).

Note: Fractions rounded up.

## Optional Accessories

Setting standards refer to page B-67.



## SERIES 125 – Screw Thread Micrometer

- Fixed anvil type to suit 60° threads.
- Directly indicates screw pitch diameter (no need for calculation).
- Equipped with Ratchet Stop for constant measuring force.



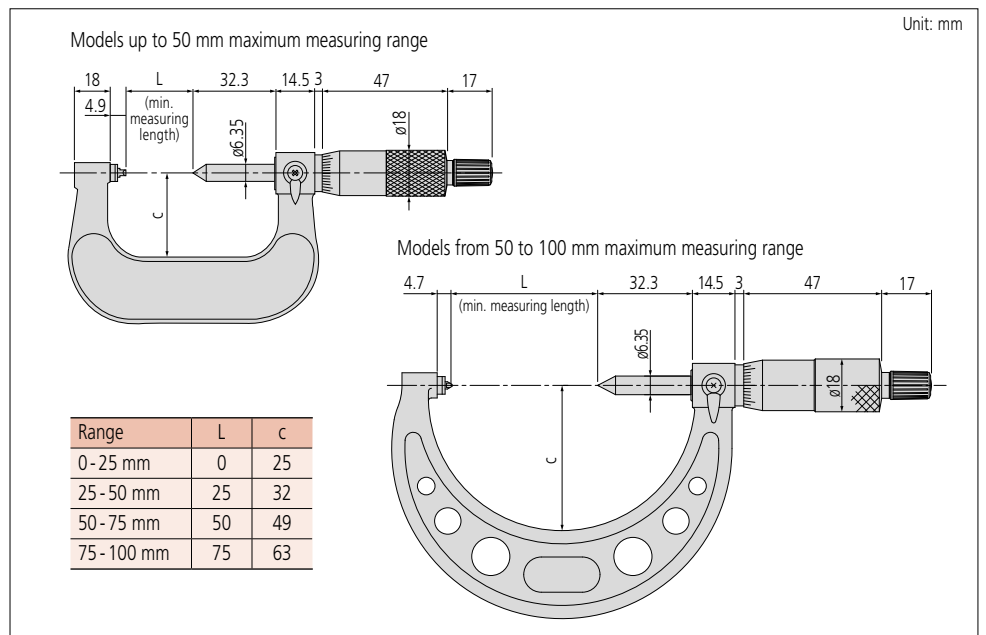
## Specifications

### Metric

Code No.	Thread to be measured (Metric/Unified)	Range	Graduation	Price
125-101	0.4-0.5 mm/64-48 TPI	0-25 mm	0.01 mm	£164.00
125-102	0.6-0.9 mm/44-28 TPI			£164.00
125-103	1-1.75 mm/24-14 TPI			£164.00
125-104	2-3 mm/13-9 TPI			£164.00
125-105	3.5-5 mm/8-5 TPI			£164.00
125-106	0.4-0.5 mm/64-48 TPI	25-50 mm		£228.00
125-107	0.6-0.9 mm/44-28 TPI			£228.00
125-108	1-1.75 mm/24-14 TPI			£228.00
125-109	2-3 mm/13-9 TPI			£228.00
125-110	3.5-5 mm/8-5 TPI			£228.00
125-111	0.6-0.9 mm/44-28 TPI	50-75 mm		£258.00
125-112	1-1.75 mm/24-14 TPI			£258.00
125-113	2-3 mm/13-9 TPI		£258.00	
125-114	3.5-5 mm/8-5 TPI		£258.00	
125-115	5.5-7 mm/4.5-3.5 TPI		£258.00	
125-116	0.6-0.9 mm/44-28 TPI	75-100 mm	£273.00	
125-117	1-1.75 mm/24-14 TPI		£273.00	
125-118	2-3 mm/13-9 TPI		£273.00	
125-119	3.5-5 mm/8-5 TPI		£273.00	
125-120	5.5-7 mm/4.5-3.5 TPI		£273.00	

Note: A setting standard is supplied with each model (except for 0-25 mm measuring range). The setting standard is for metric threads (unified) 60°.

## Dimensions



# Micrometers

## SERIES 326 – Digimatic Interchangeable Anvil Screw Thread Micrometer

- Anvils and spindle tips are interchangeable in matching pairs to enable measurement of Metric/Unified or Whitworth threads.
- Direct reading of screw pitch diameter (no need for calculation).
- Equipped with Ratchet Stop for constant measuring force.
- Interchangeable anvils/spindle tips are optional.

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326-351-30



Interchangeable anvils / spindle tips (optional).

### Specifications

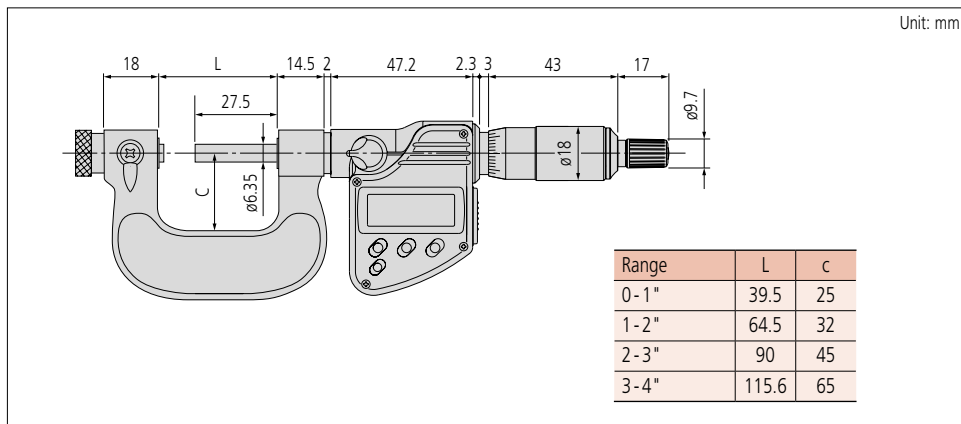
Inch/Metric

Code No.	Range	Resolution	Accuracy*	Price
326-351-30	0 - 1" (0 - 25.4 mm)	.00005" (0.001 mm)	±.0002" (±4 μm)	£575.00
326-352-30	1 - 2" (25.4 - 50.8 mm)			£630.00
326-353-30	2 - 3" (50.8 - 76.2 mm)			£660.00
326-354-30	3 - 4" (76.2 - 101.6 mm)			£637.00

\* Excluding quantizing error.

Note: A matching setting standard is supplied with each model (except for 0 - 25 mm measuring range). The setting standard is for metric threads (unified) 60°.

### Dimensions



### Technical Data

Spindle feed error: .00015" (3 μm)  
Battery: SR44 (2 pcs) **938882**

### Functions

**Origin point setting** (ABS measurement system):  
Resets the ABS origin at the current spindle position to the minimum value of the measuring range and switches to ABS mode.

**Zero setting** (INC measurement system):  
A brief press on the ZERO/ABS button sets display to zero at the current spindle position and switches to the incremental (INC) measuring mode. A longer press resets to the ABS measuring mode.

**Hold:**  
Pressing the HOLD button freezes the current value in the display. This function is useful for preserving a measurement in situations of poor visibility where the instrument must be moved away from the workpiece before the reading can be recorded.

**Auto power ON/OFF:**  
The reading on the LCD disappears after this instrument is idle for about 20 minutes, but the reading and measurement mode are retained. Turning the spindle causes the reading to reappear.

**Data output:**  
Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

**Error alarm:**  
In the unlikely event of a display overflow or calculation error, an error message is displayed and measurement stops. Measurement cannot continue until the error is corrected. Also, if the battery voltage drops below a certain point, the battery indicator will turn on before measurement becomes impossible, warning the user that the battery needs to be replaced.

### Optional Accessories

Code No.	Description	Price
264-622	U-WAVE-TM transmitter	£193.00
02AZF310	U-WAVE-TM connection unit	£62.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB input tool direct USB-ITN-B (2 m)	£126.00

Interchangeable anvil / spindle tip sets refer to page B-30.  
Setting standards refer to page B-67.



## Technical Data

Spindle feed error: 3 µm/.00015"

## Optional Accessories

Interchangeable anvils/spindle tips



For Metric/Unified threads (pair)

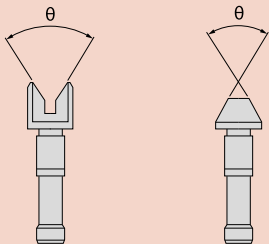
Code No.	Metric	UNF	Price
126-801	0.4 - 0.5 mm	64 - 48	£48.20
126-802	0.6 - 0.9 mm	44 - 28	£48.20
126-803	1 - 1.75 mm	24 - 14	£48.20
126-804	2 - 3 mm	13 - 9	£48.20
126-805	3.5 - 5 mm	8 - 5	£48.20
126-806	5.5 - 7 mm	4.5 - 3.5	£48.20

For Whitworth threads (pair)

Code No.	TPI	Price
126-811	60 - 48	£48.20
126-812	48 - 40	£48.20
126-813	40 - 32	£48.20
126-814	32 - 24	£48.20
126-815	24 - 18	£48.20
126-816	18 - 14	£48.20
126-817	14 - 10	£48.20
126-818	10 - 7	£48.20
126-819	7 - 4.5	£48.20
126-820	4.5 - 3.5	£48.20

Sets

Code No.	Description	Price
126-800	Consists of 126-801 to 126-806	£321.00
126-810	Consists of 126-811 to 126-820	£532.00



Allowable error in the vee/cone angles

Type	Metric (Unified)	Whitworth	Half-angle error
Pitch (mm), Nominal designation of threads per inch		W1	±30'
	M1 (U1)	W2	±30'
		W3	±20'
	M2 (U2)	W4	±20'
		W5	±15'
	M3 (U3)	W6	±15'
		W7	±10'
	M4 (U4)	W8	±10'
		W9	±10'
	M5 (U5)	W10	±10'
			±10'

Setting standards refer to page B-67.

## SERIES 126 – Interchangeable Anvil Screw Thread Micrometer

- Anvils and spindle tips are interchangeable in matching pairs to enable measurement of Metric/Unified or Whitworth threads.
- Direct reading of screw pitch diameter (no need for calculation).
- Equipped with Ratchet Stop for constant measuring force.
- Interchangeable anvils/spindle tips are optional.



126-137

## Specifications

Metric				
Code No.	Range	Graduation	Accuracy	Price
126-125	0 - 25 mm	0.01 mm	±4 µm	£226.00
126-126	25 - 50 mm			£284.00
126-127	50 - 75 mm			£292.00
126-128	75 - 100 mm		±5 µm	£302.00
126-129	100 - 125 mm			£350.00
126-130	125 - 150 mm			£417.00
126-131	150 - 175 mm			£508.00
126-132	175 - 200 mm		±6 µm	£589.00
126-133	200 - 225 mm			£618.00
126-134	225 - 250 mm			£621.00
126-135	250 - 275 mm	±7 µm	£730.00	
126-136	275 - 300 mm		£745.00	

Inch				
Code No.	Range	Graduation	Accuracy	Price
126-137	0 - 1"	.001"	±.0002"	£226.00
126-138	1 - 2"			£284.00
126-139	2 - 3"			£292.00
126-140	3 - 4"		±.00025"	£302.00
126-141	4 - 5"			£350.00
126-142	5 - 6"			£417.00
126-143	6 - 7"			£508.00

Note: A matching setting standard is supplied with each model (except for 0 - 25 mm measuring range). The standard is for metric threads (unified) 60°.

## Dimensions

Unit: mm					
Range	L	c	Range	L	c
0 - 25 mm	39.5	25	150 - 175 mm	190.5	105
25 - 50 mm	64.5	32	175 - 200 mm	215.5	120
50 - 75 mm	90	45	200 - 225 mm	240.5	130
75 - 100 mm	115.6	65	225 - 250 mm	265.5	147
100 - 125 mm	140.6	79	250 - 275 mm	290.5	165
125 - 150 mm	165.6	93	275 - 300 mm	315.5	171

# Micrometers

## SERIES 313 – Three-Wire Units

- Enables measurement of the pitch diameter (effective diameter) of screw threads with a standard micrometer using the *three-wire method*.



952141

### Technical Data

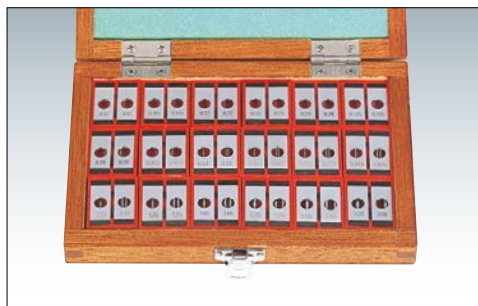
Roundness:	0.5 µm or less
Cylindricity:	1 µm or less
Hardness:	63 to 66 HRC
Accuracy:	±2 µm



### Specifications

Code No.	No. of units in set	Wire diameter range (mm)	Support spindle (mm)	Price
Three-wire unit set				
313-101	18	0.170 - 3.200	ø6.35	£2910.00

Code No.	Wire diameter (mm)	Thread type			Price
		Metric (mm)	Unified (threads per inch)	Whitworth (threads per inch)	
One pair, support spindle ø6.35 mm (ø.25")					
952131	0.170	0.2, 0.25, 0.3	80	—	£165.00
952132	0.195	0.35	72	—	£165.00
952133	0.220	0.4	64	—	£165.00
952134	0.250	0.45	56	60	£165.00
952135	0.290	0.5	48	48	£165.00
952136	0.335	0.6	44, 40	40	£165.00
952137	0.390	0.7	36	36	£165.00
952138	0.455	0.75, 0.8	32	32	£165.00
952139	0.530	0.9	28	28, 26	£165.00
952140	0.620	1.0	24	24, 22	£165.00
952141	0.725	1.25	20	20, 19, 18	£165.00
952142	0.895	1.5	18, 16	16	£165.00
952143	1.100	1.75, 2.0	14, 13, 12	14, 12	£165.00
952144	1.350	2.5	11, 10	11, 10	£165.00
952145	1.650	3.0	9, 8	9, 8	£165.00
952146	2.050	3.5	7	7	£165.00
952147	2.550	4, 4.5	6	6	£165.00
952148	3.200	5, 5.5, 6	5, 4.5	5, 4.5	£165.00



313-101



## SERIES 169 – Paper Thickness Micrometer

- Ideal where a greater contact area is advantageous such as when measuring soft and thin workpieces such as paper, felt, rubber, cardboard, fabrics and similar materials.
- Non-rotating spindle ensures no twisting action is applied to the material being measured.
- Equipped with Ratchet Stop for constant measuring force ( $8 \pm 0.8\text{ N}$ ).

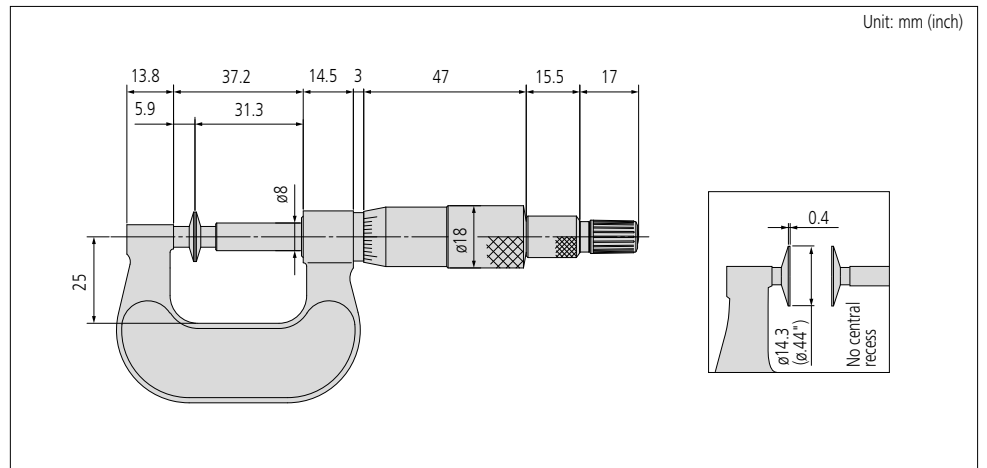


169-103

### Specifications

Metric						
Code No.	Range	Graduation	Accuracy	Flatness	Parallelism	Price
169-101	0-25 mm	0.01 mm	$\pm 4\ \mu\text{m}$	1 $\mu\text{m}$	3 $\mu\text{m}$	£202.00
Inch						
Code No.	Range	Graduation	Accuracy	Flatness	Parallelism	Price
169-103	0-1"	.001"	$\pm .0002$ "	.00004"	.00012"	£202.00

### Dimensions



# Micrometers

## SERIES 323 – Digimatic Disc Micrometer

- Can be used for making root tangent measurements on spur gears and helical gears.
- Equipped with Ratchet Stop for constant measuring force.
- Supplied with a setting standard (except for 0-25 mm/0-1" measuring range).

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323-350-30

### Specifications

Inch/Metric

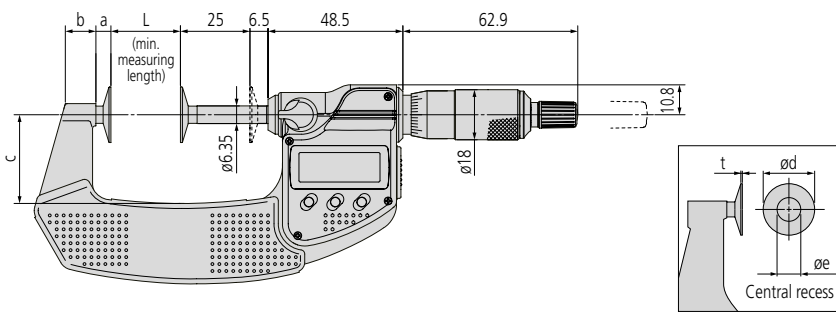
Code No.	Range	Resolution	Accuracy*	Anvil	Measurable module	Price
323-350-30	0-1" (0-25.4 mm)	.00005" (0.001 mm)	±.0002" (± 4 μm)	ø.787" (ø20 mm)	0.5-6	£490.00
323-351-30	1-2" (25.4-50.8 mm)					£540.00
323-352-30	2-3" (50.8-76.2 mm)		£570.00			
323-353-30	3-4" (76.2-101.6 mm)		±.0003" (± 6 μm)			£650.00

\* Excluding quantizing error.

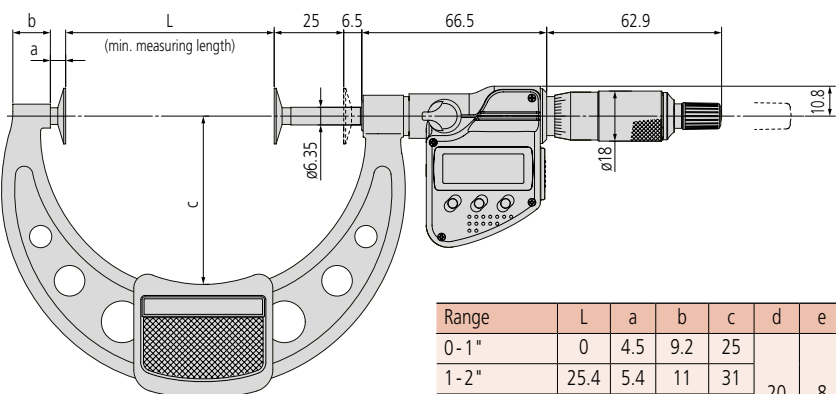
### Dimensions

Models up to 3" maximum measuring range

Unit: mm



Model with 3-4" measuring range



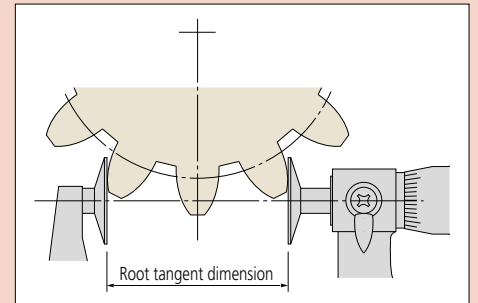
Range	L	a	b	c	d	e	t
0-1"	0	4.5	9.2	25	20	8	0.7
1-2"	25.4	5.4	11	31			
2-3"	50.8	5.5	12.2	50			
3-4"	76.2	14	60	60			

### Technical Data

Flatness:	.00004" (1 μm)
Parallelism:	.0002" (4 μm) for models up to 2", .0003" (6 μm) for models up to 4"
Battery:	SR44 (2 pcs) <b>938882</b>

### Optional Accessories

Code No.	Description	Price
264-622	U-WAVE-TM transmitter	£193.00
02AZF310	U-WAVE-TM connection unit	£62.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB input tool direct USB-ITN-B (2 m)	£126.00

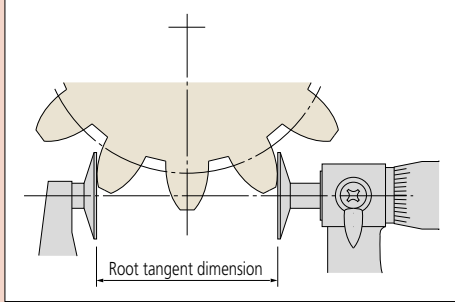


Root tangent measurement.

## Technical Data

Flatness:	1 $\mu\text{m}$ / .00004" for models up to 100 mm / 4", 1.6 $\mu\text{m}$ / .00063" for models over 100 mm / 4"
Parallelism:	4 $\mu\text{m}$ / .0002" for models up to 50 mm / 2", 6 $\mu\text{m}$ / .0003" for models up to 100 mm / 4"

\* R = max. range (mm).  
Note: Fractions rounded up.



Root tangent (En).

## SERIES 123 – Disc Micrometer

- Can be used for making root tangent measurements on spur gears and helical gears.
- Equipped with Ratchet Stop for constant measuring force.
- Supplied with a setting standard (except for 0-25 mm/0-1" measuring range).



## Specifications

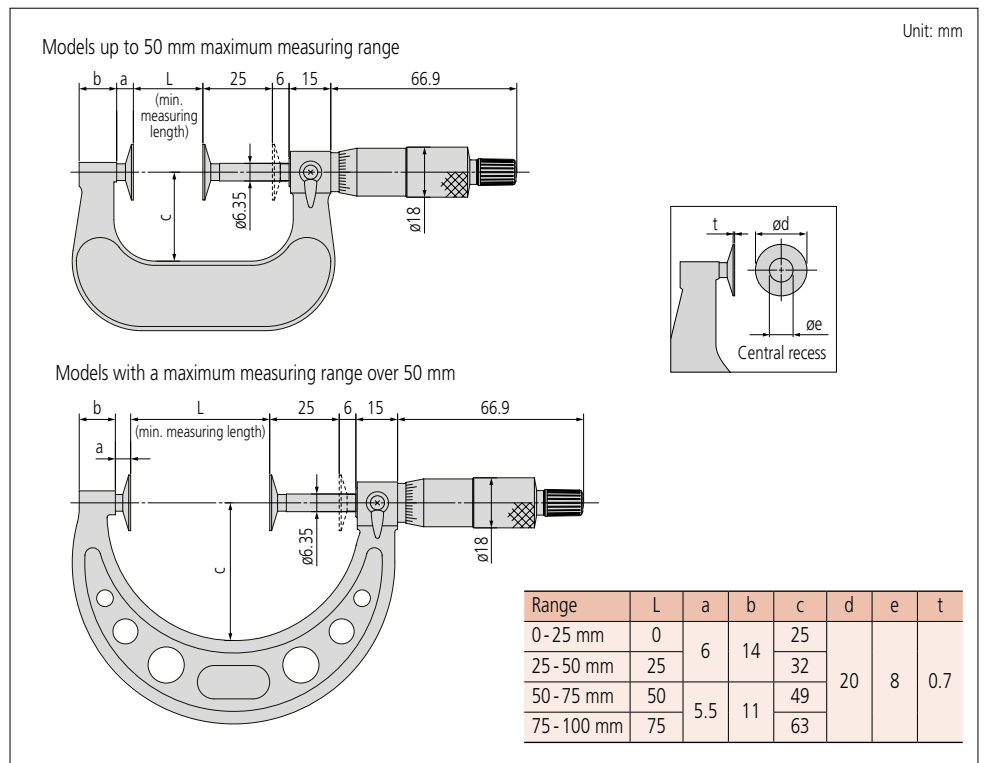
### Metric

Code No.	Range	Graduation	Accuracy	Anvil	Measurable module	Price
123-101	0 - 25 mm	0.01 mm	$\pm 4 \mu\text{m}$	$\varnothing 20 \text{ mm}$	0.5 - 6	<b>£197.00</b>
123-102	25 - 50 mm					<b>£222.00</b>
123-103	50 - 75 mm		$\pm 6 \mu\text{m}$			<b>£243.00</b>
123-104	75 - 100 mm					<b>£257.00</b>

### Inch

Code No.	Range	Graduation	Accuracy	Anvil	Measurable module	Price
123-125	0 - 1"	.001"	$\pm .0002"$	$\varnothing .787"$	0.5 - 6	<b>£197.00</b>
123-126	1 - 2"					<b>£222.00</b>
123-127	2 - 3"		$\pm .0003"$			<b>£243.00</b>
123-128	3 - 4"					<b>£257.00</b>

## Dimensions



# Micrometers

## SERIES 324 – Digimatic Interchangeable Anvil Gear Tooth Micrometer

- Intended for making *over-pin diameter* measurements on gears using precision ball anvils/spindle tips.
- Interchangeable steel (or carbide) ball anvils/spindle tips for various gear modules (0.5 - 5.25) are optional (see page B-36 for details).
- Equipped with Ratchet Stop for constant measuring force.

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324-351-30

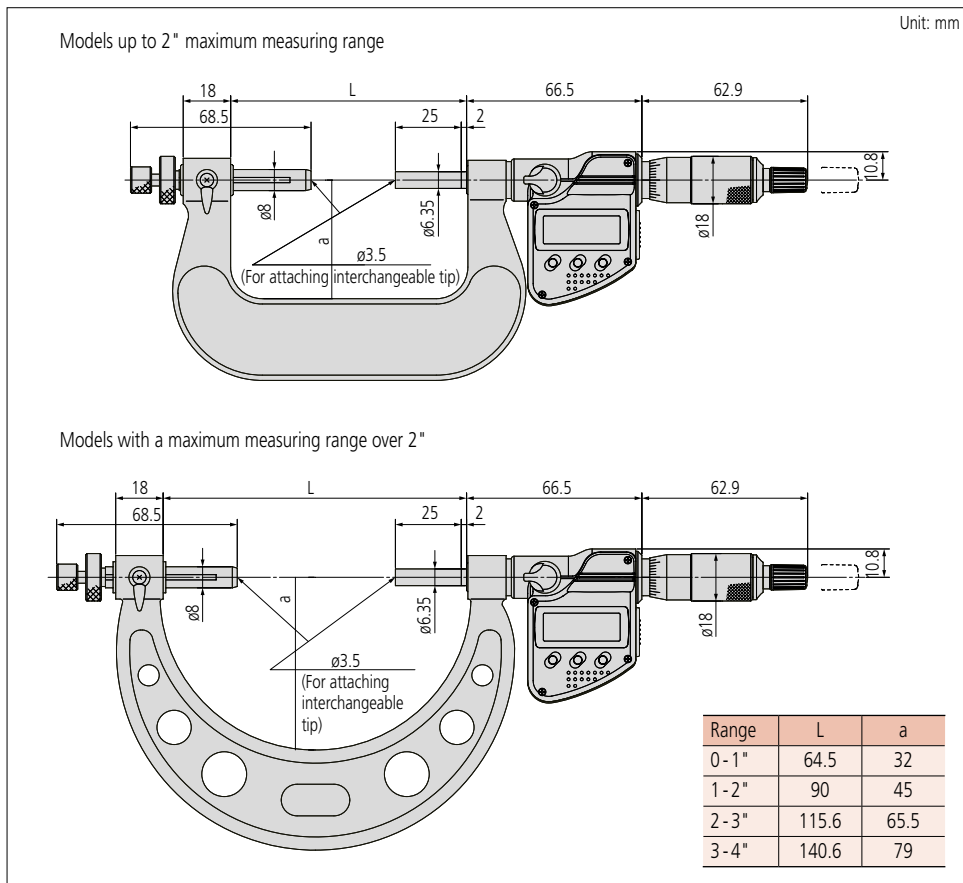
### Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy*	Price
324-351-30	0 - 1" (0 - 25.4 mm)	.00005" (0.001 mm)	±.0002" (± 4 μm)	£590.00
324-352-30	1 - 2" (25.4 - 50.8 mm)			£629.00
324-353-30	2 - 3" (50.8 - 76.2 mm)			£664.00
324-354-30	3 - 4" (76.2 - 101.6 mm)			£709.00

\* Excluding quantizing error.

### Dimensions



### Technical Data

Battery: SR44 (2 pcs) **938882**

### Optional Accessories

Code No.	Description	Price
264-622	U-WAVE-TM transmitter	£193.00
02AZF310	U-WAVE-TM connection unit	£62.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB input tool direct USB-ITN-B (2 m)	£126.00

Interchangeable anvil / spindle tip sets refer to page B-36.





## Interchangeable Anvils / Spindle Tips

Code No.	Diameter* (mm)	Gear module	Dia. pitch	Price
124-801	ø0.8	0.5-0.55	50	£95.00
124-802	ø1.0	0.6-0.65	45	£95.00
124-803	ø1.191 ( $\frac{3}{64}$ " )	0.7-0.8	35-30	£95.00
124-821	ø1.5	0.9-1	28-26	£95.00
124-804	ø1.588 ( $\frac{1}{16}$ " )	0.9-1	28-26	£95.00
124-805	ø2.0	1.25	22	£95.00
124-806	ø2.381 ( $\frac{3}{32}$ " )	1.5	17	£95.00
124-822	ø2.5	1.5	17	£95.00
124-807	ø3.0	1.75	15	£95.00
124-808	ø3.175 ( $\frac{1}{8}$ " )	—	14	£95.00
124-823	ø3.5	2	13	£95.00
124-809	ø3.969 ( $\frac{5}{32}$ " )	2	13	£95.00
124-810	ø4.0	2.25	11	£95.00
124-824	ø4.5	2.5	10	£95.00
124-811	ø4.763 ( $\frac{3}{16}$ " )	2.5	10	£95.00
124-812	ø5.0	2.75	9	£95.00
124-813	ø5.556 ( $\frac{7}{32}$ " )	3.0-3.25	8	£95.00
124-814	ø6.0	3.5	7	£95.00
124-815	ø6.35 ( $\frac{1}{4}$ " )	3.75	7	£95.00
124-816	ø7.0	4.0	6.5	£95.00
124-817	ø7.144 ( $\frac{9}{32}$ " )	4.25	6	£95.00
124-818	ø7.938 ( $\frac{5}{16}$ " )	4.5	5.5	£95.00
124-819	ø8.0	4.75	5.5	£95.00
124-820	ø8.731 ( $\frac{11}{32}$ " )	0.5-5.25	5	£95.00

\* ø2 mm or less /carbide-tipped type.

## SERIES 124 – Interchangeable Anvil Gear Tooth Micrometer

- Intended for making *over-pin diameter* measurements on gears using precision ball anvils/spindle tips.
- Interchangeable steel (or carbide) ball anvils/spindle tips for various gear modules (0.5-5.25) are optional.
- Equipped with Ratchet Stop for constant measuring force.

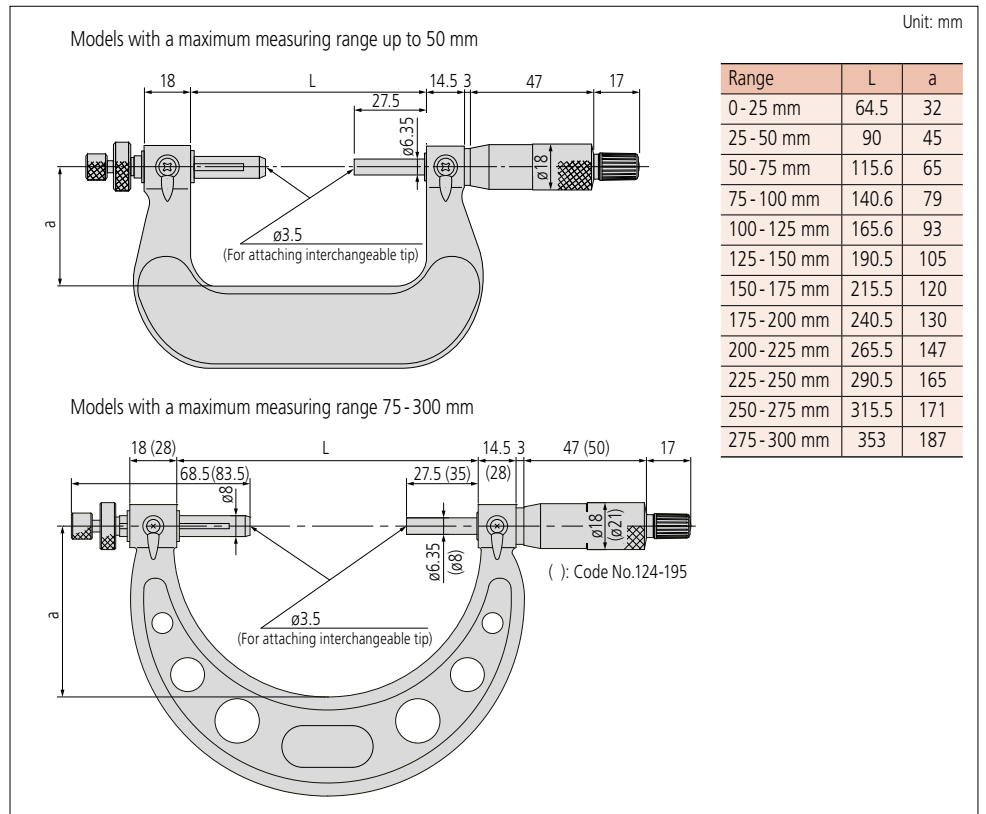


124-173

### Specifications

Metric				
Code No.	Range	Graduation	Accuracy	Price
124-173	0-25 mm	0.01 mm	±4 μm	£270.00
124-174	25-50 mm			£290.00
124-175	50-75 mm			£310.00
124-176	75-100 mm		±5 μm	£320.00
124-177	100-125 mm			£340.00
124-178	125-150 mm			£360.00
124-179	150-175 mm		±6 μm	£440.00
124-180	175-200 mm			£470.00
124-181	200-225 mm			£510.00
124-182	225-250 mm		±7 μm	£560.00
124-183	250-275 mm	£590.00		
124-184	275-300 mm	£640.00		
124-195	275-300 mm	£640.00		

### Dimensions



# Micrometers

## SERIES 369 – Digimatic Non-Rotating Spindle Disc Micrometer

- Can be used for making root tangent measurements on spur gears and helical gears.
- Measurable range of gear pitch: 0.5 to 6 module.
- Equipped with Ratchet Stop for constant measuring force.
- Supplied with a setting standard (except for 0-25 mm/0-1" measuring range).

**MeasurLink** ENABLED

Data Management Software by Mitutoyo



369-350-30

### Specifications

Inch/Metric

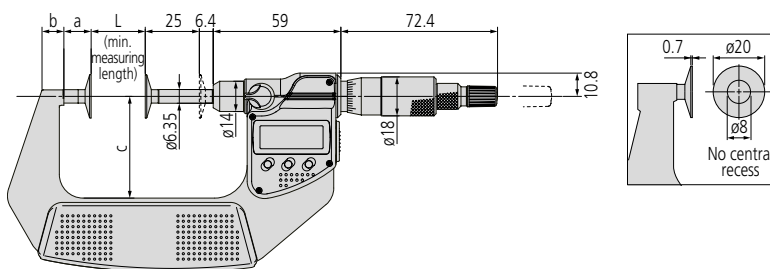
Code No.	Range	Resolution	Accuracy*	Anvil	Flatness	Parallelism	Price
369-350-30	0-1" (0-25.4 mm)	.00005" (0.001 mm)	±.0002" (±4 μm)	ø20	.00004" (1 μm)	.0002" (4 μm)	£630.00
369-351-30	1-2" (25.4-50.8 mm)					.0003" (6 μm)	£714.00
369-352-30	2-3" (50.8-76.2 mm)		±.0003" (±6 μm)			.0003" (6 μm)	£746.00
369-353-30	3-4" (76.2-101.6 mm)					.0003" (6 μm)	£771.00

\* Excluding quantizing error.

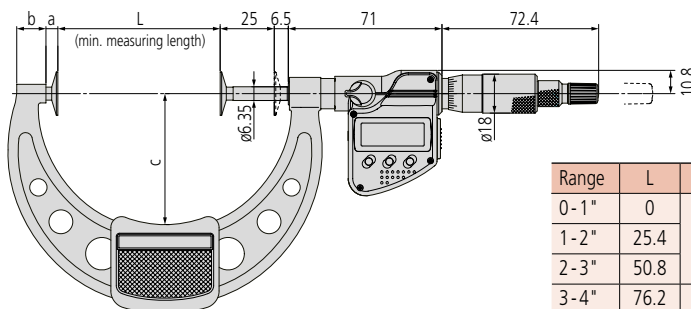
### Dimensions

Models up to 3" maximum measuring range

Unit: mm



Model with 3-4" measuring range



Range	L	a	b	c
0-1"	0		7	32
1-2"	25.4	12.9	9.8	47
2-3"	50.8		11.2	60
3-4"	76.2	5.5	13.5	

### Technical Data

Battery: SR44 (2 pcs) **938882**

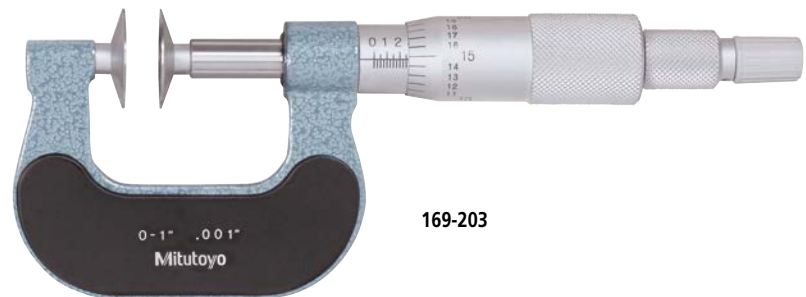
### Optional Accessories

Code No.	Description	Price
264-623	U-WAVE-TM transmitter	£193.00
02AZF310	U-WAVE-TM connection unit	£62.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB input tool direct USB-ITN-B (2 m)	£126.00



## SERIES 169 – Non-Rotating Spindle Disc Micrometer

- Can be used for making root tangent measurements on spur gears and helical gears.
- Measurable range of gear pitch: 0.5 to 6 module.
- Equipped with Ratchet Stop for constant measuring force.
- Supplied with a setting standard (except for 0-25 mm/0-1" measuring range).



169-203

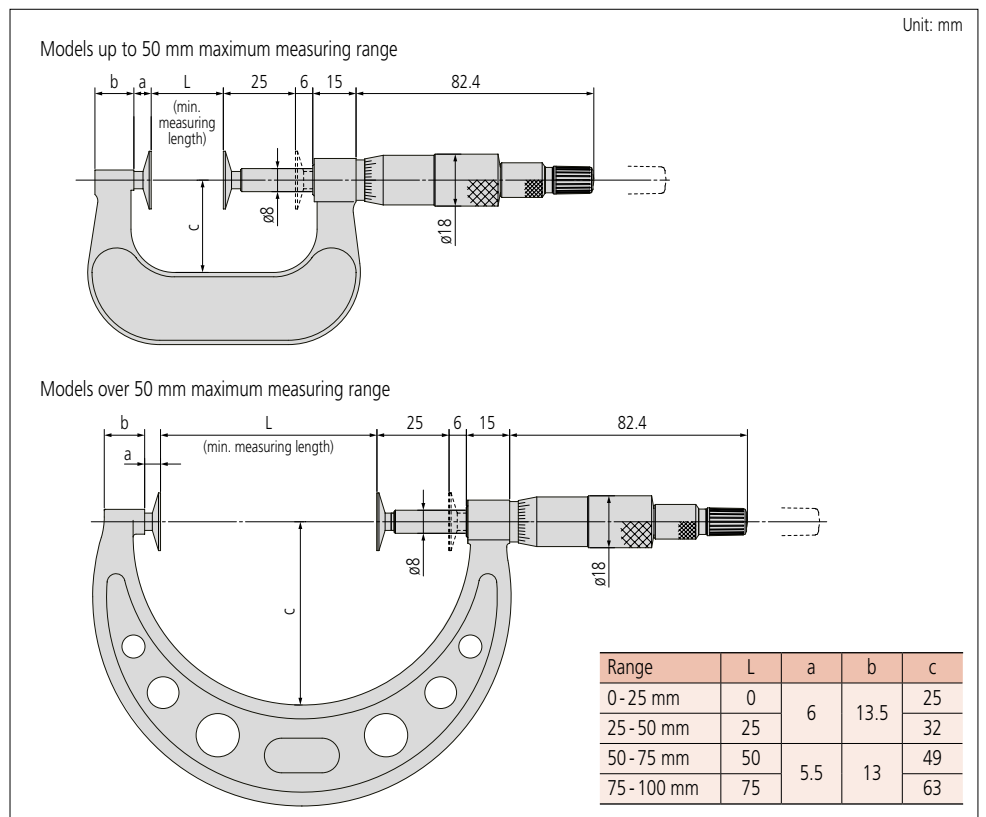
### Specifications

Metric							
Code No.	Range	Graduation	Accuracy	Anvil	Flatness	Parallelism	Price
169-201	0-25 mm	0.01 mm	±4 μm	ø20	1 μm	4 μm	£214.00
169-202	25-50 mm						£242.00
169-205	50-75 mm		±6 μm			6 μm	£261.00
169-207	75-100 mm					£285.00	

Inch							
Code No.	Range	Graduation	Accuracy	Anvil	Flatness	Parallelism	Price
169-203	0-1"	.001"	±.0002"	ø20	.00004"	.00016"	£214.00
169-204	1-2"						£242.00
169-206	2-3"		±.0003"			.00024"	£261.00
169-208	3-4"					£285.00	

### Dimensions



# Micrometers

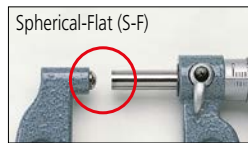
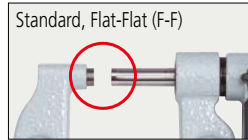
## SERIES 389 – Digimatic Sheet Metal Micrometer

- The large throat depth makes this micrometer ideal for measuring the thickness of sheet metal at a considerable distance from the edge.
- Measuring faces: carbide.
- Equipped with Ratchet Stop for constant measuring force.
- Profile of measuring faces: Flat-Flat, Spherical-Flat and Spherical-Spherical.

MeasurLink<sup>®</sup> ENABLED  
Data Management Software by Mitutoyo



389-351-30



### Specifications

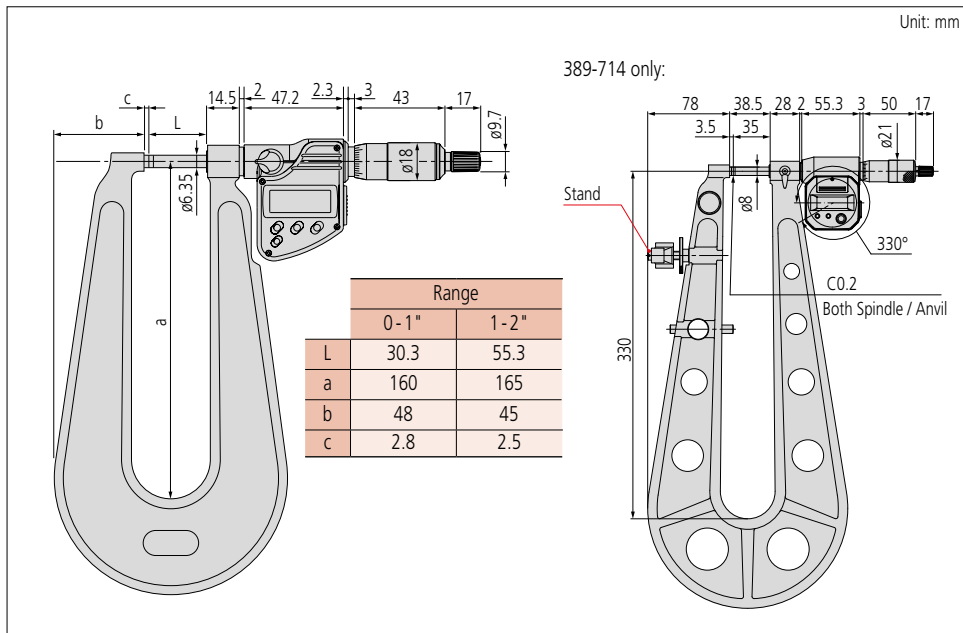
Inch/Metric

Code No.	Range	Resolution	Accuracy* <sup>1</sup>	Throat depth* <sup>2</sup>	Measuring surfaces	Price
389-351-30	0 - 1" (0 - 25.4 mm)	.00005" (0.001 mm)	±.0002" (±4 μm)	6" (150 mm)	F-F	£485.00
S-F					£485.00	
S-S					£485.00	
389-714	1 - 2" (25.4 - 50.8 mm)	.00005" (0.001 mm)	±.00025" (±5 μm)	12" (300 mm)	F-F	£931.00
S-F					£570.00	
S-S					£608.00	
389-352-30	1 - 2" (25.4 - 50.8 mm)	.00005" (0.001 mm)	±.0002" (±4 μm)	6" (150 mm)	F-F	£608.00
S-F					£608.00	
S-S					£608.00	

\*<sup>1</sup> Excluding quantizing error.

\*<sup>2</sup> Models with a 300 mm (12") throat are equipped with a stand for convenience of measurement in the horizontal orientation.

### Dimensions



### Technical Data

Flatness:	.000024" (0.6 μm) for models up to 6" (150 mm) throat, .00004" (1.0 μm) for models with 12" (300 mm) throat
Parallelism:	.00012" (3 μm)
Quantizing error:	Excluding ±1 count
Battery:	SR44 (1 pc), 938882 (2 pcs: 389-714)

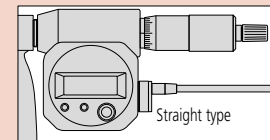
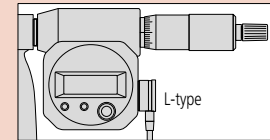
### Optional Accessories

Code No.	Description	Price
264-622	U-WAVE-TM transmitter	£193.00
02AZF310	U-WAVE-TM connection unit	£62.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB input tool direct USB-ITN-B (2 m)	£126.00

For 389-714 only

959149	SPC data cable with pushbutton (1 m)* <sup>3</sup>	£35.70
959150	SPC data cable with pushbutton (2 m)* <sup>3</sup>	£40.60
02AZD790C	U-WAVE-T data cable (160 mm)	£62.00
04AZB512	SPC data cable L-type with pushbutton (1 m)	£67.20
04AZB513	SPC data cable L-type with pushbutton (2 m)	£71.70

\*<sup>3</sup> May interfere with operating the thimble.

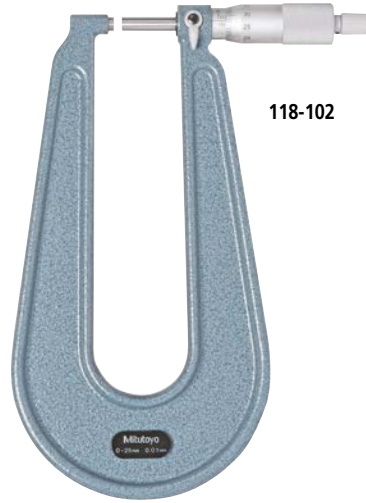


## Technical Data

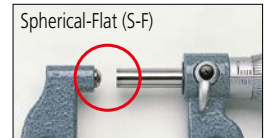
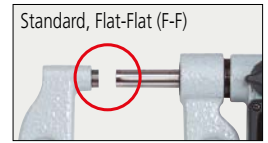
Flatness:	0.6 $\mu\text{m}$ / .000024" for models up to 150 mm / 6" throat, 1.0 $\mu\text{m}$ / .00004" for models with 300 mm / 12" throat
Parallelism:	3 $\mu\text{m}$ / .00012"

## SERIES 118 – Sheet Metal Micrometer

- The large throat depth makes this micrometer ideal for measuring the thickness of sheet metal at a considerable distance from the edge.
- Measuring faces: carbide.
- Profile of measuring faces: Flat-Flat, Spherical-Flat and Spherical-Spherical.
- Equipped with Ratchet Stop for constant measuring force.



118-102



## Specifications

### Metric

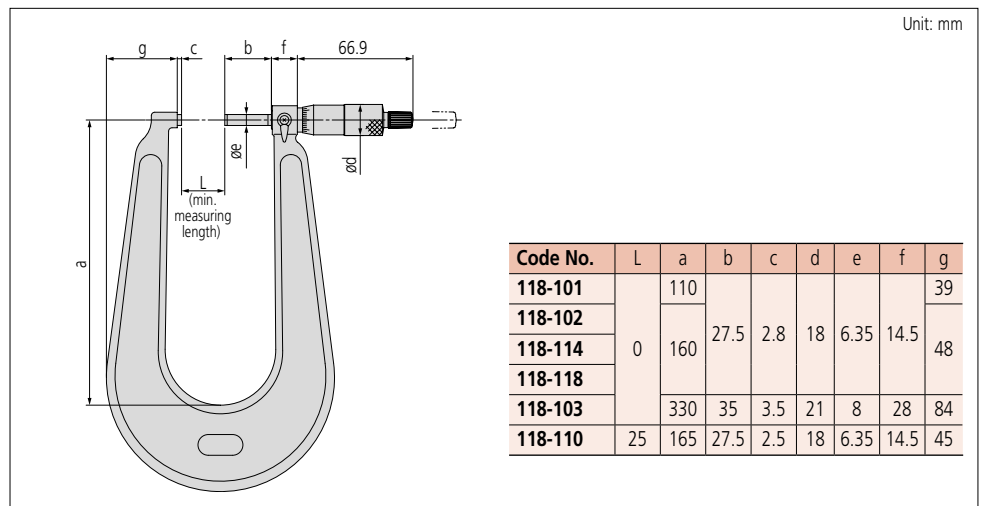
Code No.	Range	Graduation	Accuracy	Throat depth*	Measuring surfaces	Price
118-101	0 - 25 mm	0.01 mm	$\pm 4 \mu\text{m}$	100 mm	F-F	£149.00
118-102					F-F	£158.00
118-114				S-F	£195.00	
118-118				S-S	£202.00	
118-103				300 mm	F-F	£290.00
118-110	25 - 50 mm	0.01 mm	$\pm 4 \mu\text{m}$	150 mm	F-F	£202.00
118-126					S-S	£217.00

### Inch

Code No.	Range	Graduation	Accuracy	Throat depth*	Measuring surfaces	Price
118-129	0 - 1"	.0001"	$\pm .0002$ "	6"	F-F	£158.00
118-116					S-F	£195.00
118-120					S-S	£202.00
118-107	1 - 2"	.001"	$\pm .00025$ "	12"	F-F	£260.00
118-112						$\pm .0002$ "

\* Models with a 300 mm (12") throat are equipped with a stand for convenience of measurement in the horizontal orientation.

## Dimensions



# Micrometers

## SERIES 395,115 – Tube Micrometers

- Designed to measure workpieces with concave-convex surfaces such as the wall thickness of tubes and pipes.
- Measuring faces: carbide (115-101: only the spindle is carbide tipped).
- 395 series: IP65 digital spherical-flat anvil type micrometer.
- Equipped with Ratchet Stop for constant measuring force.

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395-351-30



115-115

### Specifications

#### Inch/Metric

Code No.	Range	Resolution	Accuracy*	D	Price
<b>Digimatic</b>					
395-351-30	0 - 1" (0-25.4 mm)	.00005" (0.001 mm)	±.0001" (±2 μm)	ø.59" (ø15 mm)	£403.00
395-352-30	1 - 2" (25.4-50.8 mm)			ø.75" (ø19 mm)	£439.00
395-353-30	2 - 3" (50.8-76.2 mm)		±.00015" (±3 μm)	ø.75" (ø19 mm)	£487.00
395-354-30	3 - 4" (76.2-101.6 mm)			ø.75" (ø19 mm)	£469.00

#### Metric

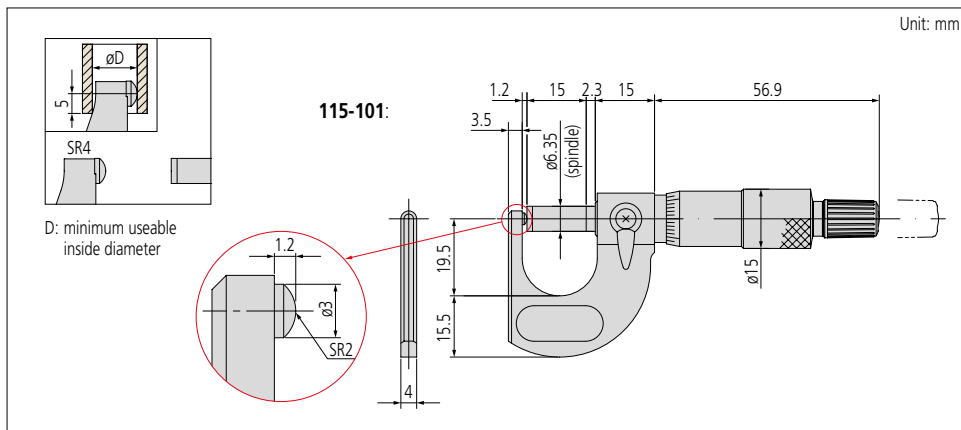
Code No.	Range	Graduation	Accuracy	D	Price
115-101	0 - 15 mm	0.01 mm	±3 μm	ø5.5 mm	£149.00
115-115	0 - 25 mm			ø10 mm	£93.90
115-116	25 - 50 mm			ø11 mm	£95.70
115-117	50 - 75 mm			ø17 mm	£97.80
115-118	75 - 100 mm		±4 μm	ø18 mm	£117.00

#### Inch

Code No.	Range	Graduation	Accuracy	D	Price
115-153	0 - 1"	.0001"	±.00015"	ø.40"	£93.90

\* Excluding quantizing error.

### Dimensions



### Technical Data

Flatness: .000024" / 0.6 μm: 115 series  
.000012" (0.3 μm): 395 series  
Battery: SR44 (1 pc), 938882: 395 series

### Optional Accessories (for 395 series only)

Code No.	Description	Price
264-622	U-WAVE-TM transmitter	£193.00
02AZF310	U-WAVE-TM connection unit	£62.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB input tool direct USB-ITN-B (2 m)	£126.00



## Technical Data

Battery: SR44 (1 pc), **938882**: 395 series

## Optional Accessories (for 395 series only)

Code No.	Description	Price
<b>264-622</b>	U-WAVE-TM transmitter	<b>£193.00</b>
<b>02AZF310</b>	U-WAVE-TM connection unit	<b>£62.00</b>
<b>05CZA662</b>	SPC data cable with pushbutton (1 m)	<b>£69.40</b>
<b>05CZA663</b>	SPC data cable with pushbutton (2 m)	<b>£83.50</b>
<b>06AFM380B</b>	USB input tool direct USB-ITN-B (2 m)	<b>£126.00</b>



## SERIES 395,115 – Spherical Anvil and Spindle Tube Micrometers

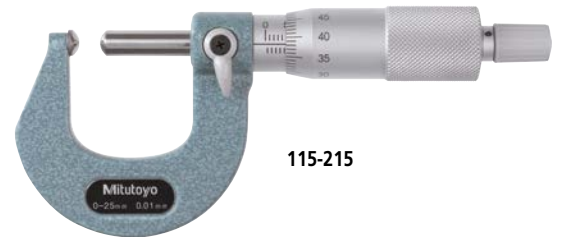
- Designed to measure workpieces with concave surfaces such as the race-wall thickness of anti-friction bearings.
- Measuring faces: carbide (115-201: only the spindle is carbide tipped).
- 395 series: Digimatic type IP65 rated with spherical anvil and spindle.
- Equipped with Ratchet Stop for constant measuring force.

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**IP 65**



395-371-30



115-215

## Specifications

### Inch/Metric

Code No.	Range	Resolution	Accuracy*	D	Price
<b>Digimatic</b>					
<b>395-371-30</b>	0-1" (0-25.4 mm)	.00005" (0.001 mm)	±.0001" (±2 μm)	ø.59" (ø15 mm)	<b>£403.00</b>
<b>395-372-30</b>	1-2" (25.4-50.8 mm)			ø.75" (ø19 mm)	<b>£439.00</b>
<b>395-373-30</b>	2-3" (50.8-76.2 mm)		±.00015" (±3 μm)	ø.79" (ø20 mm)	<b>£487.00</b>
<b>395-374-30</b>	3-4" (76.2-101.6 mm)			<b>£510.00</b>	

### Metric

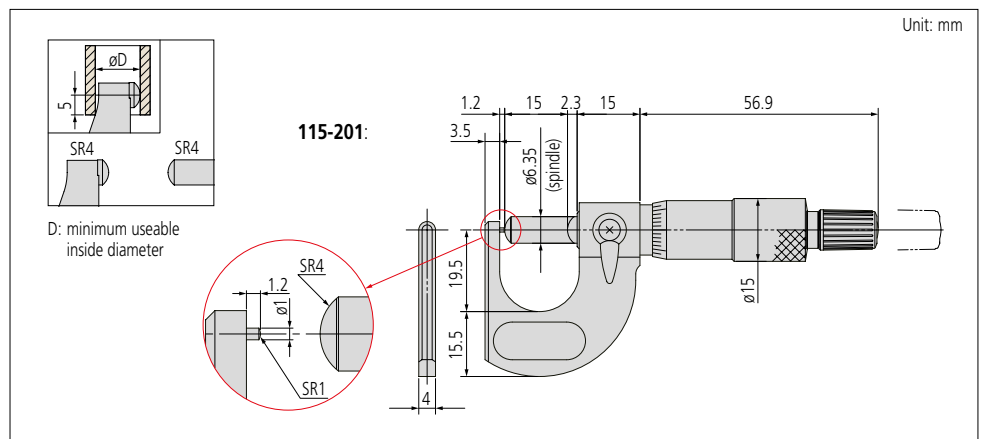
Code No.	Range	Graduation	Accuracy	D	Price
<b>115-201</b>	0-15 mm	0.01 mm	±3 μm	ø5.5 mm	<b>£122.00</b>
<b>115-215</b>	0-25 mm			ø10 mm	<b>£110.00</b>
<b>115-216</b>	25-50 mm			ø11 mm	<b>£120.00</b>
<b>115-217</b>	50-75 mm		ø17 mm	<b>£130.00</b>	
<b>115-218</b>	75-100 mm		±4 μm	ø18 mm	<b>£140.00</b>

### Inch

Code No.	Range	Graduation	Accuracy	D	Price
<b>115-253</b>	0-1"	.0001"	±.00015"	ø.40"	<b>£110.00</b>
<b>115-242</b>	1-2"	.001"		ø.44"	<b>£120.00</b>
<b>115-243</b>	2-3"			ø.67"	<b>£130.00</b>

\* Excluding quantizing error.

## Dimensions



# Micrometers

## SERIES 395,115 – Cylindrical/Spherical Anvil Tube Micrometers

- Spindle face: carbide.
- 395 series: Digimatic type IP65 rated with a choice of spherical or cylindrical anvils.
- Equipped with Ratchet Stop for constant measuring force.

**MeasurLink<sup>®</sup> ENABLED**  
Data Management Software by Mitutoyo

**IP65**

**TÜVRheinland**  
CERTIFIED  
www.tuv.com  
ID 000040191



395-363-30



115-315

### Specifications

#### Inch/Metric

Code No.	Range	Resolution	Type	Price
Digimatic				
395-362-30	0 - 1" (0 - 25.4 mm)	.00005" (0.001 mm)	BMB2	£393.00
395-363-30			BMB3	£451.00
395-364-30			BMB4	£451.00

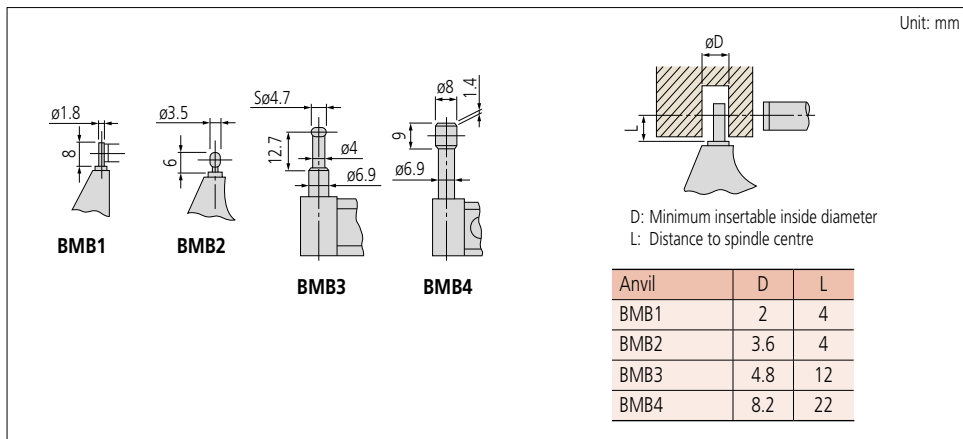
#### Metric

Code No.	Range	Graduation	Type	Price
115-302	0 - 25 mm	0.01 mm	BMB1	£97.40
115-308			BMB2	£114.00
115-303	25 - 50 mm	0.01 mm	BMB1	£107.00
115-315	0 - 25 mm		BMB3	£130.00
115-316		BMB4	£130.00	

#### Inch

Code No.	Range	Graduation	Type	Price
115-305	0 - 1"	.001"	BMB1	£97.40
115-313		.0001"	BMB3	£130.00
115-314		.0001"	BMB4	£130.00

### Dimensions



### Technical Data

Accuracy:  $\pm (2 + L/75) \mu\text{m}^*$   
 Battery: SR44 (1 pc), **938882**: 395 series  
 \* L = measured length in mm.

### Optional Accessories (for 395 series only)

Code No.	Description	Price
264-622	U-WAVE-TM transmitter	£193.00
02AZF310	U-WAVE-TM connection unit	£62.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB input tool direct USB-ITN-B (2 m)	£126.00



BMB1



BMB2



BMB3



BMB4



## Technical Data

Flatness: .000012" (0.3 μm)  
 Parallelism\*1: [.00008+.00004(R/4)]", (2+R/100) μm  
 Battery: SR44 (1 pc), **938882**

Note: Fractions rounded down.  
 \*1 R = max. range (mm/inch).

## Optional Accessories (for 331 series only)

Code No.	Description	Price
<b>264-622</b>	U-WAVE-TM transmitter	<b>£193.00</b>
<b>02AZF310</b>	U-WAVE-TM connection unit	<b>£62.00</b>
<b>05CZA662</b>	SPC data cable with pushbutton (1 m)	<b>£69.40</b>
<b>05CZA663</b>	SPC data cable with pushbutton (2 m)	<b>£83.50</b>
<b>06AFM380B</b>	USB input tool direct USB-ITN-B (2 m)	<b>£126.00</b>



## SERIES 331 – Digimatic Spline Micrometer

- The anvil and spindle are of small diameter for measuring splined shafts, slots, and keyways.
- Measuring faces: carbide.
- Equipped with Ratchet Stop for constant measuring force.

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 Data Management Software by Mitutoyo



**331-351-30**

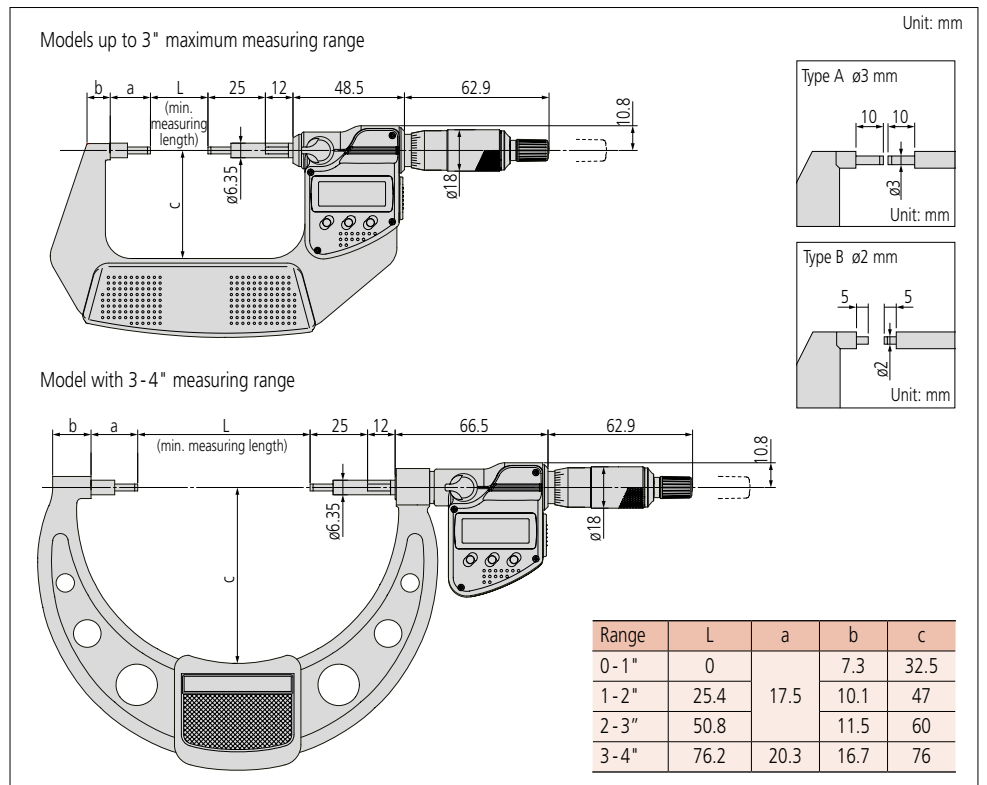
## Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy*2	Remarks	Price
<b>331-351-30</b>	0 - 1" (0 - 25.4 mm)	.00005" (0.001 mm)	±.0001" (±2 μm)	Type A	<b>£450.00</b>
<b>331-352-30</b>	1 - 2" (25.4 - 50.8 mm)				<b>£520.00</b>
<b>331-353-30</b>	2 - 3" (50.8 - 76.2 mm)				<b>£540.00</b>
<b>331-354-30</b>	3 - 4" (76.2 - 101.6 mm)				<b>£620.00</b>
<b>331-361-30</b>	0 - 1" (0 - 25.4 mm)		±.00015" (±3 μm)	Type B	<b>£510.00</b>
<b>331-362-30</b>	1 - 2" (25.4 - 50.8 mm)				<b>£569.00</b>
<b>331-363-30</b>	2 - 3" (50.8 - 76.2 mm)				<b>£605.00</b>
<b>331-364-30</b>	3 - 4" (76.2 - 101.6 mm)				<b>£629.00</b>

\*2 Excluding quantizing error.

## Dimensions



# Micrometers

## SERIES 111 – Spline Micrometer

- The anvil and spindle are of small diameter for measuring splined shafts, slots, and keyways.
- Measuring faces: carbide.
- Equipped with Ratchet Stop for constant measuring force.

### Technical Data

Flatness: 0.3  $\mu\text{m}$  / .000012"  
 Parallelism\*: (2+R/100)  $\mu\text{m}$ , [.00008+.00004(R/4)]"  
 Note: Fractions rounded down.  
 \* R = max. range (mm/inch).

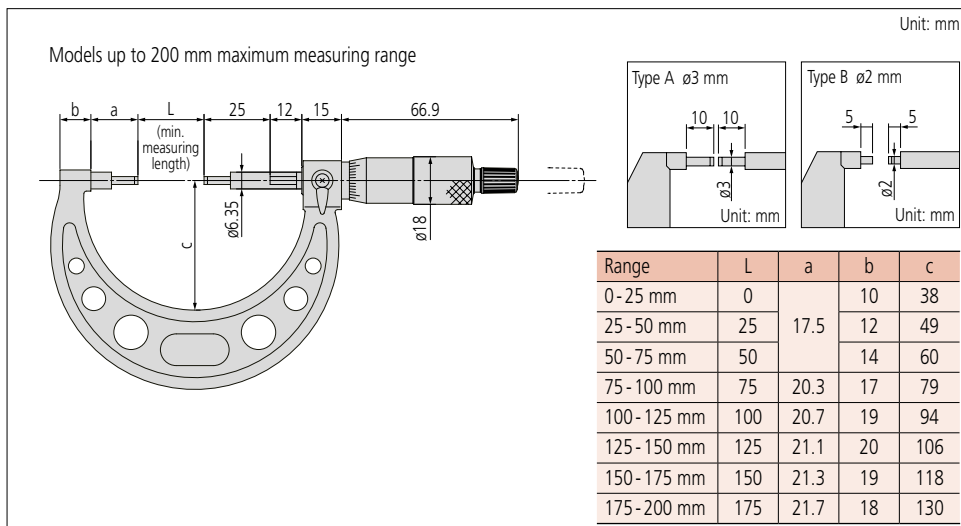


111-115

### Specifications

Metric						
Code No.	Range	Graduation	Accuracy	Type	Price	
111-215	0 - 25 mm	0.01 mm	$\pm 3 \mu\text{m}$	B	£155.00	
111-115	0 - 25 mm			A	£147.00	
111-116	25 - 50 mm			A	£170.00	
111-117	50 - 75 mm			A	£190.00	
111-118	75 - 100 mm		$\pm 4 \mu\text{m}$	A	£203.00	
111-119	100 - 125 mm			A	£298.00	
111-120	125 - 150 mm			A	£312.00	
111-121	150 - 175 mm			A	£347.00	
111-122	175 - 200 mm		$\pm 5 \mu\text{m}$	A	£370.00	
111-123	200 - 225 mm			A	£403.00	
111-124	225 - 250 mm			A	£420.00	
111-125	250 - 275 mm			A	£440.00	
111-126	275 - 300 mm		$\pm 6 \mu\text{m}$	A	£522.00	
Inch						
Code No.	Range		Graduation	Accuracy	Type	Price
111-166	0 - 1"	.0001"	$\pm .00015"$	A	£147.00	

### Dimensions



## Technical Data

Battery: SR44 (1 pc), 938882

## Optional Accessories

Code No.	Description	Price
264-622	U-WAVE-TM transmitter	£193.00
02AZF310	U-WAVE-TM connection unit	£62.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB input tool direct USB-ITN-B (2 m)	£126.00



## SERIES 342 – Digimatic Point Micrometer

- Pointed spindle and anvil for measuring the web thickness of drills, small grooves, keyways, and other hard-to-reach features.
- The measuring points (carbide tipped) have, approximately, a 0.3 mm radius.
- Equipped with Ratchet Stop for constant measuring force.

MeasurLink<sup>1</sup> ENABLED  
Data Management Software by Mitutoyo

IP 65



342-351-30

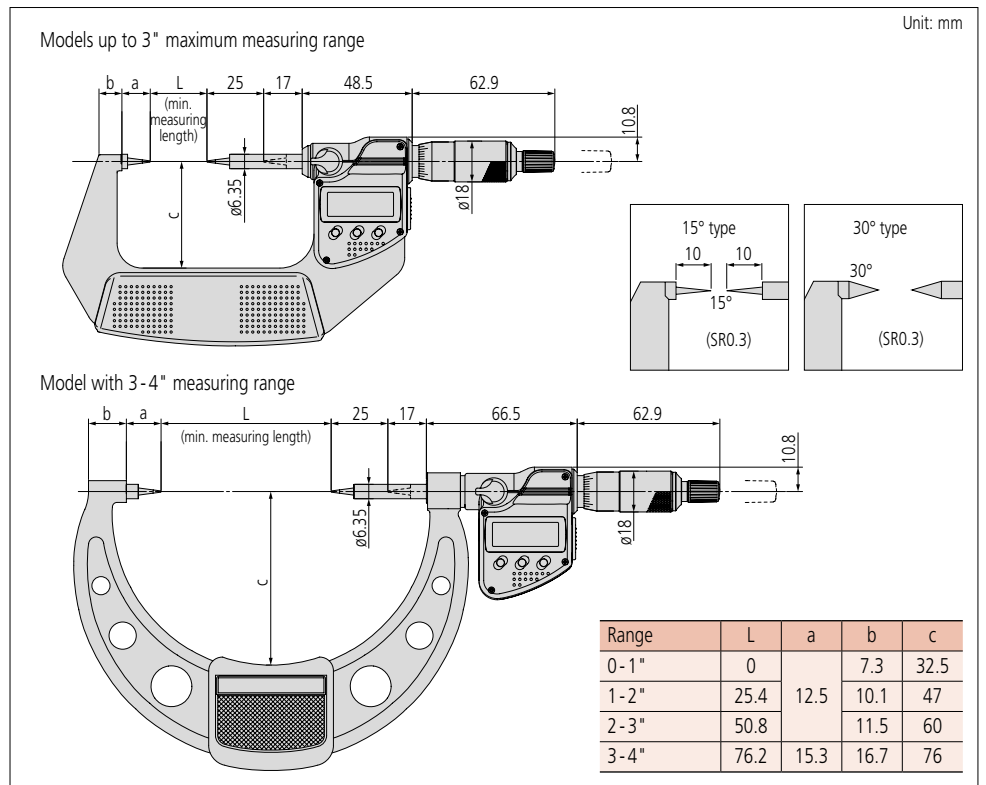
## Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy*	Point	Price
342-351-30	0-1" (0-25.4 mm)	.00005" (0.001 mm)	±.0001" (±2 μm)	15°	£440.00
342-352-30	1-2" (25.4-50.8 mm)				£530.00
342-353-30	2-3" (50.8-76.2 mm)				£550.00
342-354-30	3-4" (76.2-101.6 mm)		±.00015" (±3 μm)	30°	£607.00
342-361-30	0-1" (0-25.4 mm)		±.0001" (±2 μm)		£440.00
342-362-30	1-2" (25.4-50.8 mm)		±.0001" (±2 μm)		£530.00
342-363-30	2-3" (50.8-76.2 mm)		±.0001" (±2 μm)		£550.00
342-364-30	3-4" (76.2-101.6 mm)		±.00015" (±3 μm)	±.00015" (±3 μm)	£607.00

\* Excluding quantizing error.

## Dimensions



# Micrometers

## SERIES 112 – Point Micrometer

- Pointed spindle and anvil for measuring the web thickness of drills, small grooves, keyways, and other hard-to-reach features.
- The measuring points (carbide tipped) have, approximately, a 0.3 mm radius.
- Equipped with Ratchet Stop for constant measuring force.



112-225

### Specifications

#### Metric

Code No.	Range	Graduation	Accuracy	Point	Price
112-153	0 - 25 mm	0.01 mm	±3 μm	15°	£124.00
112-154	25 - 50 mm				£153.00
112-155	50 - 75 mm				£214.00
112-156	75 - 100 mm				£261.00
112-201	0 - 25 mm		±3 μm	30°	£125.00
112-202	25 - 50 mm				£175.00
112-203	50 - 75 mm				£214.00
112-204	75 - 100 mm				£230.00

#### With carbide tip

112-165	0 - 25 mm	0.01 mm	±3 μm	15°	£216.00
112-166	25 - 50 mm				£246.00
112-167	50 - 75 mm				£261.00
112-168	75 - 100 mm				£345.00
112-213	0 - 25 mm		±3 μm	30°	£186.00
112-214	25 - 50 mm				£214.00
112-215	50 - 75 mm				£225.00
112-216	75 - 100 mm				£285.00

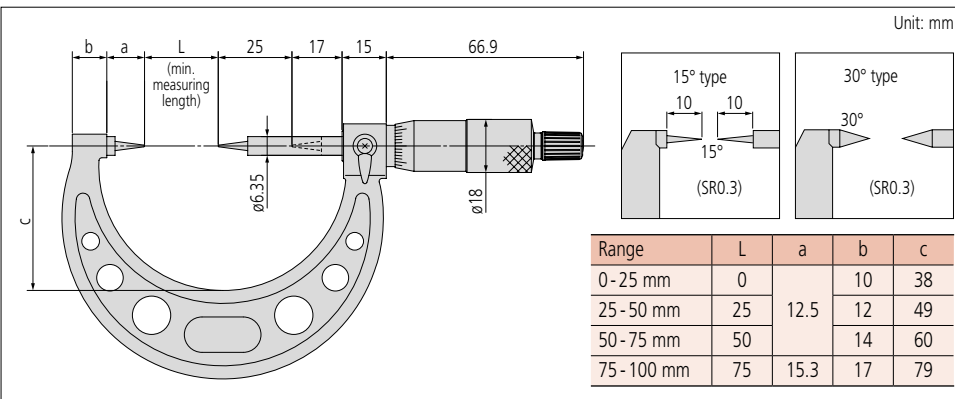
#### Inch

Code No.	Range	Graduation	Accuracy	Point	Price
112-177	0 - 1"	.001"	±.00015"	15°	£124.00
112-178	1 - 2"				£153.00
112-225	0 - 1"			30°	£125.00
112-226	1 - 2"				£175.00

#### With carbide tip

112-189	0 - 1"	.001"	±.00015"	15°	£232.00
112-190	1 - 2"				£246.00
112-191	2 - 3"				£297.00
112-237	0 - 1"			30°	£186.00
112-238	1 - 2"				£214.00

### Dimensions



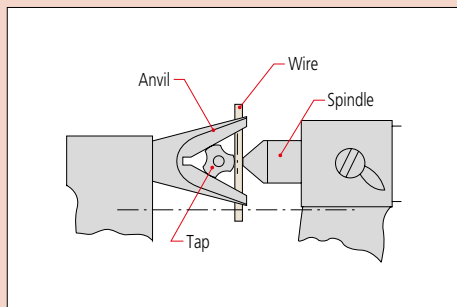
## Technical Data

Battery: SR44 (1 pc), **938882**

## Optional Accessories

Code No.	Description	Price
<b>264-623</b>	U-WAVE-TM transmitter	<b>£193.00</b>
<b>02AZF310</b>	U-WAVE-TM connection unit	<b>£62.00</b>
<b>05CZA662</b>	SPC data cable with pushbutton (1 m)	<b>£69.40</b>
<b>05CZA663</b>	SPC data cable with pushbutton (2 m)	<b>£83.50</b>
<b>06AFM380B</b>	USB input tool direct USB-ITN-B (2 m)	<b>£126.00</b>

Setting standards refer to page B-67.



Pitch diameter measurement of tap by single-wire method.

## SERIES 314 – Digimatic V-Anvil Micrometer

- Measures the outside diameter of cutting tools (such as taps, reamers, end mills) which have three flutes.
- Can measure pitch diameter of screw threads.
- Measuring faces: carbide.
- Equipped with Ratchet Stop for constant measuring force.

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**314-351-30**

## Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy*	Remarks	Anvil	Price
<b>For 3-flute cutting tools</b>						
<b>314-351-30</b>	.05 - .6" (1.27 - 15.24 mm)	.00005" (0.001 mm)	±.0002" (±4 μm)	Grooved	60°	<b>£637.00</b>
<b>314-352-30</b>	.4 - 1" (10.16 - 25.4 mm)					<b>£709.00</b>
<b>314-353-30</b>	1 - 1.6" (25.4 - 40.64 mm)		±.00025" (±5 μm)	—		<b>£759.00</b>
<b>314-361-30</b>	.05 - .6" (1.27 - 15.24 mm)		—	—		<b>£637.00</b>
<b>314-362-30</b>	.4 - 1" (10.16 - 25.4 mm)		±.0002" (±4 μm)	—		<b>£709.00</b>

\* Excluding quantizing error.

## Dimensions

Unit: mm

**314-351-30:**

Grooveless model

Grooved model

**314-353-30:**

Range	(a)
.4 - 1"	6.2
1 - 1.6"	19.14

# Micrometers

## SERIES 114 – Three-Flute V-Anvil Micrometer

- Measures the outside diameter of cutting tools (such as taps, reamers, end mills) which have three flutes.
- Can measure pitch diameter of screw threads.
- Equipped with Ratchet Stop for constant measuring force.



114-101



114-102

### Specifications

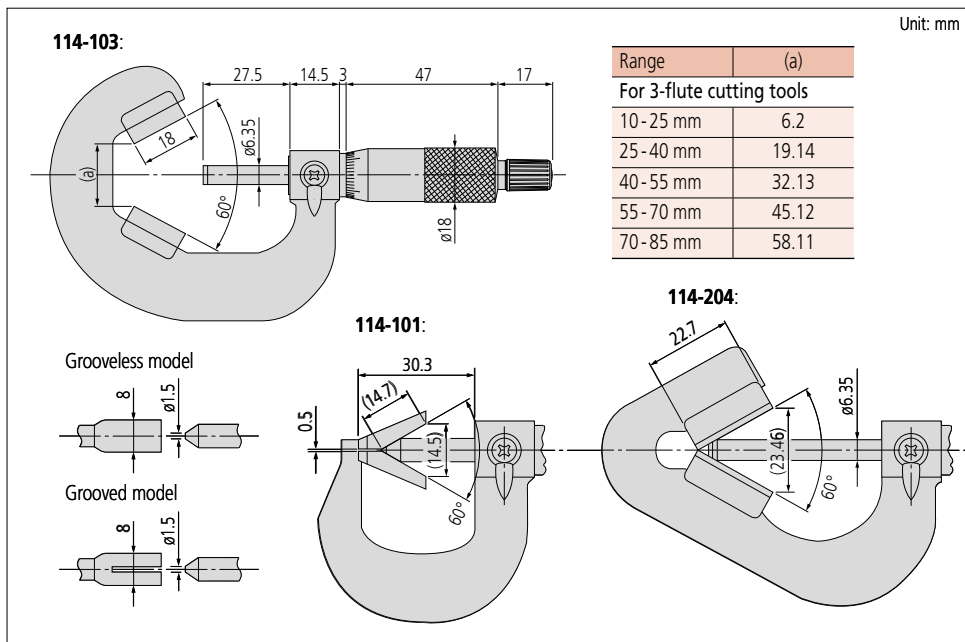
#### Metric

Code No.	Range	Graduation	Accuracy	Remarks	Anvil	Carbide tip	Price
114-204	2.3-25 mm	0.01 mm	±4 μm	—	60°	Anvil and spindle	£300.00
114-101	1-15 mm		±4 μm	Grooved		Spindle	£320.00
114-102	10-25 mm					Spindle	£328.00
114-103	25-40 mm		±5 μm	—		Spindle	£376.00
114-104	40-55 mm		±6 μm	—		Spindle	£423.00
114-105	55-70 mm		±6 μm	—		Spindle	£430.00
114-106	70-85 mm		±7 μm	—		Spindle	£497.00
114-161	1-15 mm		±4 μm	—		Spindle	£320.00
114-162	10-25 mm		±4 μm	—		Spindle	£371.00

#### Inch

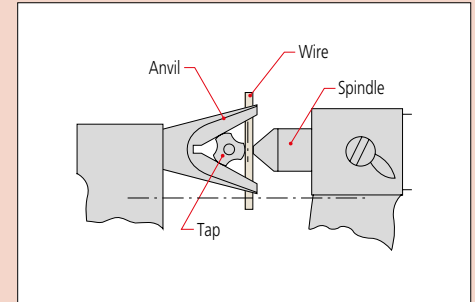
Code No.	Range	Graduation	Accuracy	Remarks	Anvil	Carbide tip	Price
114-163	.05-.6"	.0001"	±.0002"	—	60°	Spindle	£320.00
114-113	1-1.6"		±.00025"	—		Spindle	£376.00

### Dimensions



### Optional Accessories

Setting standards refer to page B-67.



Pitch diameter measurement of tap by single-wire method.

## Optional Accessories

Setting standards refer to page B-67.

## SERIES 114 – Five-Flute V-Anvil Micrometer

- Measures the outside diameter of cutting tools (such as taps, reamers, end mills) which have five flutes.
- Can measure pitch diameter of screw threads.
- Equipped with Ratchet Stop for constant measuring force.



114-137

### Specifications

Metric							
Code No.	Range	Graduation	Accuracy	Remarks	Anvil	Carbide tip	Price
114-137	2.3 - 25 mm	0.01 mm	±4 μm	—	108°	Anvil and spindle	£376.00
114-121	5 - 25 mm		±4 μm	w/groove		Spindle	£346.00
114-122	25 - 45 mm		±5 μm	—		Spindle	£445.00
114-123	45 - 65 mm		±6 μm	—		Spindle	£493.00
114-124	65 - 85 mm		±7 μm	—		Spindle	£615.00
114-165	5 - 25 mm		±4 μm	—		Spindle	£330.00
Inch							
Code No.	Range	Graduation	Accuracy	Remarks	Anvil	Carbide tip	Price
114-135	.09 - 1"	.0001"	±.0002"	—	108°	Spindle	£346.00

B

# Micrometers

## SERIES 422 – Digimatic Blade Micrometer

- The anvil and spindle are blade-shaped for measuring the groove diameter of shafts, keyways, and other hard-to-reach features.
- Equipped with Ratchet Stop for constant measuring force.
- Four types of blade shape are available (see diagrams below). Types C and D have carbide-tipped measuring faces.

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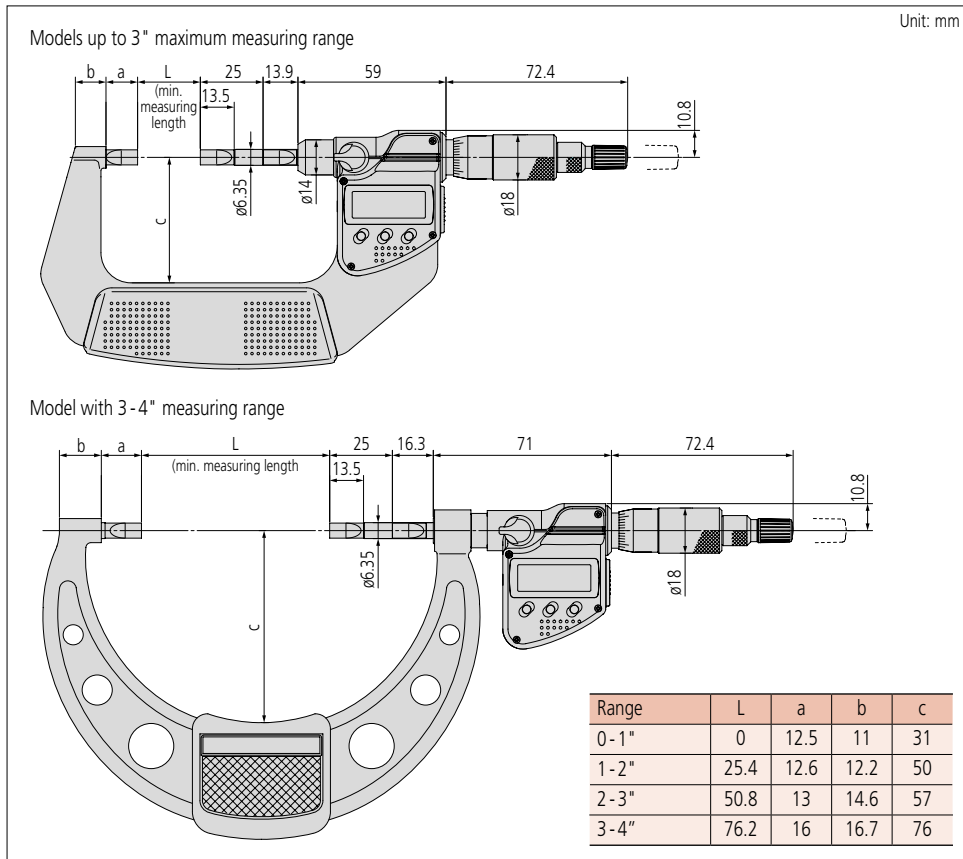
422-330-30

### Specifications

Inch/Metric					
Code No.	Range	Resolution	Accuracy*	Remarks	Price
422-330-30	0 - 1" (0 - 25.4 mm)	.00005" (0.001 mm)	±.00015" (±3 μm)	Type A	£700.00
422-331-30	1 - 2" (25.4 - 50.8 mm)				£747.00
422-332-30	2 - 3" (50.8 - 76.2 mm)				£782.00
422-333-30	3 - 4" (76.2 - 101.6 mm)		±.0002" (±4 μm)	£806.00	
422-360-30	0 - 1" (0 - 25.4 mm)		±.00015" (±3 μm)	Type B	£782.00
422-370-30				Type C	£811.00
422-371-30		Type D		£829.00	

\* Excluding quantizing error.

### Dimensions

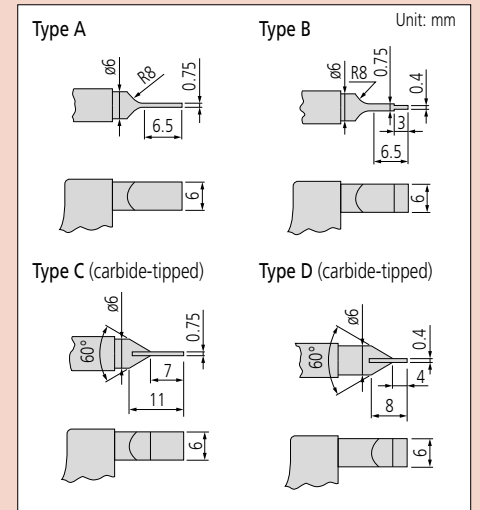
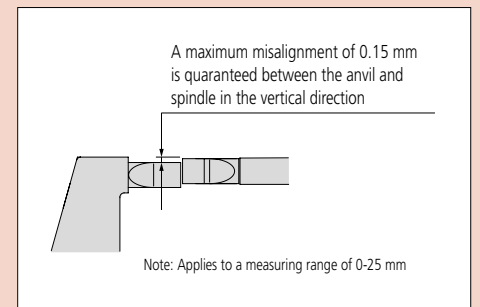


### Technical Data

Parallelism: .00015" (3 μm) for models up to 3",  
.0002" (4 μm) for models over 3"  
Battery: SR44 (1 pc) 938882

### Optional Accessories

Code No.	Description	Price
264-623	U-WAVE-TM transmitter	£193.00
02AZF310	U-WAVE-TM connection unit	£62.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB input tool direct USB-ITN-B (2 m)	£126.00





## Technical Data

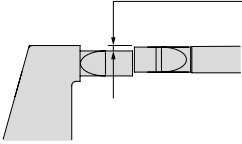
Parallelism: 3  $\mu\text{m}$  / .00015" for models up to 75 mm / 3", (3+R/100)  $\mu\text{m}$ \* for models over 75 mm, .0002" for 4" model

\* R = max. range (mm).

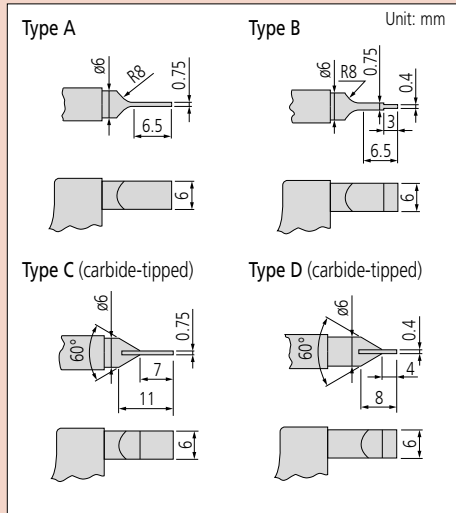
Note: Fractions rounded up.



A maximum misalignment of 0.15 mm is guaranteed between the anvil and spindle in the vertical direction



Note: Applies to a measuring range of 0-25 mm



## SERIES 122 – Blade Micrometer

- The anvil and spindle are blade-shaped for measuring the groove diameter of shafts, keyways, and other hard-to-reach features.
- Equipped with Ratchet Stop for constant measuring force.
- Four types of blade shape are available (see diagrams below). Types C and D have carbide-tipped measuring faces.



122-101

## Specifications

### Metric

Code No.	Range	Graduation	Accuracy	Remarks	Price	
122-101	0-25 mm	0.01 mm	$\pm 3 \mu\text{m}$	Type A	£189.00	
122-102	25-50 mm				£200.00	
122-103	50-75 mm				£233.00	
122-104	75-100 mm				£251.00	
122-105	100-125 mm				$\pm 4 \mu\text{m}$	£320.00
122-106	125-150 mm				£350.00	
122-107	150-175 mm		$\pm 5 \mu\text{m}$		£380.00	
122-108	175-200 mm		£420.00			
122-109	200-225 mm		£479.00			
122-110	225-250 mm		$\pm 6 \mu\text{m}$		£510.00	
122-115	250-275 mm		£601.00			
122-116	275-300 mm		£640.00			
122-111	0-25 mm	0.01 mm	$\pm 3 \mu\text{m}$	Type B	£203.00	
122-112	25-50 mm			Type B	£208.00	

### With carbide tip

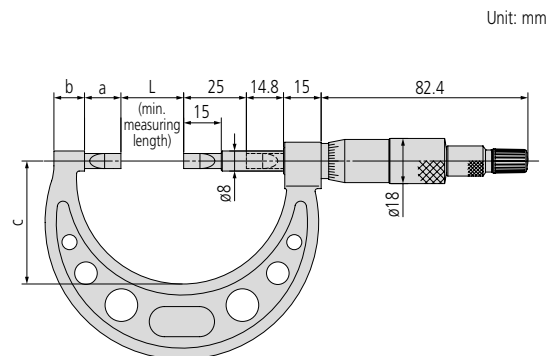
122-161	0-25 mm	0.01 mm	$\pm 3 \mu\text{m}$	Type C	£240.00
122-162	25-50 mm			Type C	£285.00
122-141	0-25 mm			Type D	£240.00
122-142	25-50 mm			Type D	£285.00

### Inch

Code No.	Range	Graduation	Accuracy	Remarks	Price	
122-125	0-1"	.0001"	$\pm .00015"$	Type A	£189.00	
122-126	1-2"				£220.00	
122-127	2-3"				£233.00	
122-128	3-4"				$\pm .0002"$	£251.00
122-135	0-1"		$\pm .00015"$		Type B	£203.00
122-151			Type D		£240.00	

## Dimensions

Range	L	a	b	c
0-25 mm	0	15	7.8	30
25-50 mm	25	14.5	12.2	49
50-75 mm	50		14.6	60
75-100 mm	75	17.5	16.7	79
100-125 mm	100	17.9	18.8	94
125-150 mm	125	18.3	19.1	106
150-175 mm	150	18.5	18.2	118
175-200 mm	175	18.9	16.8	130
200-225 mm	200	17.7	18	143
225-250 mm	225	156		
250-275 mm	250	169		
275-300 mm	275	181		



# Micrometers

## SERIES 147 – Can Seam Micrometers

- Measures the width, height and depth of can seams.



147-103

### Specifications

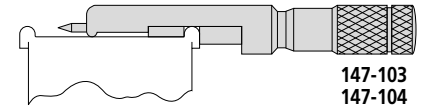
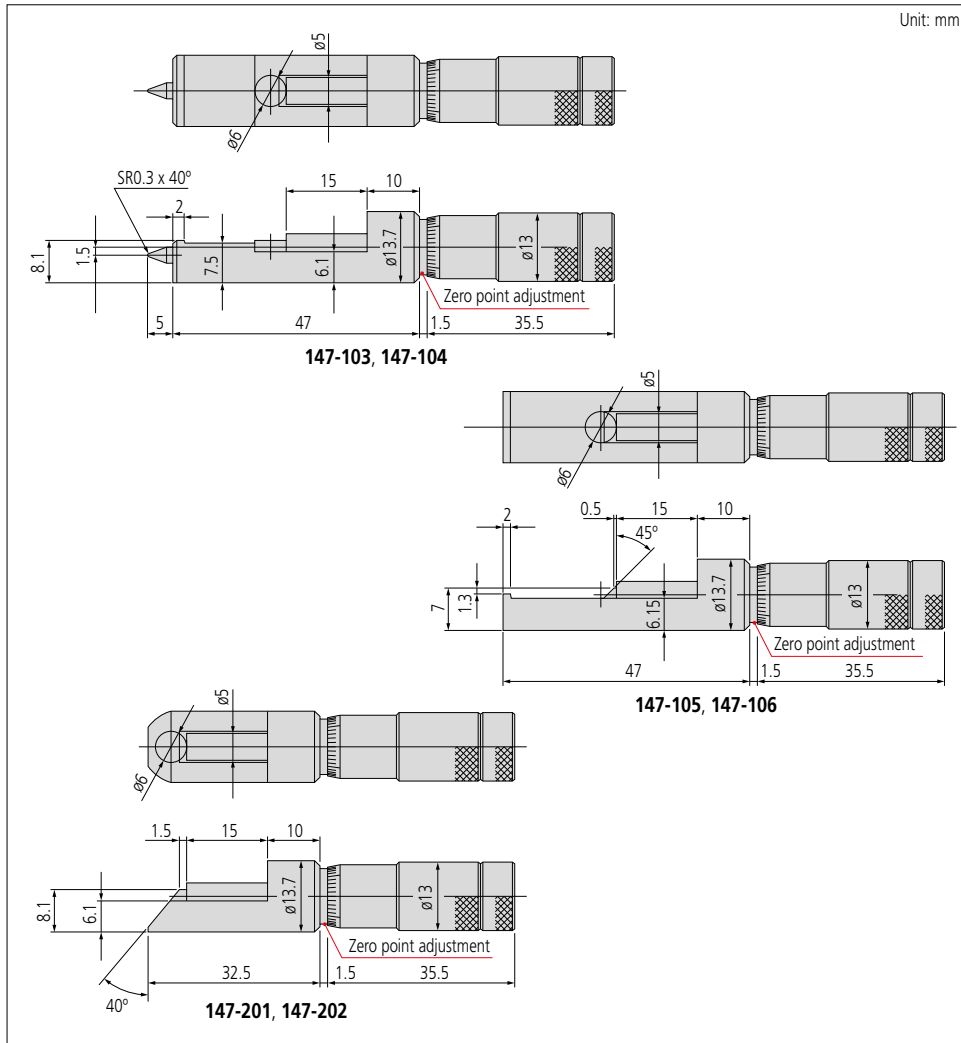
#### Metric

Code No.	Range	Graduation	Accuracy	Remarks	Price
147-103	0-13 mm	0.01 mm	±3 μm	For steel cans	£143.00
147-105				For aluminium cans	£148.00
147-202				For spray cans	£135.00

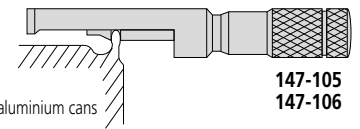
#### Inch

Code No.	Range	Graduation	Accuracy	Remarks	Price
147-104	0-.5"	.001"	±.00015"	For steel cans	£143.00
147-106				For aluminium cans	£148.00
147-201				For spray cans	£135.00

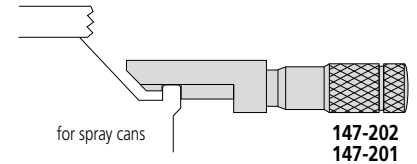
### Dimensions



for steel cans  
(for depth measurements up to 5 mm)



for aluminium cans



for spray cans

### Technical Data

Flatness:  $0.6 \mu\text{m} / .000024''$   
 Parallelism:  $(2+R/100) \mu\text{m}, [.00008+.00004(R/4)]''$

\* R = max. range (mm/inch).  
 Note: Fractions rounded up.



### SERIES 147 – Hub Micrometer

- Measures hub thickness and shoulders inside a bore.
- Measuring faces: carbide.
- Equipped with Ratchet Stop for constant measuring force.

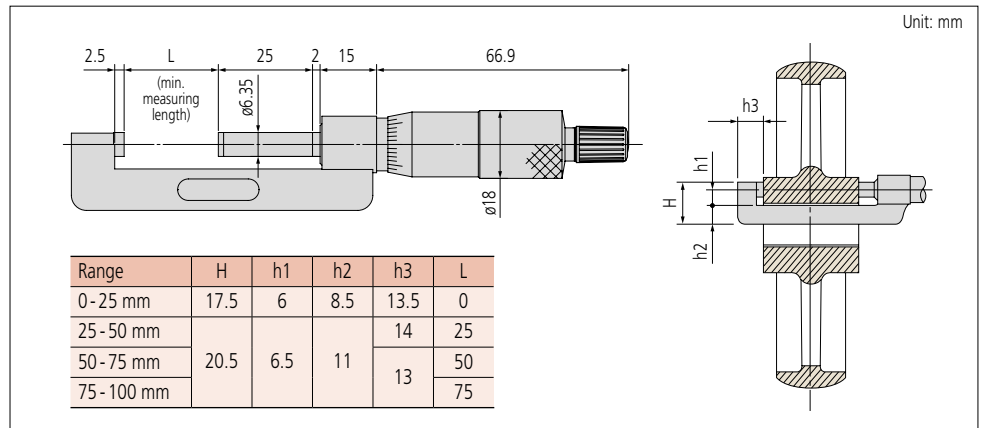


147-351

### Specifications

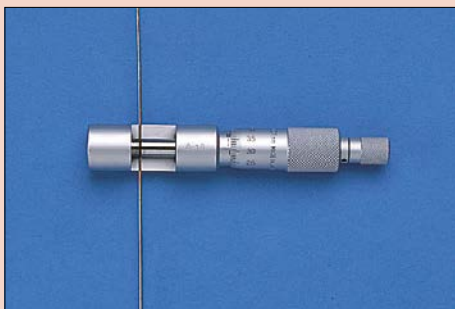
Metric					Inch					
Code No.	Range	Graduation	Accuracy	Price	Code No.	Range	Graduation	Accuracy	Price	
147-301	0-25 mm	0.01 mm	$\pm 2 \mu\text{m}$	£166.00	147-351	0-1"	.001"	$\pm .0001''$	£166.00	
147-302	25-50 mm			£190.00	147-352	1-2"			£190.00	
147-303	50-75 mm			£226.00	147-353	2-3"			£226.00	
147-304	75-100 mm			$\pm 3 \mu\text{m}$	£261.00	147-354			3-4"	£261.00
									$\pm .00015''$	

### Dimensions



### Technical Data

Flatness:  $0.6 \mu\text{m} / .000024''$   
 Parallelism:  $1.3 \mu\text{m} / .00005''$



### SERIES 147 – Wire Micrometer

- Designed for measuring wire thickness.
- Measurable wire diameter: 10 mm or less.
- Measuring faces: carbide.
- Equipped with Ratchet Stop for constant measuring force.

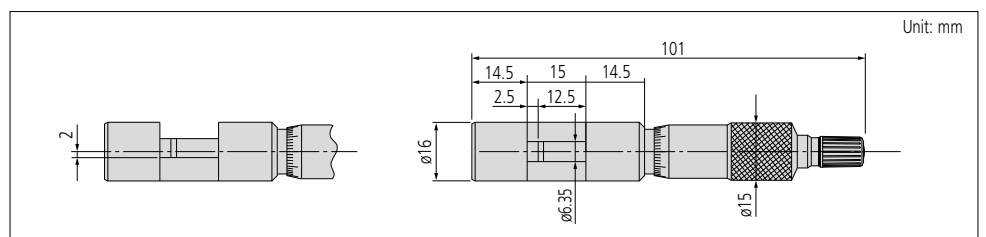


147-401

### Specifications

Metric					Inch				
Code No.	Range	Graduation	Accuracy	Price	Code No.	Range	Graduation	Accuracy	Price
147-401	0-10 mm	0.01 mm	$\pm 3 \mu\text{m}$	£170.00	147-402	0-.4"	.0001"	$\pm .00015''$	£170.00

### Dimensions



# Micrometers

## SERIES 342, 112 – Crimp Height Micrometers

- Measures the height of crimp contacts.
- Equipped with Ratchet Stop for constant measuring force.
- 342 series: Digimatic type IP65 rated.

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342-371-30



112-401

### Specifications

#### Inch/Metric

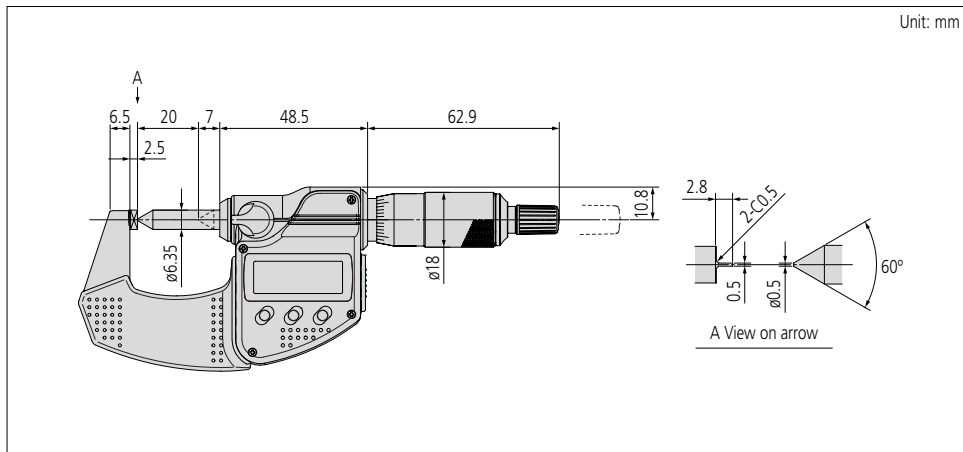
Code No.	Range	Resolution	Accuracy*	Price
342-371-30	0 - .8" (0 - 20.32 mm)	0.001 mm (.00005")	±3 μm (±.00015")	£468.00

#### Metric

Code No.	Range	Graduation	Accuracy	Price
112-401	0 - 25 mm	0.01 mm	±3 μm	£174.00

\* Excluding quantizing error.

### Dimensions



### Technical Data

Battery: SR44 (1 pc), **938882**: 342 series

### Optional Accessories (for 342 series only)

Code No.	Description	Price
264-622	U-WAVE-TM transmitter	£193.00
02AZF310	U-WAVE-TM connection unit	£62.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB input tool direct USB-ITN-B (2 m)	£126.00

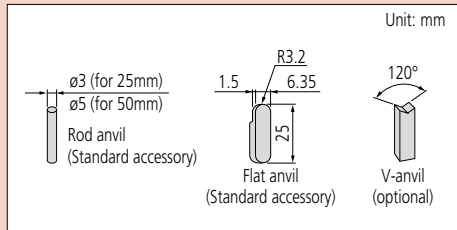


## Technical Data

Flatness	
Spindle face:	0.6 µm
Anvil face:	2 µm
Parallelism:	3 µm
Battery:	SR44 (1 pc), <b>938882</b> : 317 series

## Optional Accessories

Code No.	Description	Price
<b>201216</b>	Flat anvil (standard accessory)	<b>£17.00</b>
<b>201217</b>	Rod anvil (standard accessory for 117-101)	<b>£1.50</b>
<b>201379</b>	Rod anvil (standard accessory for 117-102)	<b>£1.60</b>
<b>201218</b>	V-anvil	<b>£11.40</b>
<b>950758</b>	Base for 25 mm	<b>£66.00</b>
For 317 series only		
<b>264-622</b>	U-WAVE-TM transmitter	<b>£193.00</b>
<b>02AZF310</b>	U-WAVE-TM connection unit	<b>£62.00</b>
<b>05CZA662</b>	SPC data cable with pushbutton (1 m)	<b>£69.40</b>
<b>05CZA663</b>	SPC data cable with pushbutton (2 m)	<b>£83.50</b>
<b>06AFM380B</b>	USB input tool direct USB-ITN-B (2 m)	<b>£126.00</b>



## SERIES 317, 117 – Uni-Mike Interchangeable Anvil Micrometers

- Measures tubing thickness, shoulder-edge distance, rivet head height, etc., with interchangeable anvils (flat anvil, rod anvil, V-anvil).
- IP65 water/dust protection (317 series).

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## Specifications

### Inch/Metric

Code No.	Range	Resolution	Accuracy*	Price
<b>Digimatic</b>				
<b>317-351-30</b>	0 - 1" (0 - 25.4 mm)	0.001 mm (.00005")	±4 µm (±.0002")	<b>£454.00</b>
<b>317-352-30</b>	1 - 2" (25.4 - 50.8 mm)			<b>£570.00</b>

### Metric

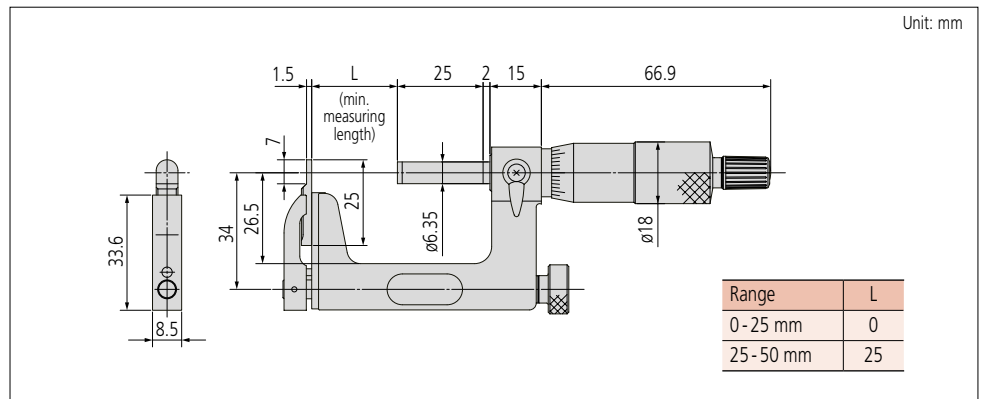
Code No.	Range	Graduation	Accuracy	Price
<b>117-101</b>	0 - 25 mm	0.01 mm	±4 µm	<b>£170.00</b>
<b>117-102</b>	25 - 50 mm			<b>£220.00</b>

### Inch

Code No.	Range	Graduation	Accuracy	Price
<b>117-107</b>	0 - 1"	.0001"	±.0002"	<b>£170.00</b>
<b>117-108</b>	1 - 2"			<b>£220.00</b>

\* Excluding quantizing error.

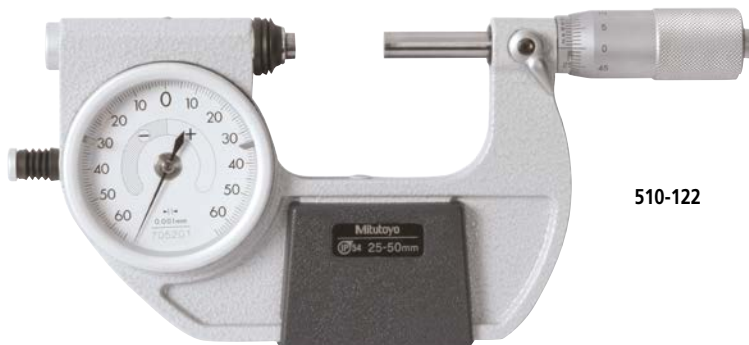
## Dimensions



# Micrometers

## SERIES 510 – Indicating Micrometer

- Suited to the measurement of low-volume manufactured parts.
- Easy to use when operating one-handed due to retractable anvil.
- In the 25 mm measuring range, models are available that offer left or right positioning of the anvil-retraction button.
- Water resistant to protection level IP54.
- Greatly improved accuracy: indication error and graduation of 1  $\mu\text{m}$ .
- Hard-coated crystal: enhanced oil and scratch resistance.
- Indicator scale is large and easy-to-read.
- Easily set zero position and adjustable limit markers for GO/NO-GO testing.
- Measuring faces: carbide.



510-122

### Specifications

#### Metric

Code No.	Range	Indicating range	Graduation	Dial graduation	Measuring force	Price
510-121	0 - 25 mm	±0.06 mm	0.001 mm	0.001 mm	5 - 10 N	£622.00
510-122	25 - 50 mm					£698.00
510-123	50 - 75 mm					£808.00
510-124	75 - 100 mm					£892.00

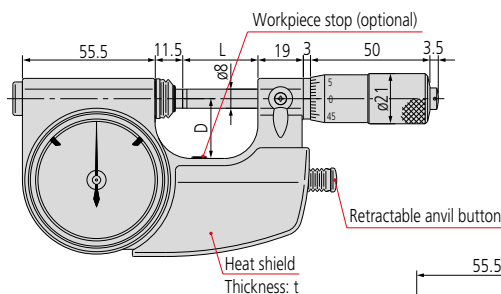
#### Inch

Code No.	Range	Indicating range	Graduation	Dial graduation	Measuring force	Price
510-131	0 - 1"	±.0023"	.0001"	.00005"	5 - 10 N	£622.00
510-132	1 - 2"					£698.00
510-133	2 - 3"					£808.00
510-134	3 - 4"					£892.00

### Dimensions

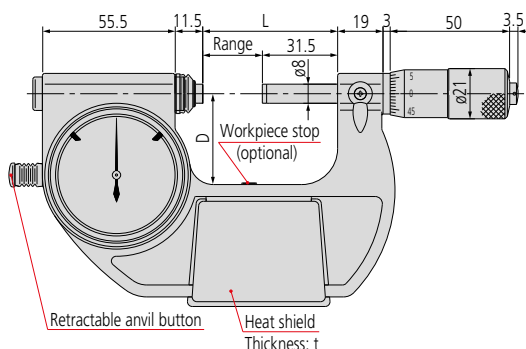
25 mm maximum measuring range models  
(anvil-retraction button on the right side)

Unit: mm



Range	D	L	t
0 - 25 mm	25	31.5	16.4
25 - 50 mm	38	56.5	16
50 - 75 mm	50	81.5	16
75 - 100 mm	63	106.5	16

Models over 25 mm maximum  
measuring range (anvil-retraction  
button on the left side)



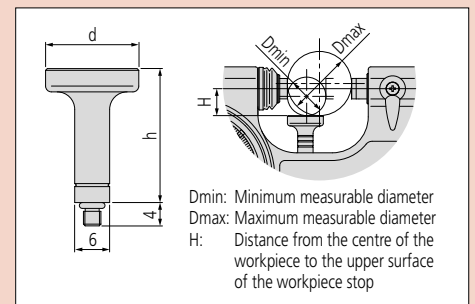
### Technical Data

Flatness:	0.3 $\mu\text{m}$ / .000012"
Parallelism:	0.6 $\mu\text{m}$ / .000024" for models up to 50 mm/2", 1 $\mu\text{m}$ / .00004" for models over 50 mm/2"
Accuracy:	±2 $\mu\text{m}$
Spindle feed error:	3 $\mu\text{m}$ / .00015"
Repeatability:	0.4 $\mu\text{m}$ / .00002"
Dial indication accuracy:	1 $\mu\text{m}$ / .00005"

### Workpiece Stop (optional)

Enables a more stable measurement. Three types with various heights (h) are available to suit workpieces of different sizes.

Code No.	Description	d	h	Price
04AZA124	Type A	ø16	23	£10.50
04AZA125	Type B	ø14	20.5	£10.50
04AZA126	Type C	ø14	15	£10.50



Description	Dmin	Dmax	H
<b>Code No. 510-121 and 510-131</b>			
Type A	N/A	N/A	N/A
Type B	4 mm	16 mm	5.0 mm
Type C	15 mm	25 mm	10.5 mm
<b>Code No. 510-122 and 510-132</b>			
Type A	25 mm	37 mm	15.5 mm
Type B	30 mm	42 mm	18.0 mm
Type C	41 mm	50 mm	23.5 mm
<b>Code No. 510-123 and 510-133</b>			
Type A	50 mm	61 mm	27.5 mm
Type B	54 mm	66 mm	30.0 mm
Type C	65 mm	75 mm	35.5 mm
<b>Code No. 510-124 and 510-134</b>			
Type A	75 mm	87 mm	40.5 mm
Type B	80 mm	92 mm	43.0 mm
Type C	91 mm	100 mm	48.2 mm



## Technical Data

Indicator	
Indicating range:	$\pm 0.06 \text{ mm} / \pm .0023''$
Repeatability of indication:	$0.4 \text{ } \mu\text{m} / .00002''$
Dial indication accuracy:	$1 \text{ } \mu\text{m} / .00005''$
Flatness:	$0.3 \text{ } \mu\text{m} / .000012''$
Parallelism:	$0.6 \text{ } \mu\text{m} / .000024''$ for models up to 50 mm/2", $1 \text{ } \mu\text{m} / .00004''$ for models over 50 mm/2" maximum measuring range



## SERIES 523 – Dial Snap Meter

- Suited to the measurement of mass produced parts.
- Designed for measurement using a stand to enable a more stable measurement.
- Greatly improved accuracy: indication error and graduation of  $1 \text{ } \mu\text{m}$ .
- Water resistant to protection level IP54.
- Indicator scale is large and easy-to-read.
- Hard-coated crystal: enhanced oil and scratch resistance.
- Easily settable adjustable limit markers for GO/NO-GO testing.
- Equipped with an elevating workpiece stop as standard.
- Measuring faces: carbide.

**IP 54**

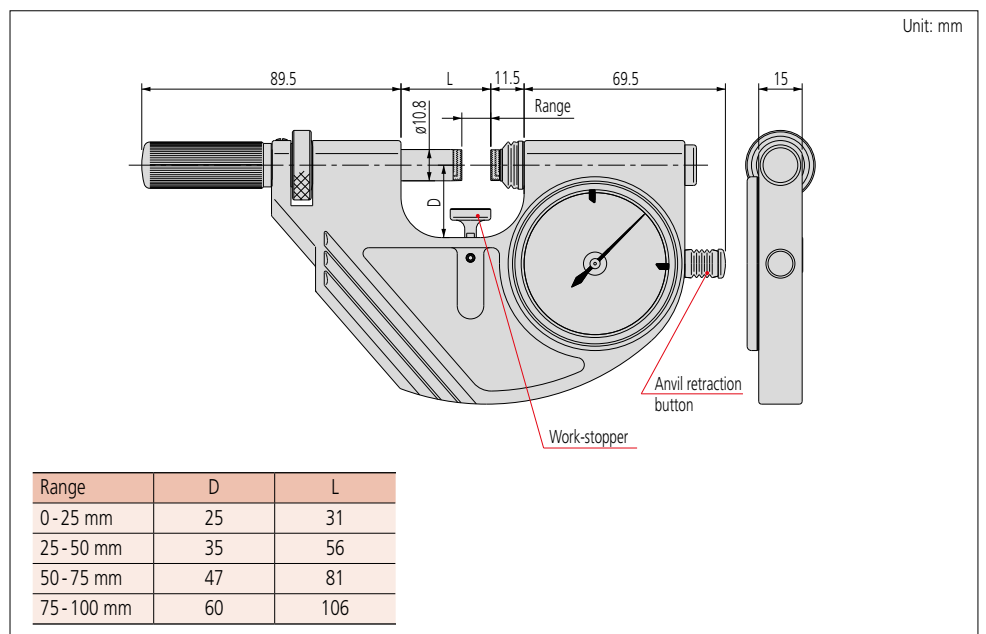


523-121

## Specifications

Metric				
Code No.	Range	Dial graduation	Measuring force	Price
523-121	0 - 25 mm	0.001 mm	5 - 10 N	£501.00
523-122	25 - 50 mm			£566.00
523-123	50 - 75 mm			£618.00
523-124	75 - 100 mm			£684.00
Inch				
Code No.	Range	Dial graduation	Measuring force	Price
523-131	0 - 1"	.00005"	5 - 10 N	£501.00
523-132	1 - 2"			£566.00
523-133	2 - 3"			£618.00
523-134	3 - 4"			£684.00

## Dimensions



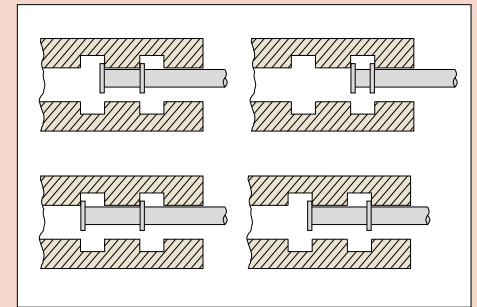
# Micrometers

## SERIES 146 – Groove Micrometer

- Flanged spindle and anvil for measuring width and location of grooves inside bores and tubes.
- Dual scales for direct reading of inside and outside measurements.
- Two-directional ratchet stop.

### Technical Data

Parallelism: 10 µm / .0004"



146-121



146-122

### Specifications

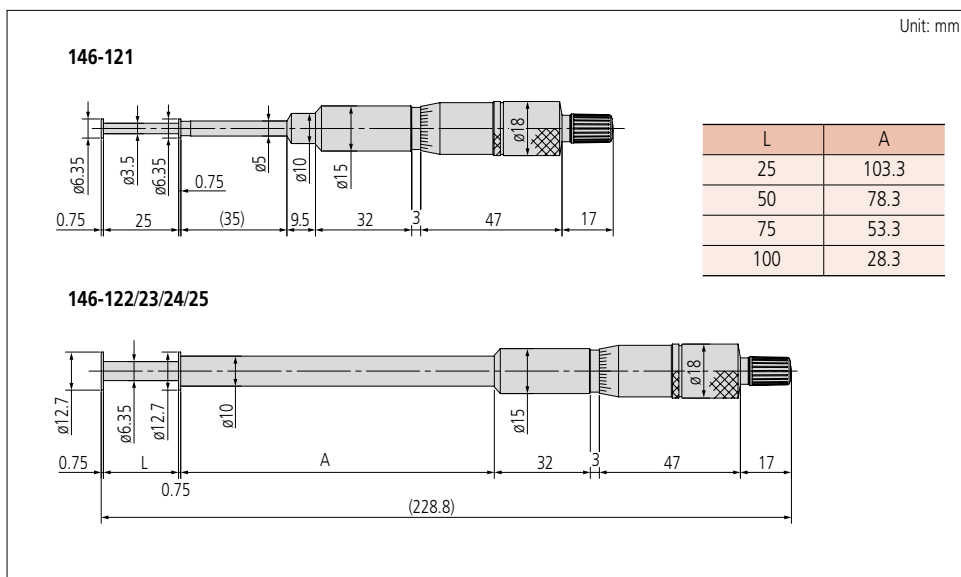
#### Metric

Code No.	Range outside	Range inside	Graduation	Accuracy	Flange	Price
146-121	0 - 25 mm	1.6 - 26.5 mm	0.01 mm	±10 µm	ø6.35 mm	£204.00
146-122						£240.00
146-123	25 - 50 mm	26.5 - 51.5 mm			ø12.7 mm	£251.00
146-124	50 - 75 mm	51.5 - 76.5 mm				£263.00
146-125	75 - 100 mm	76.5 - 101.5 mm				£284.00

#### Inch

Code No.	Range outside	Range inside	Graduation	Accuracy	Flange	Price
146-131	0 - 1"	.055 - 1.05"	.001"	±.0004"	ø.25"	£204.00
146-132						£240.00
146-133	1 - 2"	1.05 - 2.05"			ø.5"	£251.00
146-134	2 - 3"	2.05 - 3.05"				£263.00
146-135	3 - 4"	3.05 - 4.05"				£308.00

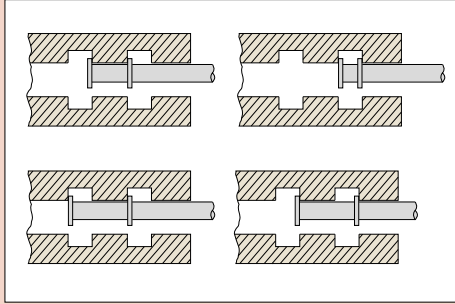
### Dimensions





## Technical Data

Parallelism: 10 µm / .0004"



## SERIES 146 – Non-Rotating Spindle Groove Micrometer

- Flanged spindle and anvil for measuring width and location of grooves inside bores and tubes.
- Dual scales for direct reading of inside and outside measurements.
- Two-directional ratchet stop.



146-221



146-222

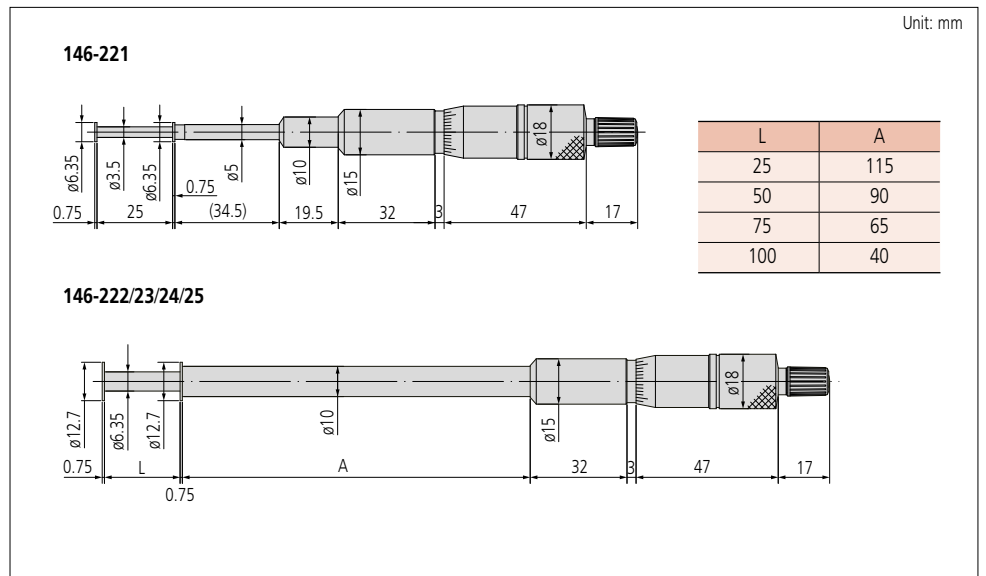
## Specifications

Metric						
Code No.	Range outside	Range inside	Graduation	Accuracy	Flange	Price
146-221	0 - 25 mm	1.6 - 26.5 mm	0.01 mm	±10 µm	ø6.35 mm	£348.00
146-222					ø12.7 mm	£393.00
146-223	25 - 50 mm	26.5 - 51.5 mm				£427.00
146-224	50 - 75 mm	51.5 - 76.5 mm				£439.00
146-225	75 - 100 mm	76.5 - 101.5 mm			£451.00	

Inch						
Code No.	Range outside	Range inside	Graduation	Accuracy	Flange	Price
146-231	0 - 1"	.055 - 1.05"	.001"	±.0004"	ø.25"	£348.00
146-232					ø.5"	£393.00
146-233	1 - 2"	1.05 - 2.05"				£427.00
146-234	2 - 3"	2.05 - 3.05"				£439.00
146-235	3 - 4"	3.05 - 4.05"			£451.00	

## Dimensions



# Micrometers

## SERIES 700 – QUICKmini

- Lightweight and palm-sized.
- Highly suitable for quick dimensional inspection of small, thin and delicate objects.
- Functions: origin setting and zero-setting.

### Application examples:

- Measurement of small objects: pearls, jewels, shims for engine tappets and screws.
- Measurement of thin objects: printing paper, polyethylene bags, sheet materials, foods including noodles, lenses for glasses, media substrates, foils, thin plates and medical products including filter cloths.
- Measurement of fine lines and bars: fishing lines, dental reamers, pasta, drills for PCBs and hard wiring.

700-118-30



### Technical Data

Battery: SR44 (1 pc) 938882



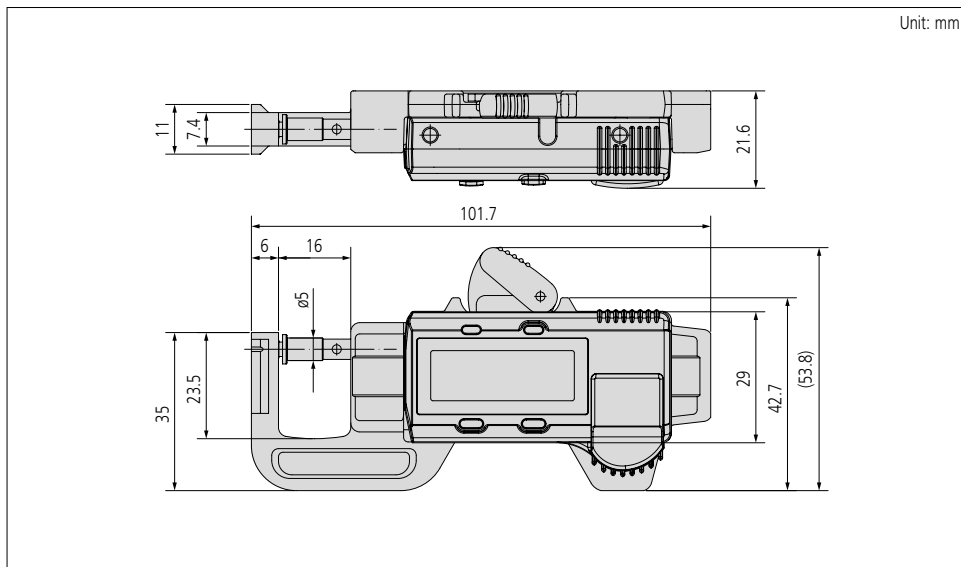
### Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy*	Price
700-118-30	0 - .5" (0 - 12.7 mm)	0.01 mm (.0005")	±0.02 mm (±.001")	£140.00

\* Excluding quantizing error.

### Dimensions





## SERIES 154 – Small Hole Gauge Set

- Extra long for gauging deep and shallow holes, slots, and similar workpiece features.
- Two sprung leaves are fully expanded and locked inside a feature so that its size can be measured with an outside micrometer after extraction.



154-902

### Specifications

Metric		
Code No.	Measuring range	Price
4-gauge set		
154-902	3 - 13 mm	£74.50
Gauges included		
154-101	3 - 5 mm	
154-102	5 - 7.5 mm	
154-103	7.5 - 10 mm	
154-104	10 - 13 mm	

Inch		
Code No.	Measuring range	Price
4-gauge set		
154-901	.125 - .5"	£74.50
Gauges included		
154-105	.125 - .2"	
154-106	.2 - .3"	
154-107	.3 - .4"	
154-108	.4 - .5"	

### Dimensions

Unit: mm

Range	ød1	L	øD	A
3 - 5 mm	2.8 - 5.2	90	5.5	22.5
5 - 7.5 mm	4.8 - 7.8	97.6		30
7.5 - 10 mm	7.3 - 10.3	108	8.5	40
10 - 13 mm	9.8 - 13.2			

# Micrometers

## SERIES 155 – Telescoping Gauge Set

- A spring-loaded plunger expands within a bore (or groove) and is locked in place, allowing measurement of diameter (or width) with an outside micrometer after extraction.



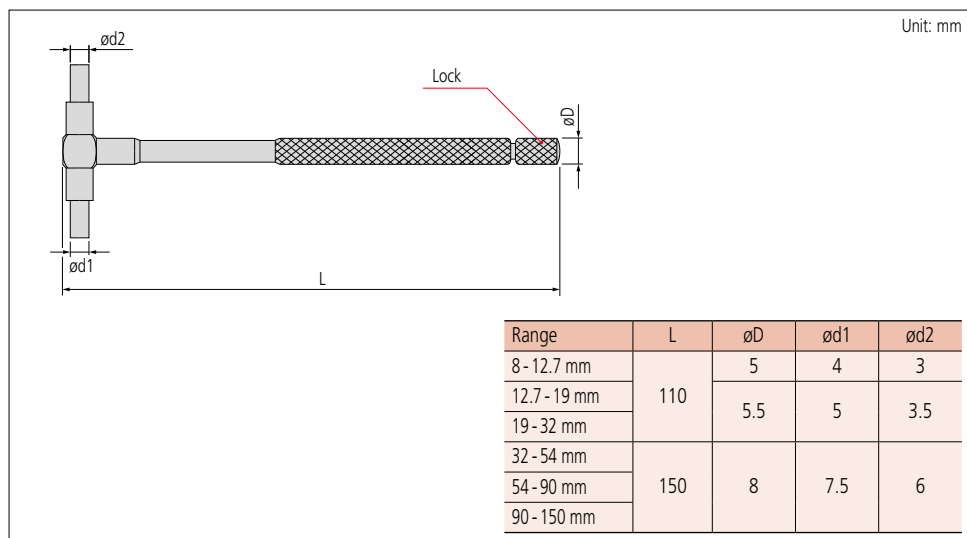
155-905

### Specifications

Metric		
Code No.	Range	Price
6-gauge set		
155-905	8 - 150 mm	£192.00
Gauges included		
155-127	8 - 12.7 mm	£24.40
155-128	12.7 - 19 mm	£29.90
155-129	19 - 32 mm	£29.90
155-130	32 - 54 mm	£37.90
155-131	54 - 90 mm	£37.90
155-132	90 - 150 mm	£37.90

Inch		
Code No.	Range	Price
6-gauge set		
155-903	.313 - 6"	£192.00
Gauges included		
155-121	.313 - .5"	£24.40
155-122	.5 - .75"	£29.90
155-123	.75 - 1.25"	£29.90
155-124	1.25 - 2.125"	£37.90
155-125	2.125 - 3.5"	£37.90
155-126	3.5 - 6"	£37.90

### Dimensions



# Optional Accessories

## SERIES 157 – Optical Parallels

- Designed to inspect parallelism and flatness of micrometer measuring faces.
- Each set consists of 4 sizes to enable testing parallelism at quarter-turn positions of the micrometer spindle.



157-903

### Specifications

#### Metric

Code No.	Range of micrometer to be checked	Sizes of parallels included in set	Diameter	Flatness	Parallelism	Price
157-903	0 - 25 mm	12.00, 12.12, 12.25, 12.37 mm	30 mm	0.1 μm	0.2 μm	£384.00
157-904	25 - 50 mm	25.00, 25.12, 25.25, 25.37 mm				£650.00

#### Inch

Code No.	Range of micrometer to be checked	Sizes of parallels included in set	Diameter	Flatness	Parallelism	Price
157-901	0 - 1"	.5000", .5062", .5125", .5187"	30 mm	0.1 μm	0.2 μm	£384.00
157-902	1 - 2"	1.0000", 1.0062", 1.0125", 1.0187"				£650.00

## SERIES 158 – Optical Flats

- Used for inspecting the flatness of very flat and reflective surfaces. A typical application is testing the measuring faces of gauge blocks for signs of wear or damage.



158-118

### Specifications

#### Metric

Code No.	Thickness	Diameter	Flatness grade	Price
158-117	12 mm	45 mm	0.2 μm	£274.00
158-118			0.1 μm	£296.00
158-119	15 mm	60 mm	0.2 μm	£350.00
158-120			0.1 μm	£430.00

#### Inch

Code No.	Thickness	Diameter	Flatness grade	Price
158-122	.5"	1.8"	.000004"	£296.00
158-124	.6"	2.4"		£430.00

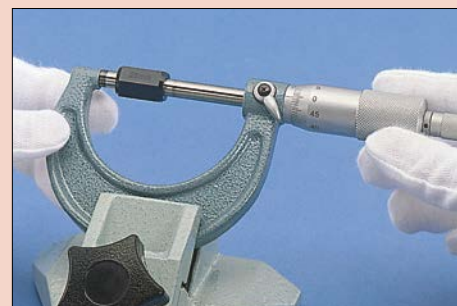
# Optional Accessories

## SERIES 167 – Setting Standards for Outside Micrometers

- Used for accurately setting outside micrometers at the start or end of the measuring range.

### Technical Data

Flatness: 0.3  $\mu\text{m}$   
 Parallelism: 2  $\mu\text{m}$



167-108



167-145

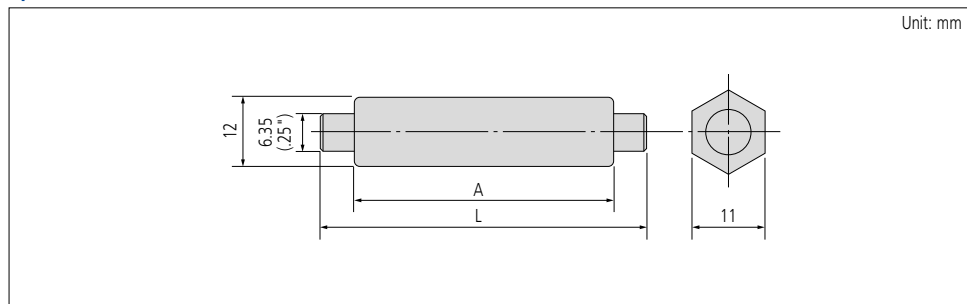


167-103



167-101

### Specifications and Dimensions

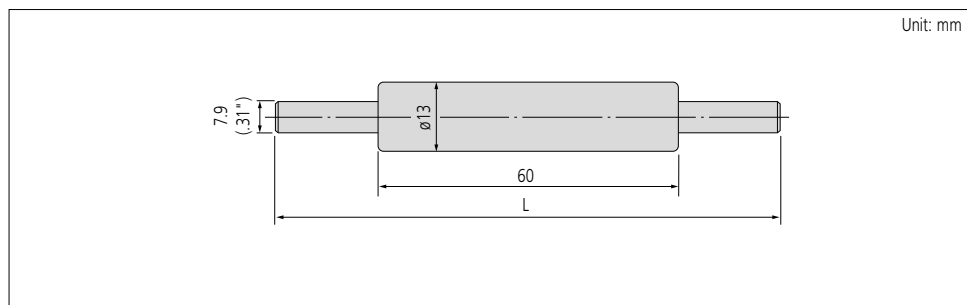


#### Metric

Code No.	Length (L)	Tolerance	A	Price
167-101	25 mm	$\pm 1.5 \mu\text{m}$	18	£13.90
167-102	50 mm	$\pm 2.0 \mu\text{m}$	40	£14.30
167-103	75 mm	$\pm 2.5 \mu\text{m}$		£15.80

#### Inch

Code No.	Length (L)	Tolerance	A	Price
167-141	1"	$\pm 0.0005"$	18	£13.90
167-142	2"	$\pm 0.001"$	40	£14.30
167-143	3"			£15.80



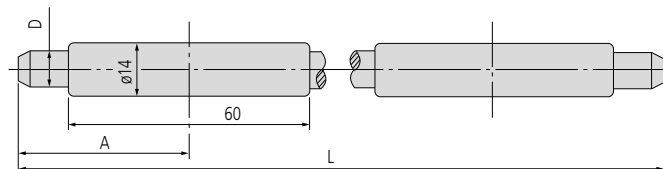
#### Metric

Code No.	Length (L)	Tolerance	Price
167-104	100 mm	$\pm 3.0 \mu\text{m}$	£17.80
167-105	125 mm	$\pm 3.5 \mu\text{m}$	£19.90
167-106	150 mm	$\pm 4.0 \mu\text{m}$	£21.20
167-107	175 mm	$\pm 4.5 \mu\text{m}$	£23.70

#### Inch

Code No.	Length (L)	Tolerance	Price
167-144	4"	$\pm 0.001"$	£17.80
167-145	5"	$\pm 0.0015"$	£19.90
167-146	6"		£21.20
167-147	7"		£23.70

Unit: mm



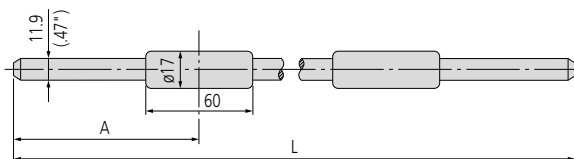
## Metric

Code No.	Length (L)	Tolerance	A	Price
167-108	200 mm	±5.0 µm	47	£27.20
167-109	225 mm	±5.5 µm	47	£29.50
167-110	250 mm	±6.0 µm	52	£32.60
167-111	275 mm	±6.5 µm	57	£36.00
167-112	300 mm	±7.0 µm	64	£39.40
167-113	325 mm	±7.5 µm	69	£43.20
167-114	350 mm	±8.0 µm	74	£47.30
167-115	375 mm	±8.5 µm	80	£52.60
167-116	400 mm	±9.0 µm	85	£58.80
167-117	425 mm	±9.5 µm	90	£64.90
167-118	450 mm	±10.0 µm	95	£70.80
167-119	475 mm	±10.5 µm	101	£77.40

## Inch

Code No.	Length (L)	Tolerance	A	Price
167-148	8"	±.00015"	47	£27.20
167-149	9"	±.0002"	47	£29.50
167-150	10"	±.0002"	52	£32.60
167-151	11"	±.0002"	57	£36.00
167-152	12"	±.00025"	64	£39.40
167-153	13"	±.00025"	69	£43.20
167-154	14"	±.00025"	74	£47.30
167-155	15"	±.00025"	80	£52.60
167-156	16"	±.00025"	85	£58.80
167-157	17"	±.00025"	90	£64.90
167-158	18"	±.00025"	95	£70.80
167-159	19"	±.0003"	101	£77.40

Unit: mm



## Metric

Code No.	Length (L)	Tolerance	A	Price
167-120	500 mm	±11.0 µm	106	£83.40
167-121	525 mm	±11.5 µm	112	£89.70
167-122	550 mm	±12.0 µm	117	£96.60
167-123	575 mm	±12.5 µm	122	£103.00
167-124	600 mm	±13.0 µm	128	£110.00
167-125	625 mm	±13.5 µm	133	£116.00
167-126	650 mm	±14.0 µm	138	£123.00
167-127	675 mm	±14.5 µm	142	£130.00
167-128	700 mm	±15.0 µm	147	£139.00
167-129	725 mm	±15.5 µm	153	£147.00
167-130	750 mm	±16.0 µm	158	£156.00
167-131	775 mm	±16.5 µm	164	£164.00
167-132	800 mm	±17.0 µm	170	£174.00
167-133	825 mm	±17.5 µm	175	£184.00
167-134	850 mm	±18.0 µm	180	£195.00
167-135	875 mm	±18.5 µm	185	£203.00
167-136	900 mm	±19.0 µm	191	£214.00
167-137	925 mm	±19.5 µm	196	£226.00
167-138	950 mm	±20.0 µm	201	£235.00
167-139	975 mm	±20.5 µm	207	£245.00
167-140	1000 mm	±21.0 µm	211	£315.00

Available up to 2000 mm.

## Inch

Code No.	Length (L)	Tolerance	A	Price
167-160	20"	±.0003"	106	£83.40
167-161	21"	±.0003"	112	£89.70
167-162	22"	±.0003"	117	£96.60
167-163	23"	±.0003"	122	£103.00
167-164	24"	±.0003"	128	£110.00
167-165	25"	±.00035"	133	£116.00
167-166	26"	±.00035"	138	£123.00
167-167	27"	±.00035"	142	£130.00
167-168	28"	±.00035"	147	£139.00
167-169	29"	±.00035"	153	£147.00
167-170	30"	±.00035"	158	£156.00
167-171	31"	±.00035"	164	£164.00
167-172	32"	±.00035"	170	£174.00
167-173	33"	±.00035"	175	£184.00
167-174	34"	±.00035"	180	£195.00
167-175	35"	±.00035"	185	£203.00
167-176	36"	±.00035"	191	£214.00
167-177	37"	±.0004"	196	£226.00
167-178	38"	±.0004"	201	£235.00
167-179	39"	±.0004"	207	£245.00
167-180	40"	±.0004"	211	£315.00

Available up to 79".

# Optional Accessories

## SERIES 167 – Setting Standards for Screw Thread Micrometers

- Used for accurately setting screw thread micrometers at the start or end of the measuring range.



167-264



167-262



### Specifications

Metric			
Code No.	Length	Accuracy	Price
Metric (unified) $\theta = 60^\circ$			
167-261	25 mm	$\pm 4 \mu\text{m}$	£35.60
167-262	50 mm	$\pm 5 \mu\text{m}$	£38.00
167-263	75 mm	$\pm 6 \mu\text{m}$	£49.50
167-264	100 mm	$\pm 7 \mu\text{m}$	£55.40
167-265	125 mm	$\pm 8 \mu\text{m}$	£58.30
167-266	150 mm	$\pm 9 \mu\text{m}$	£66.50
167-267	175 mm	$\pm 10 \mu\text{m}$	£72.50
167-268	200 mm	$\pm 11 \mu\text{m}$	£72.50
167-269	225 mm	$\pm 12 \mu\text{m}$	£76.00
167-270	250 mm	$\pm 13 \mu\text{m}$	£76.00
167-271	275 mm	$\pm 14 \mu\text{m}$	£79.50
Whitworth $\theta = 55^\circ$			
167-272	25 mm	$\pm 4 \mu\text{m}$	£35.60
167-273	50 mm	$\pm 5 \mu\text{m}$	£38.00
167-274	75 mm	$\pm 6 \mu\text{m}$	£49.50
167-275	100 mm	$\pm 7 \mu\text{m}$	£55.40
167-276	125 mm	$\pm 8 \mu\text{m}$	£58.30
167-277	150 mm	$\pm 9 \mu\text{m}$	£66.50
167-278	175 mm	$\pm 10 \mu\text{m}$	£72.50
167-279	200 mm	$\pm 11 \mu\text{m}$	£77.10
167-280	225 mm	$\pm 12 \mu\text{m}$	£78.50
167-281	250 mm	$\pm 13 \mu\text{m}$	£78.50
167-282	275 mm	$\pm 14 \mu\text{m}$	£81.40

Inch			
Code No.	Length	Accuracy	Price
Metric (unified) $\theta = 60^\circ$			
167-294	1"	$\pm 0.00015"$	£35.60
167-295	2"	$\pm 0.0002"$	£38.00
167-296	3"	$\pm 0.00025"$	£49.50
167-297	4"	$\pm 0.0003"$	£55.40
167-298	5"	$\pm 0.00035"$	£58.30
167-299	6"	$\pm 0.0004"$	£66.50
Whitworth $\theta = 55^\circ$			
167-283	1"	$\pm 0.00015"$	£35.60
167-284	2"	$\pm 0.0002"$	£38.00
167-285	3"	$\pm 0.00025"$	£49.50
167-286	4"	$\pm 0.0003"$	£55.40
167-287	5"	$\pm 0.00035"$	£58.30
167-288	6"	$\pm 0.0004"$	£66.50

## SERIES 167 – Setting Standards for V-Anvil Micrometers

- Finely finished cylindrical standards of size designed for accurate setting of V-anvil micrometers.



167-329



### Specifications

Metric				
Code No.	Diameter	Accuracy	Type	Price
167-327	5 mm	$\pm 2 \mu\text{m}$	Plug	£35.60
167-328	10 mm	$\pm 2 \mu\text{m}$	Plug	£40.30
167-329	25 mm	$\pm 2 \mu\text{m}$	Plug	£57.50
167-330	40 mm	$\pm 3 \mu\text{m}$	Ring	£100.00
167-331	55 mm	$\pm 3 \mu\text{m}$	Ring	£139.00
167-332	70 mm	$\pm 3 \mu\text{m}$	Ring	£175.00
167-333	85 mm	$\pm 3 \mu\text{m}$	Ring	£207.00

Inch				
Code No.	Diameter	Accuracy	Type	Price
167-337	.2"	$\pm 0.0001"$	Plug	£35.60
167-338	.4"	$\pm 0.0001"$	Plug	£40.30
167-339	1"	$\pm 0.0001"$	Plug	£60.50
167-340	1.6"	$\pm 0.00015"$	Ring	£100.00
167-341	2.2"	$\pm 0.00015"$	Ring	£139.00
167-342	2.8"	$\pm 0.00015"$	Ring	£175.00
167-343	3.4"	$\pm 0.00015"$	Ring	£207.00

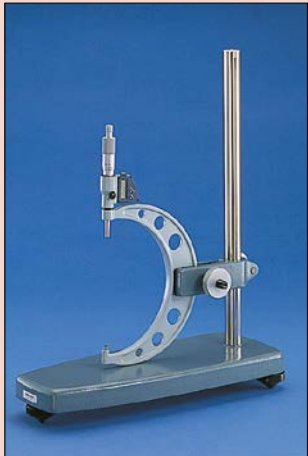




156-105-10



156-101-10



156-102

## SERIES 156 – Micrometer Stands

- Designed to allow benchtop use of hand micrometers or other gauges which have frames suitable for gripping by the clamp.



156-105-10



156-101-10

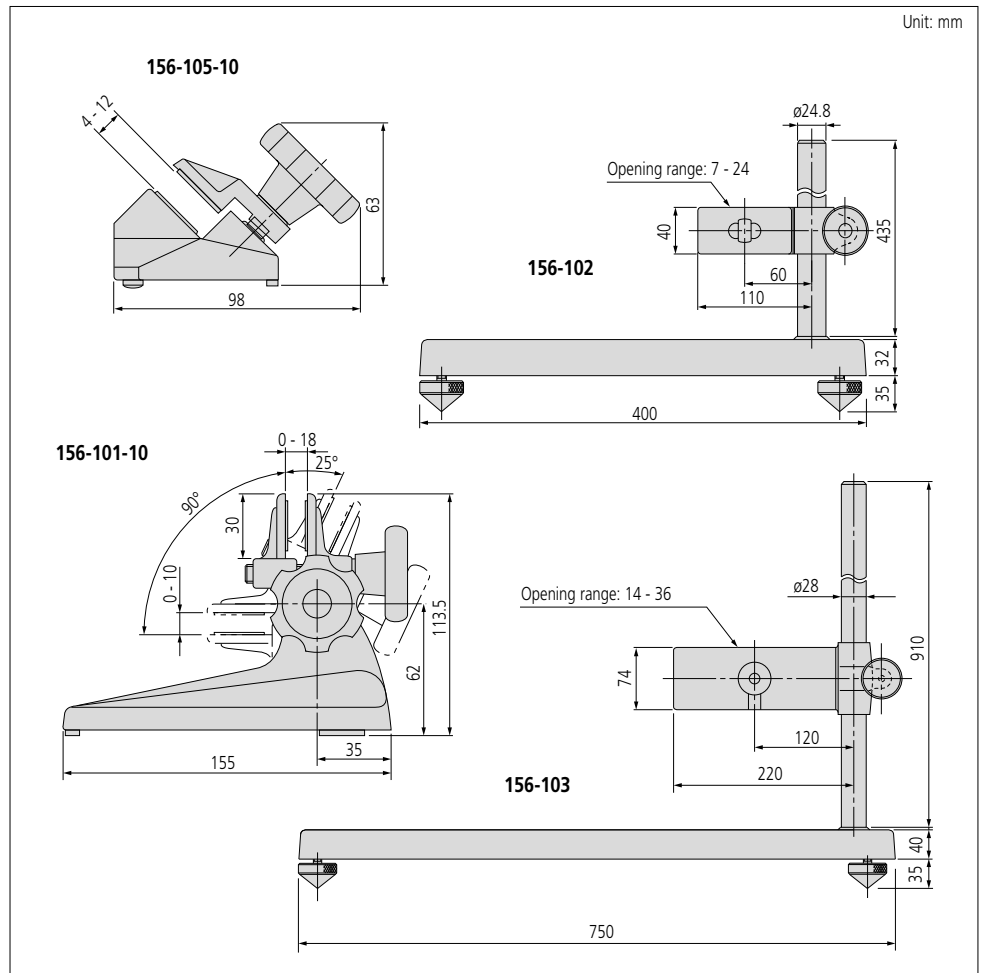


156-102

### Specifications

Code No.	Micrometer ranges	Remarks	Price
156-101-10	Up to 100 mm (4")	Adjustable angle type	£45.50
156-105-10	0 - 25 mm (0 - 1"), 25 - 50 mm (1 - 2")	Fixed angle type	£34.50
156-102	125 - 300 mm (5 - 12")	Vertical type	£395.00
156-103	300 - 1000 mm (12 - 40")		£835.00

### Dimensions



# Optional Accessories

## Spindle Attachment Tips

- Simple interchangeable tips attached to standard micrometer spindles enable measurement of contours otherwise unmeasurable (for 6.35 mm spindles only).
- Measuring range changes when a spindle attachment tip is mounted: the maximum measuring range is 10 mm or less (accuracy is not guaranteed).



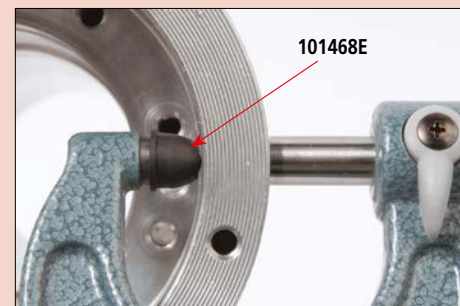
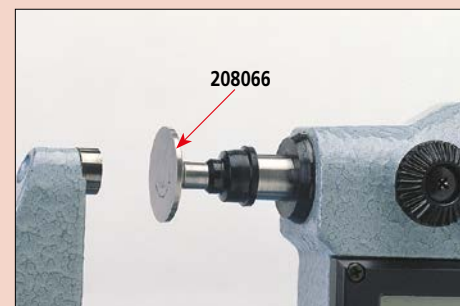
### Specifications

Code No.	Tip type	Dimensions	Price
208062	Spline		£25.90
208063	Comparator		£25.90
208064	Blade		£25.90
208065	Knife edge		£25.90
208066	Disc		£29.90
101468M	Metric ball (5 mm)	—	£11.90
101468E	Inch ball (.2")	—	

### Technical Data

Tip length\*: 10 mm ±5 µm

\* Excluding ball attachments



## Micrometer Oil

- Special lubricant for micrometers.



### Specifications

Code No.	Item	Remarks	Price
207000UK	Micrometer oil	Quantity 30 ml	£11.20

## Colour-Coded Ratchet and Speeder Covers

- Ratchet and speeder covers in a choice of seven colours for use in instrument identification control schemes: red, blue, yellow, green, brown, black and grey.



Standard outside micrometer

### Ratchet



### Speeder



### Ratchet Cover Specifications

Code No.	Colour	Material	Price
Analogue type: 0-300 mm			
04GZA239	Grey	Plastic	£4.80
985056	Black		£6.50
985061	Red		£6.50
985081	Blue		£6.50
985071	Yellow		£6.50
985076	Green		£6.50
985066	Brown		£6.50
950700	Grey		Steel
Analogue type: 300-1000 mm			
04GZA243	Grey	Plastic	£5.80
Digimatic type: 0-300 mm			
04GZA241*	Grey	Plastic	£5.80

\* Cannot be used for non-digital micrometers.

### Speeder Cover Specifications

Code No.	Colour	Material	Price
04GAA260	Grey	Plastic	£1.00
301708	Black		£1.00
301709	Red		£1.00
301713	Blue		£1.00
301711	Yellow		£1.00
301712	Green		£1.00
301710	Brown		£1.00



Ratchet thimble micrometer



QuantuMike

### Speeder



### Speeder Cover Specifications

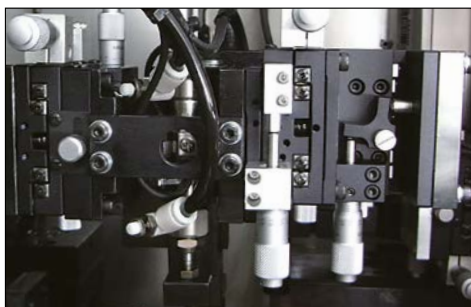
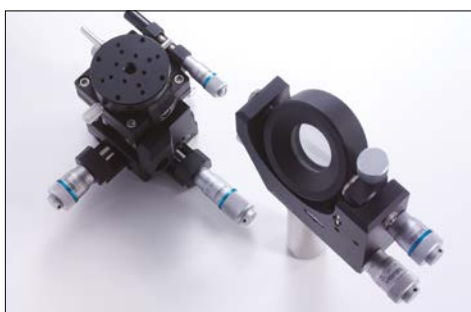
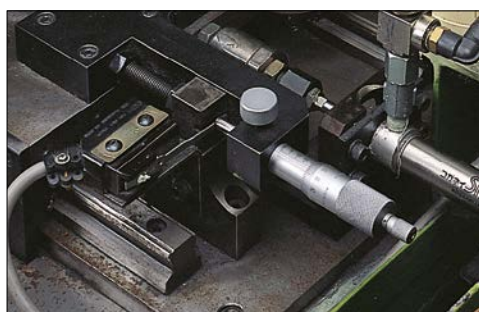
Code No.	Colour	Material	Price
04GAA899	Black	Plastic	£1.80
04GAA900	Red		£1.80
04GAA901	Yellow		£1.80
04GAA902	Green		£1.80
04GAA903	Blue		£1.80
04AAB208	Grey		£1.50

# Micrometer Heads

## Selection Guide

Mounted on measuring instruments and precision instruments, micrometer heads are used for various purposes including measurement, feeding and positioning. Recent developments in technology have seen the micrometer head widely utilized in precise feeding devices and cross-travel stages on laser instruments and manipulators, in addition to the usual duties on measurement jigs. In parallel with the application expansion, the customer's needs have increased. To meet customer demands, Mitutoyo provides standard micrometer heads with different measuring ranges, stem type and body size. Furthermore, high-performance types of Digimatic Micrometer Head, 0.1 mm spindle-pitch models (standard 0.5 mm), etc., are now available for the new applications. Mitutoyo also provides customization services for special applications. Micrometer heads with customized spindle tips and precision leadscrews manufactured to customer specification can be offered even in one-off quantities.

Measuring range	Main feature of head		Series	Page
0 - 2.5 mm	High-function	Fine spindle feed of 0.25 mm/rev	110	B-74
	Standard	Locking-screw type	148	B-79
0 - 6.5 mm	Standard	Small type	148	B-75
		Short body	148	B-76
0 - 13 mm	High-function	Fine spindle feed of 0.25 mm/rev	110	B-74
		Short body	148	B-76
	Standard	Small standard type	148	B-77
		Small standard type with zero-adjustable thimble	148	B-78
0 - 15 mm	High-function	Non-rotating spindle type	153	B-85
	Standard	Small standard type with carbide-tipped spindle	149	B-80
0 - 25 mm	Digimatic	Standard data output type	350	B-73
	High-function	Non-rotating spindle type	153	B-85
		Large thimble type for fine feed	152	B-83
		XY-stage type	152	B-84
		Fine graduation and high accuracy	153	B-86
	Standard	Medium-sized standard type with carbide-tipped spindle	150	B-81
Medium-sized standard type with ø8 mm spindle		151	B-82	
0 - 50 mm	Digimatic	Rotatable-display data output type	164	B-72
		Large thimble type for fine feed	152	B-83
		Non-rotating spindle, 2X faster feed and large thimble	197	B-87
		Medium-sized standard type with ø8 mm spindle	151	B-82
60 - 75 mm	Micro Jack	High load bearing	7	B-88



## Functions

### Origin point setting (ABS measurement system):

Resets the ABS origin at the current spindle position to the minimum value of the measuring range and switches to ABS mode.

### Zero setting (INC measurement system):

A brief press on the ZERO/ABS button sets display to zero at the current spindle position and switches to the incremental (INC) measuring mode. A longer press resets to the ABS measuring mode.

### Auto power ON/OFF:

The reading on the LCD disappears after this instrument is idle for about 20 minutes, but the reading and measurement mode are retained. Turning the spindle causes the reading to reappear.

### Data output:

Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

### Error alarm:

In the unlikely event of a display overflow or calculation error, an error message is displayed and measurement stops. Measurement cannot continue until the error is corrected. Also, if the battery voltage drops below a certain point, the battery indicator will turn on before measurement becomes impossible, warning the user that the battery needs to be replaced.

## Optional Accessories

Code No.	Description	Price
959149	SPC data cable with pushbutton (1 m)	£35.70
959150	SPC data cable with pushbutton (2 m)	£40.60
02AZD790C	U-WAVE-T data cable with pushbutton (160 mm)	£62.00
02AZE140C	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	£127.00
06AFM380C	USB Input Tool Direct USB-ITN-C (2 m)	£109.00



## SERIES 164 – Digimatic Rotatable Display Micrometer Head

- The display is rotatable to enable easy reading from practically any direction. This feature is especially useful in XY-table applications.
- The Digimatic output port enables inclusion in a statistical process control or networked measurement system.
- Non-rotating spindle.



164-164

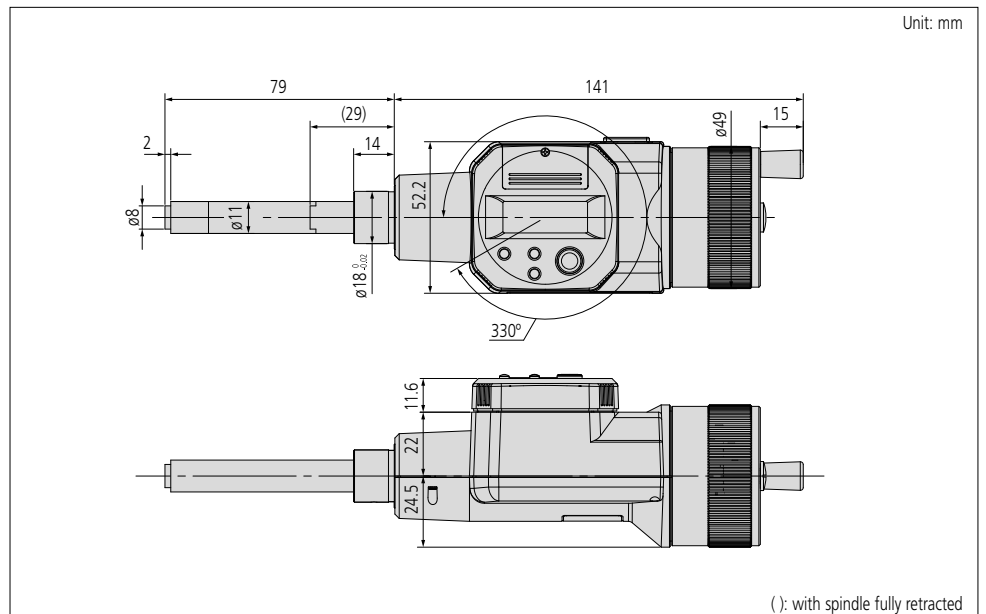
## Specifications

### Inch/Metric

Code No.	Range	Resolution	Accuracy*	Price
164-164	0 - 50 mm (0 - 2")	0.001 mm (.00005")	±3 μm (±.00015")	£749.00

\* Excluding quantizing error.

## Dimensions



# Micrometer Heads

## SERIES 350 – Digimatic Micrometer Head

- The Digimatic output port enables inclusion in a statistical process control or networked measurement system.



350-351-30

IP65



350-361-30

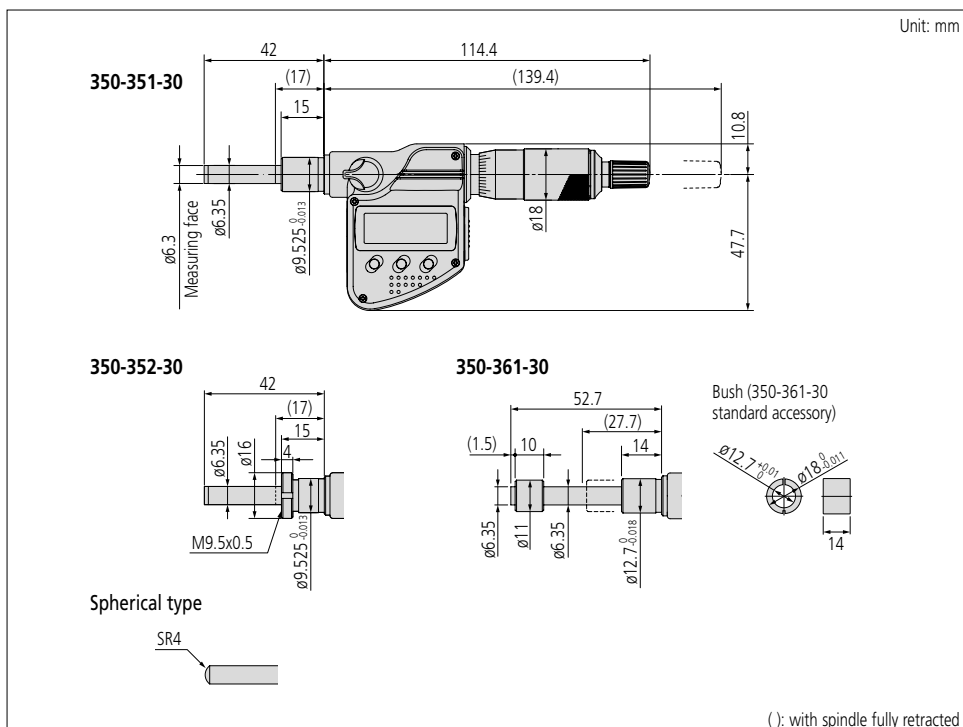
### Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy*	Stem type	Spindle end	IP65	Price
350-351-30	0 - 25 mm (0 - 1")	0.001 mm (.00005")	±2 μm (±.0001")	Plain	Flat (carbide tip)	—	£285.00
350-352-30				Locknut	Flat (carbide tip)	—	£308.00
350-353-30				Plain	Spherical (SR4)	—	£345.00
350-354-30				Locknut	Spherical (SR4)	—	£368.00
350-361-30				Plain	Flat with non-rotating device	✓	£395.00

\* Excluding quantizing error.

### Dimensions



### Functions

**Origin point setting** (ABS measurement system): Resets the ABS origin at the current spindle position to the minimum value of the measuring range and switches to ABS mode.

**Zero setting** (INC measurement system): A brief press on the ZERO/ABS button sets display to zero at the current spindle position and switches to the incremental (INC) measuring mode. A longer press resets to the ABS measuring mode.

**Auto power ON/OFF:** The reading on the LCD disappears after this instrument is idle for about 20 minutes, but the reading and measurement mode are retained. Turning the spindle causes the reading to reappear.

**Data output:** Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

**Error alarm:** In the unlikely event of a display overflow or calculation error, an error message is displayed and measurement stops. Measurement cannot continue until the error is corrected. Also, if the battery voltage drops below a certain point, the battery indicator will turn on before measurement becomes impossible, warning the user that the battery needs to be replaced.

### Optional Accessories

Code No.	Description	Price
02AZF310	U-WAVE-TM connection unit	£62.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB input tool direct USB-ITN-B (2 m)	£126.00
For non IP-rated models only		
264-623	U-WAVE-TM transmitter (buzzer type)	£193.00
For 350-361-30 only		
264-622	U-WAVE-TM transmitter (IP67 type)	£193.00

## SERIES 110 – Differential Screw Micrometer Head

- The differential movement of spindle threads and nuts allows ultra-fine feed.
- Especially useful in precision translation type applications such as found in electronics component manufacture, optical alignment, etc.



110-102



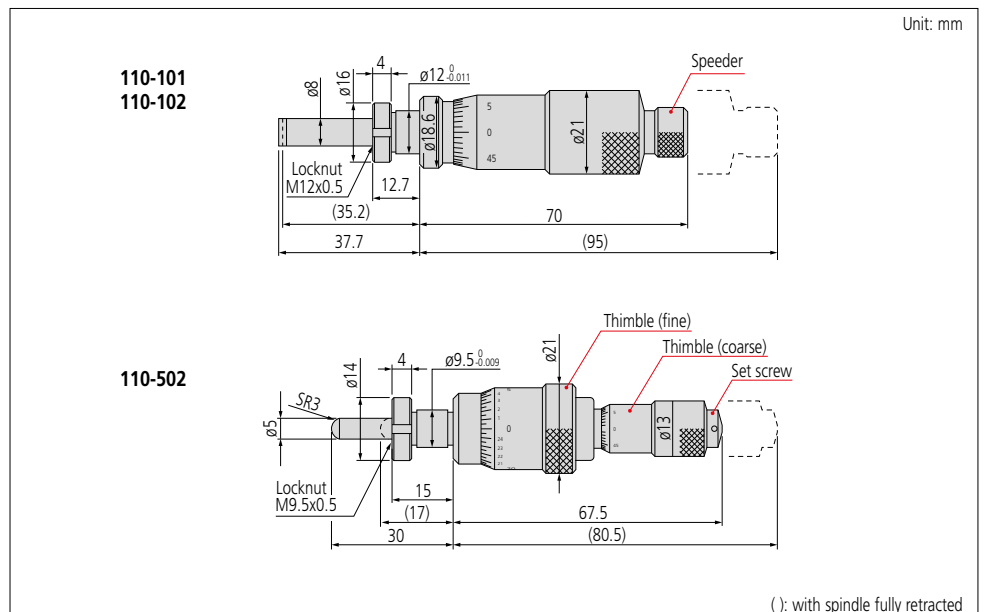
110-502

### Specifications

Metric								
Code No.	Range	Graduation	Accuracy*	Stem	Stem type	Spindle end	Graduation features	Price
110-101	0-2.5 mm	0.001 mm	$\pm 5 \mu\text{m}$	$\varnothing 12 \text{ mm}$	Locknut	Flat (carbide tip)	Standard	£260.00
110-102		0.0001 mm	$\pm 1.5 \mu\text{m}$				Fine	£288.00
Double thimble type								
110-502	Thimble (fine) 0-0.2 mm	Thimble (fine) 0.0005 mm	$\pm 3 \mu\text{m}$ $\pm 1.5 \mu\text{m}$	$\varnothing 9.5 \text{ mm}$	Locknut	Spherical (SR3)	Dual scales; 0.2 mm fine-feed range	£410.00
	Thimble (coarse) 0-13 mm	Thimble (coarse) 0.01 mm						
Inch								
Code No.	Range	Graduation	Accuracy*	Stem	Stem type	Spindle end	Graduation features	Price
Double thimble type								
110-504	Thimble (fine) 0-.006"	Thimble (fine) .00002"	$\pm 0.0015$ " / $\pm 0.00006$ "	$\varnothing .375$ "	Locknut	Spherical (SR3)	Dual scales; 0.2 mm/.006" fine-feed range	£410.00
	Thimble (coarse) 0-.5"	Thimble (coarse) .001"						

\* Wide range/narrow range.

### Dimensions



# Micrometer Heads

## SERIES 148 – Short Range Small Micrometer Head

- Miniature micrometer heads for ease of incorporating into machines, jigs and fixtures.

### Technical Data

Graduation: 0.01 mm / .001"



148-201



148-203



148-205

### Specifications

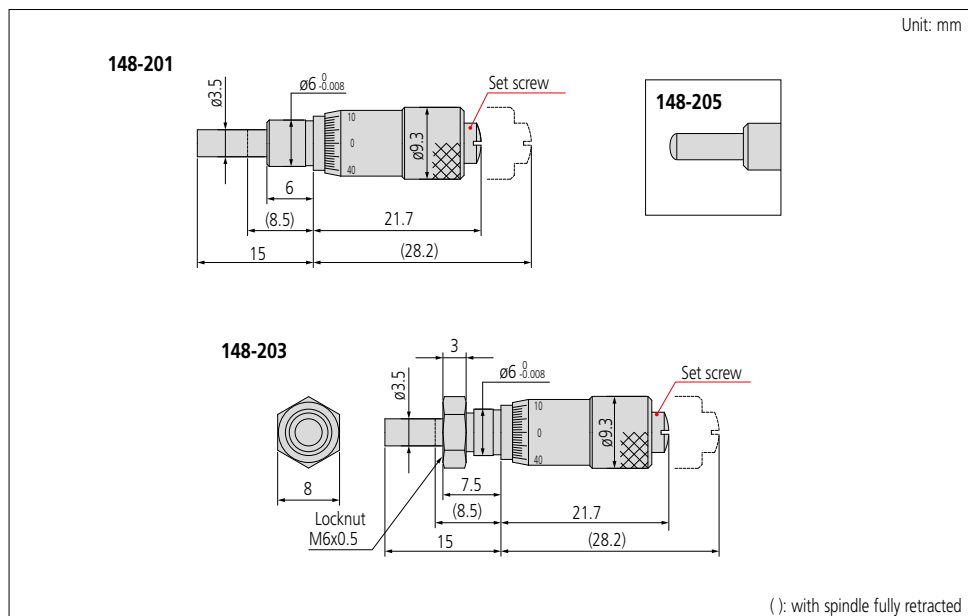
#### Metric

Code No.	Range	Accuracy	Stem	Stem type	Spindle end	Price
148-201	0 - 6.5 mm	±5 μm	ø6 mm	Plain	Flat	£46.30
148-203				Locknut		£52.50
148-205				Plain	Spherical (SR3)	£52.80

#### Inch

Code No.	Range	Accuracy	Stem	Stem type	Spindle end	Price
148-202	0 - .25"	±.00025"	ø.25"	Plain	Flat	£46.30

### Dimensions





## Technical Data

Graduation: 0.01 mm  
 Spindle pitch: 0.5 mm

## SERIES 148 – Short Body Micrometer Head

- Short body design maintains measuring range for limited space applications.



148-303

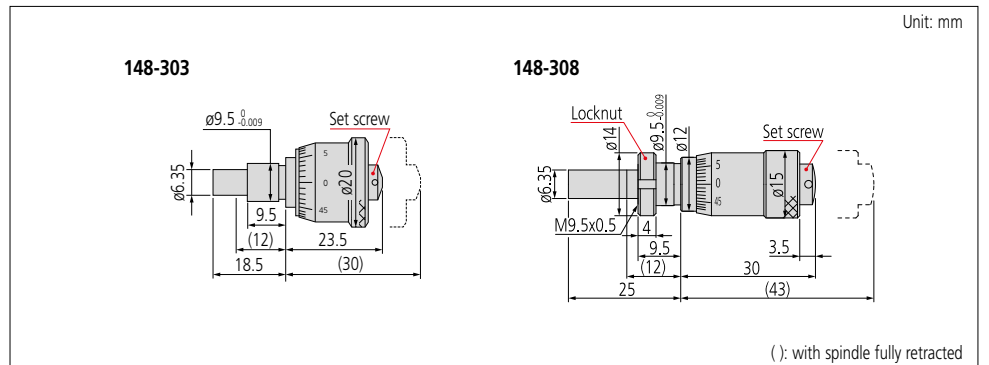


148-308

## Specifications

Metric							
Code No.	Range	Accuracy	Stem	Stem type	Spindle end	Thimble	Price
148-303	0 - 6.5 mm	±2 μm	ø9.5 mm	Plain	Flat	ø20 mm	£70.70
148-308	0 - 13 mm			Locknut		ø15 mm	£70.70

## Dimensions



B

# Micrometer Heads

## SERIES 148 – Small Standard Micrometer Head

- Measuring range 13 mm / .5".



148-104



148-801



148-821

### Technical Data

Graduation:	0.01 mm / .001"
Spindle pitch:	0.5 mm / .025"
Spindle end:	Flat or spherical form, SKS-3 tool steel (more than HRC60), lapped surface
Scale:	Satin-chrome plated

### Specifications

#### Metric

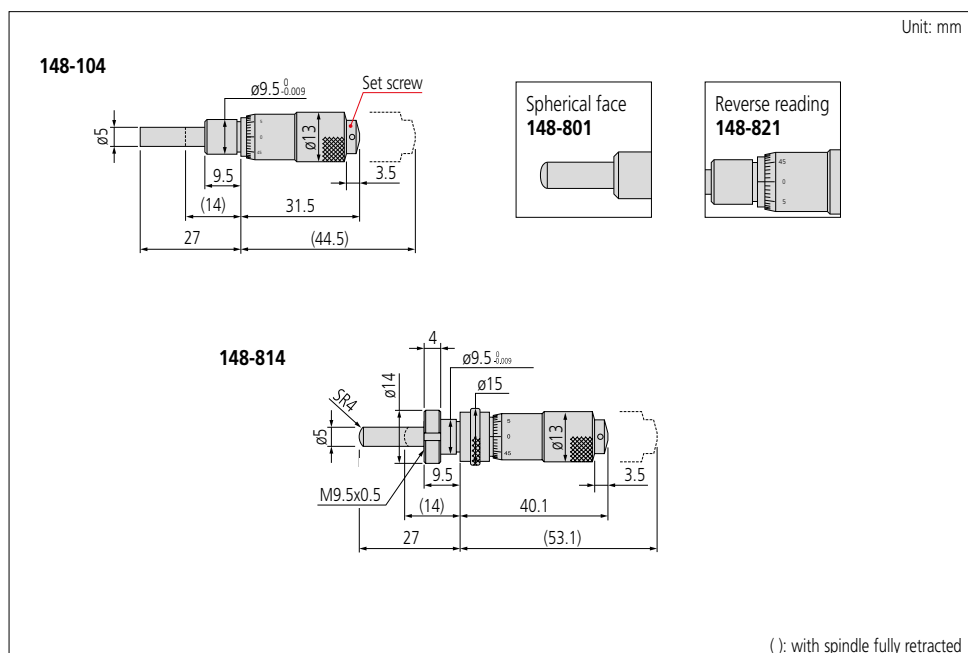
Code No.	Range	Accuracy	Stem	Stem type	Spindle end	Graduation features	Price
148-104	0 - 13 mm	±2 μm	ø9.5 mm	Plain	Flat	Standard	£47.10
148-801					Spherical (SR4)		
148-821					Flat	Reverse reading	£47.70

#### Inch

Code No.	Range	Accuracy	Stem	Stem type	Spindle end	Graduation features	Price
148-112	0 - .5"	±.0001"	ø.375"	Plain	Flat	Standard	£47.10
148-811				Plain	Spherical (SR4)		
148-814*				Locknut		£67.00	
148-831				Plain	Flat	Reverse reading	£47.70

\* With spindle lock.

### Dimensions



## Technical Data

Graduation: 0.01 mm / .001"  
 Spindle pitch: 0.5 mm / .025"

## SERIES 148 – Adjustable Thimble Small Standard Micrometer Head

- Measuring range 13 mm / .5".
- The thimble can be set to zero at any position by loosening the setscrew.



148-503



148-504



148-853



148-863



148-854



148-864

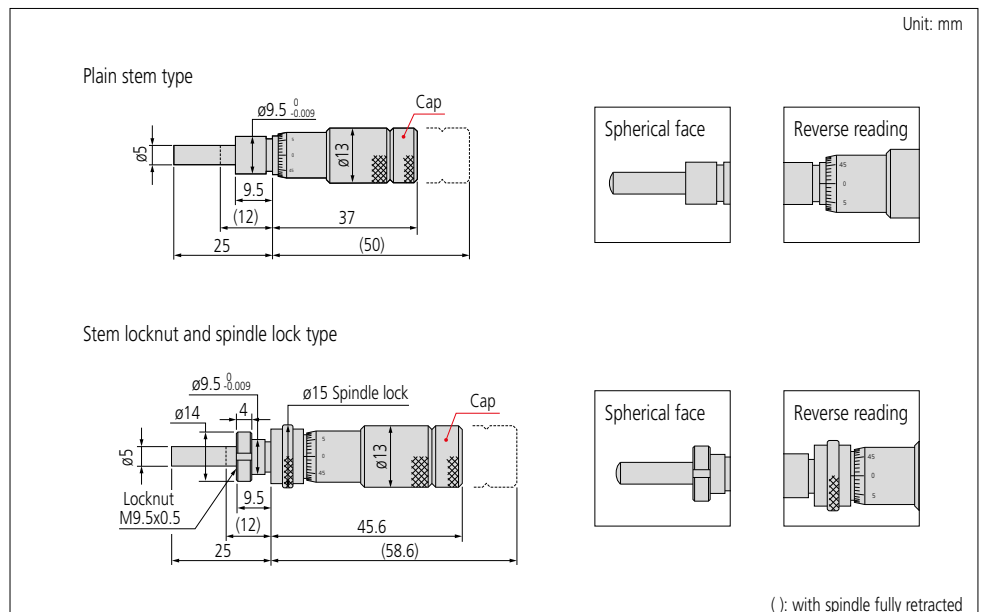
## Specifications

Metric							
Code No.	Range	Accuracy	Stem	Stem type	Spindle end	Special features	Price
148-503	0 - 13 mm	±2 μm	ø9.5 mm	Plain	Flat	Standard	£48.50
148-504*				Locknut			£56.30
148-853				Plain	Spherical (SR4)		£55.00
148-854*				Locknut			£58.10
148-863				Plain	Flat	Reverse reading	£60.60
148-864*				Locknut			£59.20

Inch							
Code No.	Range	Accuracy	Stem	Stem type	Spindle end	Special features	Price
148-501	0 - .5"	±.0001"	ø.375"	Plain	Flat	Standard	£48.50
148-502*				Locknut			£56.30
148-851				Plain	Spherical (SR4)		£55.00
148-852*				Locknut			£58.10
148-861				Plain	Flat	Reverse reading	£60.60
148-862*				Locknut			£59.20

\* With spindle lock.

## Dimensions



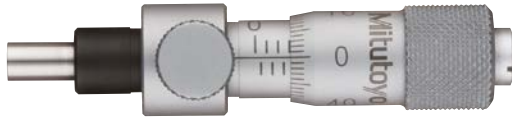
# Micrometer Heads

## SERIES 148 – Locking Screw Micrometer Head

- Locking screw provides secure locking at any position of the spindle.
- Position of the locking screw is the same as the sleeve index line.

### Technical Data

Graduation: 0.01 mm / .001"  
 Spindle pitch: 0.5 mm / .025"



148-220

### Specifications

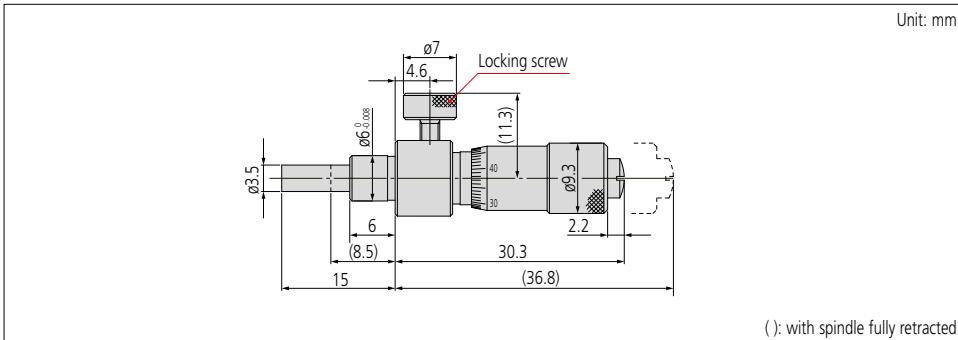
#### Metric

Code No.	Range	Accuracy	Stem	Stem type	Spindle end	Price
148-220	0 - 6.5 mm	±5 µm	ø6 mm	Plain	Flat	£46.30

#### Inch

Code No.	Range	Accuracy	Stem	Stem type	Spindle end	Price
148-230	0 - .25"	±.00025"	ø.25"	Plain	Flat	£46.30

### Dimensions



## Technical Data

Graduation: 0.01 mm / .001"  
 Spindle pitch: 0.5 mm / .025"

## SERIES 149 – Carbide-Tipped Spindle Small Standard Micrometer Head

- Carbide-tipped spindle provides high abrasion resistance.



149-131



149-132



149-802

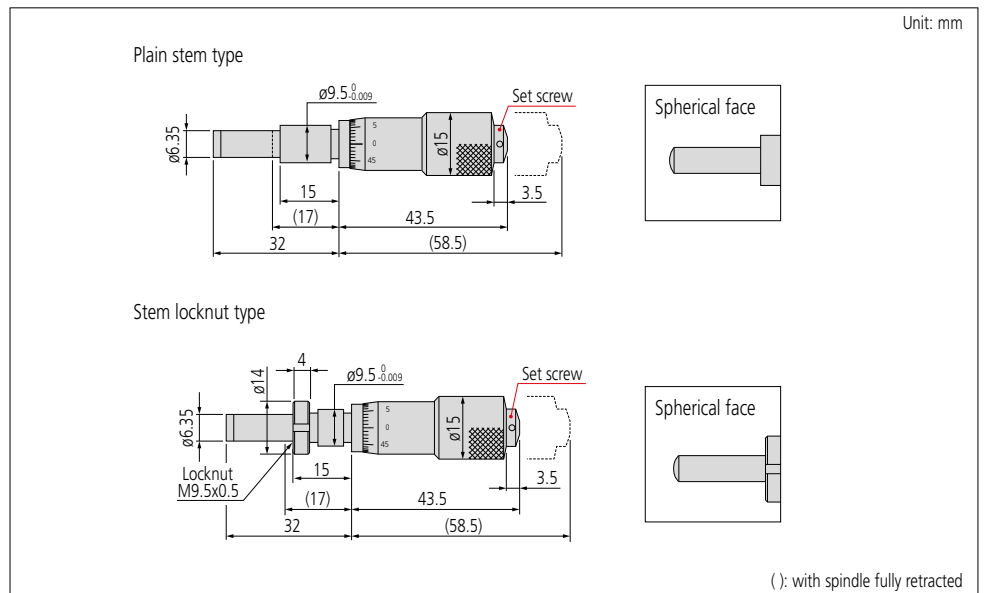


149-801

## Specifications

Metric						
Code No.	Range	Accuracy	Stem	Stem type	Spindle end	Price
149-132	0 - 15 mm	±2 μm	ø9.5 mm	Plain	Flat	£47.10
149-131				Locknut		£50.80
149-801				Plain	Spherical (SR4)	£48.20
149-802				Locknut		£52.60
Inch						
Code No.	Range	Accuracy	Stem	Stem type	Spindle end	Price
149-811	0 - .5"	±.0001"	ø.375"	Plain	Spherical (SR4)	£48.20
149-812				Locknut		£52.60

## Dimensions



# Micrometer Heads

## SERIES 150 – Carbide-Tipped Spindle Medium Standard Micrometer Head

- Measuring range of 25 mm.

### Technical Data

Spindle pitch: 0.5 mm / .025"



150-191



150-801



150-190

### Specifications

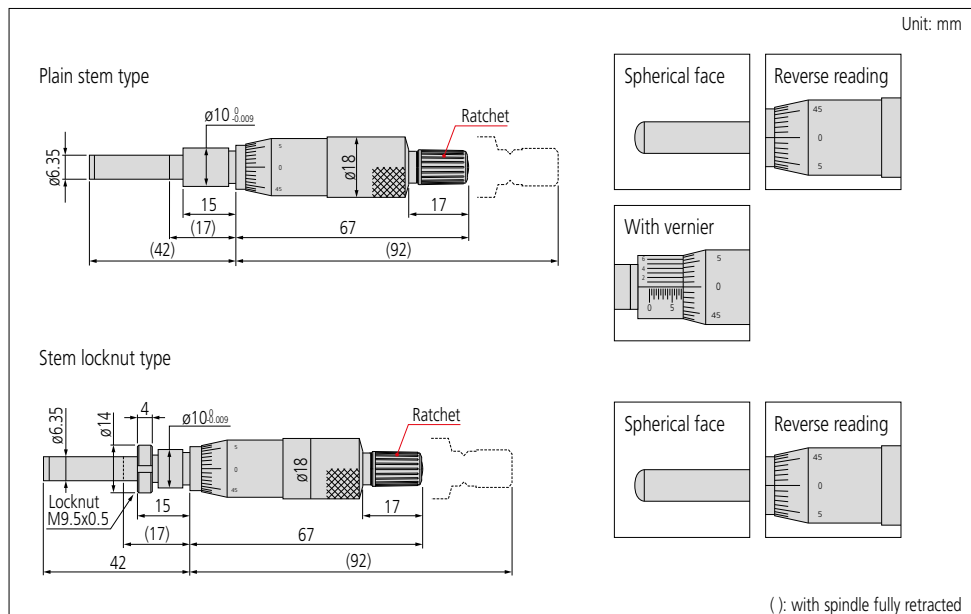
#### Metric

Code No.	Range	Graduation	Accuracy	Stem	Stem type	Spindle end	Special features	Price
150-190	0-25 mm	0.001 mm	±2 μm	ø10 mm	Plain	Flat	With vernier	£66.70
150-192							Standard	£45.50
150-191		Locknut			£45.50			
150-801		Plain			Spherical (SR4)	£46.30		
150-802		Locknut			£48.20			
150-821		Plain			Flat	Reverse graduation		£48.20
150-822		Locknut			£51.90			

#### Inch

Code No.	Range	Graduation	Accuracy	Stem	Stem type	Spindle end	Special features	Price
150-206	0-1"	.0001"	±.0001"	ø.375"	Plain	Flat	With vernier	£66.70
150-208							Standard	£45.50
150-207		Locknut			£45.50			
150-811		Plain			Spherical (SR4)	£46.30		
150-812		Locknut			£48.20			
150-831		Plain			Flat	Reverse graduation		£48.20
150-832		Locknut			£51.90			

### Dimensions



## Technical Data

Spindle pitch: 0.5 mm / .025"

## SERIES 151 – ø8 mm Spindle Medium Standard Micrometer Head

- Larger spindle for heavy-duty applications (normally ø6.35 mm).

151-221



151-224



151-255



### Specifications

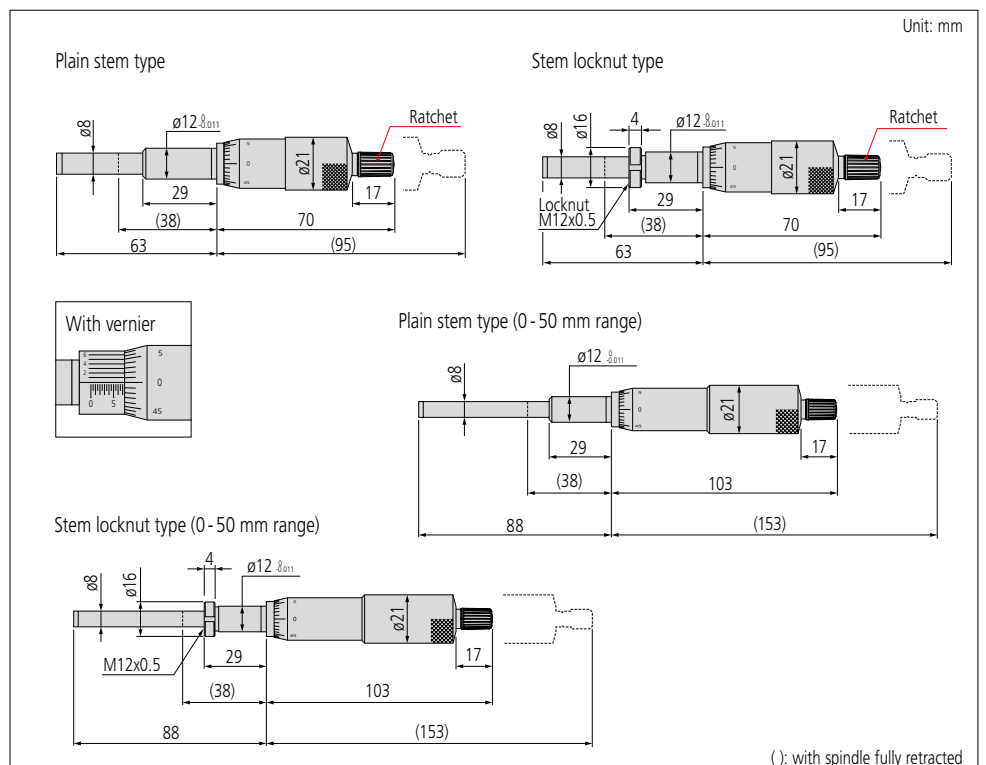
#### Metric

Code No.	Range	Graduation	Accuracy	Stem	Stem type	Spindle end	Special features	Price
151-224	0 - 25 mm	0.01 mm	±2 µm	ø12 mm	Plain	Flat (carbide tip)	—	£73.50
151-223					Locknut			£73.50
151-222		0.001 mm			With vernier		Plain	£73.50
151-221							Locknut	£77.50
151-256	0 - 50 mm	0.01 mm	±4 µm		Plain		—	£132.00
151-255					Locknut			£132.00

#### Inch

Code No.	Range	Graduation	Accuracy	Stem	Stem type	Spindle end	Special features	Price
151-240	0 - 1"	.001"	±.0001"	ø.5"	Plain	Flat (carbide tip)	—	£73.50
151-239					Locknut			£73.50
151-238		.0001"			With vernier		Plain	£73.50
151-237							Locknut	£77.50
151-272	0 - 2"	.001"	±.0002"		Plain		—	£132.00
151-271					Locknut			£132.00

### Dimensions



# Micrometer Heads

## SERIES 152 – Large Diameter Thimble Micrometer Head

- Large-diameter thimble provides high discrimination without the need for a vernier scale on standard-range heads.
- Bidirectional graduations for use in either direction.

### Technical Data

Graduation: 0.002 mm / .0001"  
Spindle pitch: 0.5 mm / .025"



152-348



152-380

### Specifications

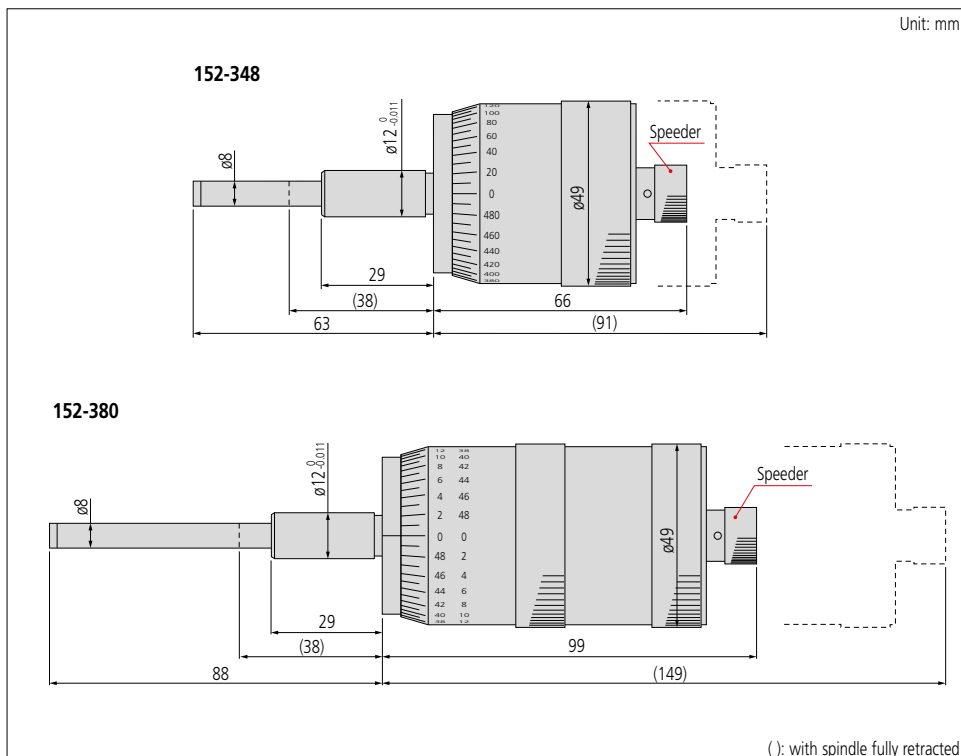
#### Metric

Code No.	Range	Accuracy	Stem	Stem type	Spindle end	Special features	Price
152-348	0 - 25 mm	±2 μm	ø12 mm	Plain	Flat (carbide tip)	Bidirectional	£317.00
152-380	0 - 50 mm	±4 μm					£400.00

#### Inch

Code No.	Range	Accuracy	Stem	Stem type	Spindle end	Special features	Price
152-372	0 - 1"	±.0001"	ø.5"	Locknut	Flat (carbide tip)	Bidirectional	£317.00
152-388	0 - 2"						£400.00

### Dimensions





## Technical Data

Graduation: 0.005 mm / .0001"  
 Spindle pitch: 1 mm / .025"

## SERIES 152 – XY-Stage Micrometer Head

- Bidirectional graduations for use in either direction, suitable for cross-travel stage translation in X and Y.
- Spindle end: Flat form and hardened, or spherical with carbide tip (more than HRA90), lapped surface.
- Rotating collar on thimble enables zero setting at any position.
- Non-rotating device on spindle reduces workpiece deformation and wear.

152-389



152-390



## Specifications

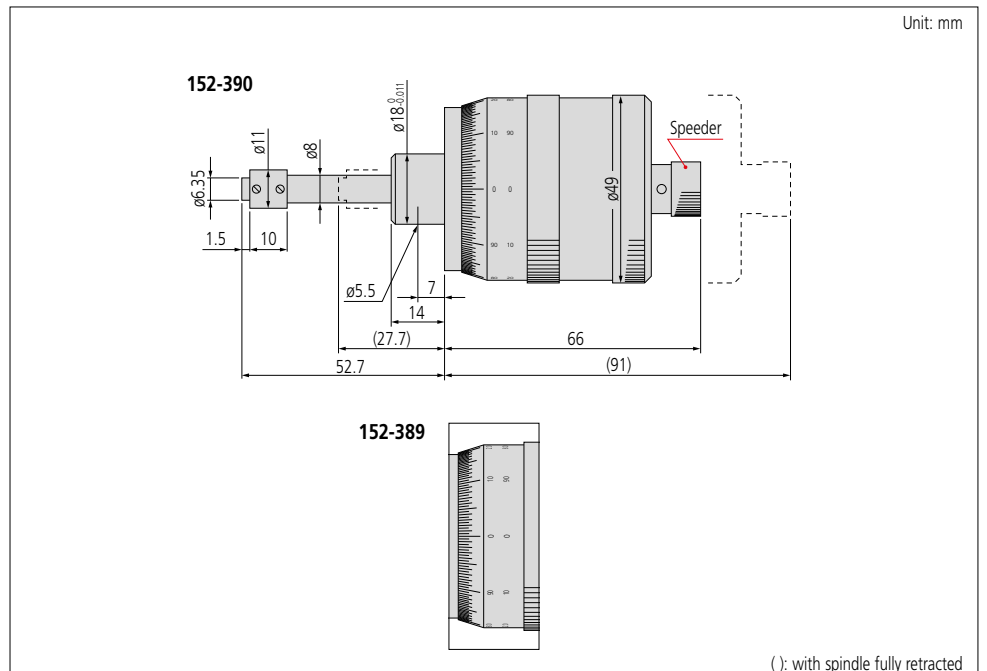
### Metric

Code No.	Range	Accuracy	Stem	Stem type	Special features	Price
152-390	0-25 mm	±2 μm	ø18 mm	Plain	For X-axis, bidirectional	£184.00
152-389					For Y-axis, bidirectional	£184.00

### Inch

Code No.	Range	Accuracy	Stem	Stem type	Special features	Price
152-392	0-1"	±.0001"	ø.709"	Plain	For X-axis, bidirectional	£184.00
152-391					For Y-axis, bidirectional	£184.00

## Dimensions



B

# Micrometer Heads

## SERIES 153 – Non-Rotating Spindle Micrometer Head

- Torsion-free feed reduces workpiece deformation and wear.

### Technical Data

Spindle pitch: 0.5 mm / .025"



153-101



153-201



153-202

### Specifications

#### Metric

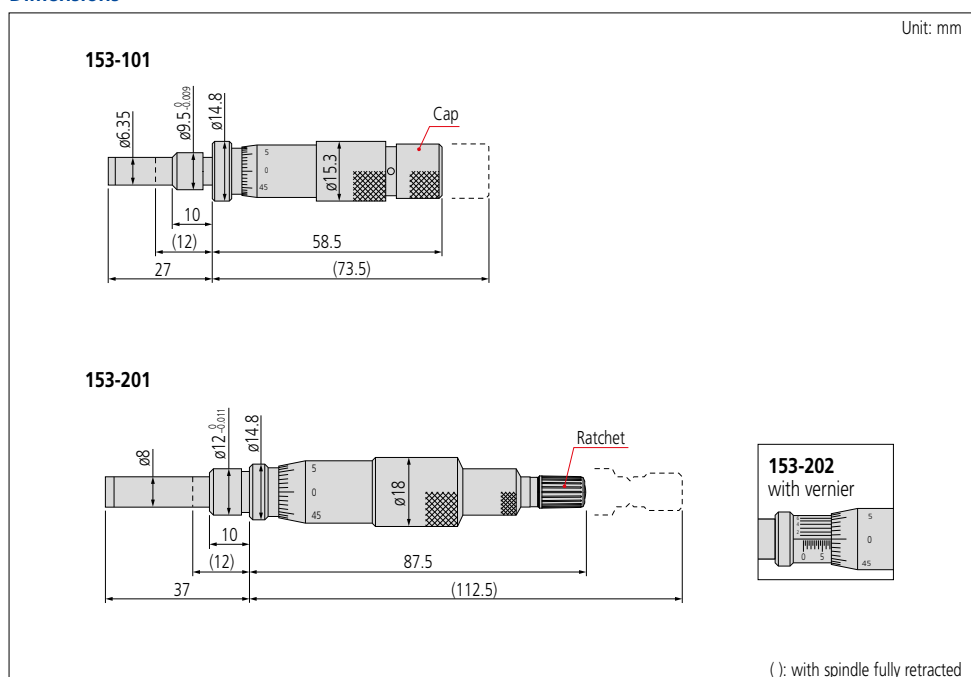
Code No.	Range	Graduation	Accuracy	Stem	Stem type	Spindle end	Special features	Price
153-101	0 - 15 mm	0.01 mm	±3 μm	ø9.5 mm	Plain	Flat (carbide tip)	—	£105.00
153-201*	0 - 25 mm			ø12 mm				£120.00
153-202*			0.001 mm			With vernier	£120.00	

#### Inch

Code No.	Range	Graduation	Accuracy	Stem	Stem type	Spindle end	Special features	Price
153-205*	0 - 1"	.001"	±.00015"	ø.5"	Plain	Flat (carbide tip)	—	£120.00
153-206*		.0001"						With vernier

\* With Ratchet Stop.

### Dimensions



### Technical Data

Graduation: 0.0005 mm / .00001"  
 Spindle pitch: 0.5 mm / .025"

## SERIES 153 – Large Diameter Thimble High Accuracy Micrometer Head

- Fine graduation and high accuracy model.
- Non-rotating spindle reduces workpiece deformation and wear.
- Bidirectional graduations for use in either direction.



153-301

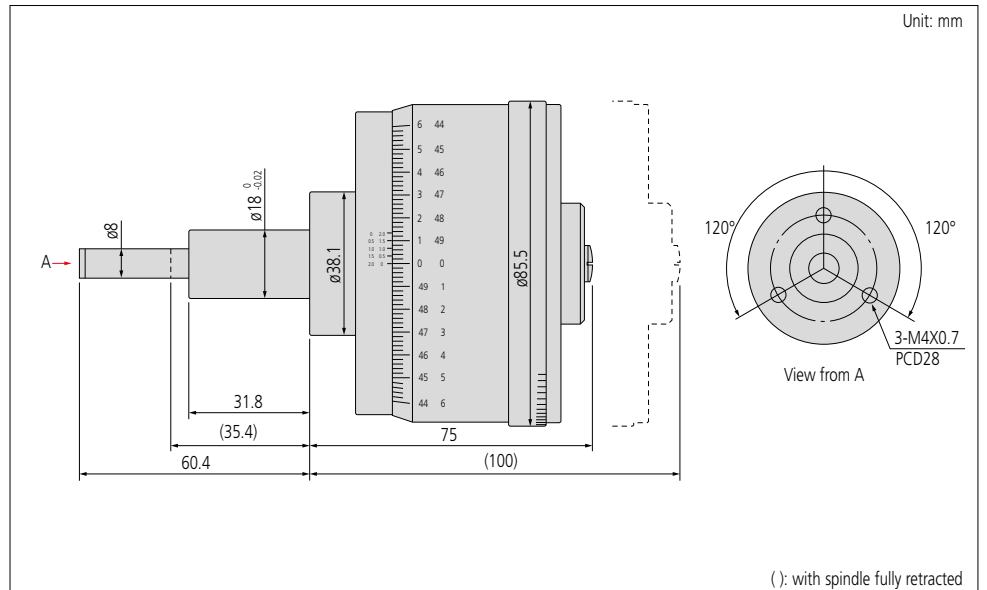
### Specifications

Metric							
Code No.	Range	Accuracy	Stem	Stem type	Spindle end	Special features	Price
153-301	0-25 mm	±1 μm / ±0.5 μm	ø18 mm	Plain	Flat (carbide tip)	Bidirectional	£936.00

Inch							
Code No.	Range	Accuracy	Stem	Stem type	Spindle end	Special features	Price
153-302	0-1"	±.00005" / ±.00003"	ø.709"	Plain	Flat (carbide tip)	Bidirectional	£936.00

### Dimensions



# Micrometer Heads

## SERIES 197 – Large Diameter Thimble Non-Rotating Spindle Micrometer Head

- Large-thimble micrometer head with non-rotating spindle.
- Floating thimble allows easy zero setting at any spindle position.
- Dual-spindle mechanism for quick feed of 1 mm (.05") / rev (standard models: 0.5 mm (.025") / rev).

### Technical Data

Graduation: 0.005 mm / .0002"  
 Spindle pitch: 1 mm / .05"

197-101



### Specifications

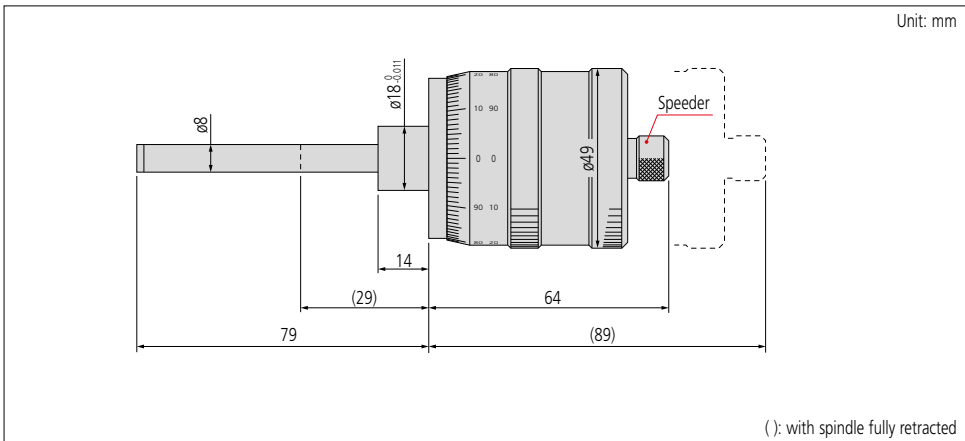
#### Metric

Code No.	Range	Accuracy	Stem	Stem type	Spindle end	Special features	Price
197-101	0-50 mm	±5 μm	ø18 mm	Plain	Flat (carbide tip)	Bidirectional	£359.00

#### Inch

Code No.	Range	Accuracy	Stem	Stem type	Spindle end	Special features	Price
197-201	0-2"	±.0001"	ø.709"	Plain	Flat (carbide tip)	Bidirectional	£359.00

### Dimensions



## Technical Data

Graduation: 0.01 mm



## SERIES 7 – Micro Jack

- Used for accurate levelling of machines, surface plates, and precision instruments.
- Zero-setting is possible at any position.
- Easy adjustment under heavy load.

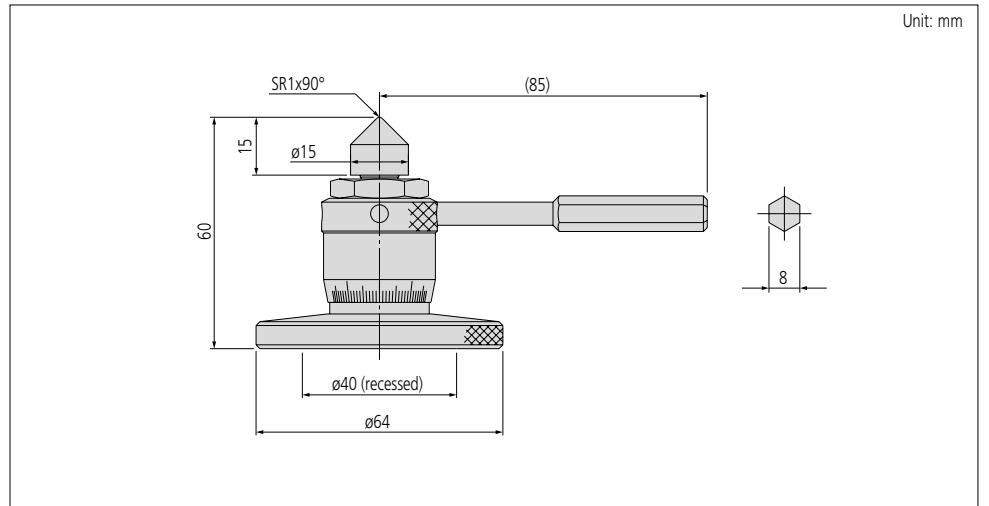


7850

## Specifications

Metric				
Code No.	Range	Handle force at max. loading	Remarks	Price
7850	60 - 75 mm	90 N	Max. load: 400 kg	£380.00

## Dimensions



# HOLTEST INSIDE MICROMETERS BORE GAUGES

C-01



C

## Holtest



## Inside Micrometers



## Bore Gauges



## Contents

### Holtest

Digimatic Holtest Bore Micrometer	C-03
Holtest Bore Micrometer	C-07
Holtest (Type II) Bore Micrometer	C-11
ABSOLUTE Borematic Bore gauge	C-13

### Inside Micrometers

Tubular Inside Micrometer	C-15
Digimatic Extension Tube Inside Micrometer	C-17
Extension Tube Inside Micrometer	C-18
Digimatic Long Range Extension Tube Inside Micrometer	C-19
Long Range Extension Tube Inside Micrometer	C-20
Digimatic Inside Caliper Micrometer	C-21
Inside Caliper Micrometer	C-22
Interchangeable Rod Inside Micrometer	C-23
Inside Micro Checker	C-24

### Bore Gauges

Extra Small Hole Bore Gauge	C-25
Small Hole Bore Gauge	C-27
Bore Gauge	C-29
Micrometer Head Bore Gauge	C-31
Blind Hole Bore Gauge	C-33
ABSOLUTE Digimatic Bore Gauge	C-34

### Optional Accessories

Bore Gauge Extension Rods	C-35
Dial Bore Gauge Checker	C-36
Setting Rings	C-37

# Holtest

## SERIES 468 – Digimatic Holtest Three-Point Bore Micrometer

- Three-point bore micrometer with large LCD readout (character height 7.5 mm).
- Titanium-coated measuring pins provide excellent durability and impact resistance and allow the instrument to measure right to the bottom of a blind hole.
- One SR44 battery is required and battery life is approx. 1.2 years under normal use.
- ABSolute and INCRemental measurement modes allow highly efficient operation.
- The IP65 protection rating allows the instrument to be used in the presence of splashing coolant.
- Deep holes can be measured by attaching an extension rod (optional).
- A function lock prevents accidental change of reference point.
- Measurement data output enables operation with Statistical Process Control (SPC) and measurement control systems.
- An interface input tool is available for transferring measurement data, under keyboard control, directly to commercial spreadsheet software.
- Interchangeable-head sets (interchangeable measuring heads type) covering an extended measuring range using multiple heads and non-interchangeable-head sets are available.
- Optional setting rings are available for setting the instrument accurately before measurement (see pages C-37 to C-38).

**MeasurLink<sup>®</sup> ENABLED**  
Data Management Software by Mitutoyo

**IP65**

**TÜVRheinland**  
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ID 0000021605

PROPRIETARY INSPECTION CERTIFICATE



### Technical Data

Display: LCD  
Dust/water protection level: IP65 (IEC60529)\*  
Battery: SR44 (1 pc), **938882**  
\* Rustproofing treatment to be applied after use.

### Functions

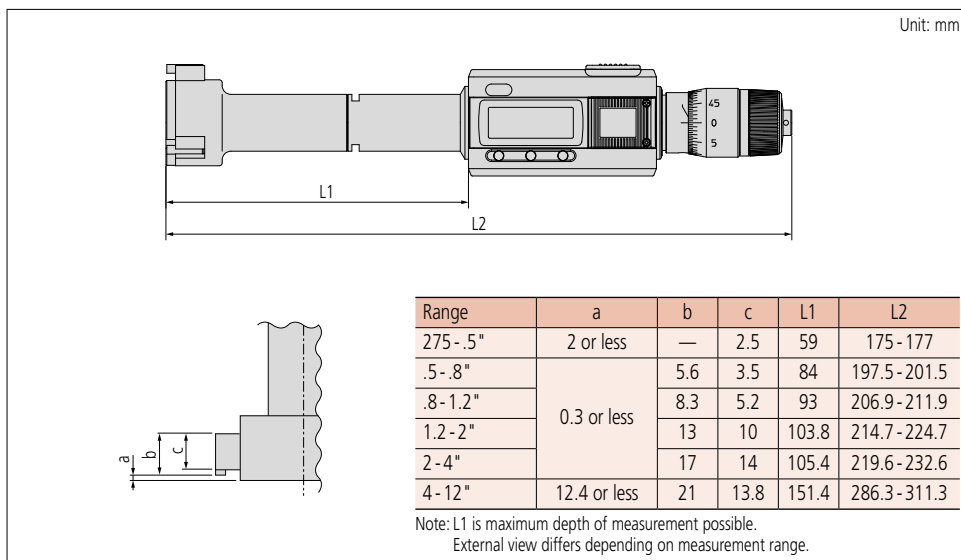
Zero-setting  
Origin restoration  
Data hold  
2-point preset  
Function lock  
inch/mm readout  
Automatic power ON/OFF  
Error alarm  
Data output



Data hold.



### Dimensions





## Optional Accessories

Code No.	Description	Price
02AZD790B	U-WAVE-T data cable with pushbutton (160 mm)	£62.00
02AZE140B	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	£142.00
04AZB157	Mounting bracket	£29.10
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB Input Tool Direct USB-ITN-B (2 m)	£126.00
Extension rods (refer to Specifications table)		
952322	100 mm	£74.50
952621	150 mm	£60.50
952622	150 mm	£67.60
952623	150 mm	£108.00



Mounting bracket **04AZB157** (optional accessory).



Shown on stand using mounting bracket.

## Specifications

Inch/Metric						
Code No.	Range	Resolution	Accuracy*	Extension rod (optional accessory)	Price	
468-261	.275 - .35" (6.985 - 8.89 mm)	.00005" (0.001 mm)	±2 μm (range 2 μm) / ±.0001" (range .0001")	952322	£880.00	
468-262	.35 - .425" (8.89 - 10.795 mm)				£880.00	
468-263	.425 - .5" (10.795 - 12.7 mm)				£880.00	
468-264	.5 - .65" (12.7 - 16.51 mm)			952621	£975.00	
468-265	.65 - .8" (16.51 - 20.32 mm)				£975.00	
468-266	.8 - 1" (20.32 - 25.4 mm)				£995.00	
468-267	1 - 1.2" (25.4 - 30.48 mm)		.0001" (0.001 mm)	±3 μm (range 3 μm) / ±.00015" (range .00015")	952622	£995.00
468-268	1.2 - 1.6" (30.48 - 40.64 mm)					£995.00
468-269	1.6 - 2" (40.64 - 50.8 mm)					£995.00
468-270	2 - 2.5" (50.8 - 63.5 mm)				952623	£1090.00
468-271	2.5 - 3" (63.5 - 76.2 mm)					£1120.00
468-272	3 - 3.5" (76.2 - 88.9 mm)					£1140.00
468-273	3.5 - 4" (88.9 - 101.6 mm)			.0001" (0.001 mm)	±5 μm (range 5 μm) / ±.00025" (range .00025")	952623
468-274	4 - 5" (101.6 - 127 mm)	£1480.00				
468-275	5 - 6" (127 - 152.4 mm)	£1550.00				
468-276	6 - 7" (152.4 - 177.8 mm)	£1620.00				
468-277	7 - 8" (177.8 - 203.2 mm)	£1710.00				
468-278	8 - 9" (203.2 - 228.6 mm)	£1790.00				
468-279	9 - 10" (228.6 - 254 mm)	£1850.00				
468-280	10 - 11" (254 - 279.4 mm)	£1940.00				
468-281	11 - 12" (279.4 - 304.8 mm)	£1990.00				

\* Excluding quantizing error. Accuracy specifications apply to the whole length of the measuring pins, and are given both in terms of the limits of deviation of a measurement and the total width of the deviation range (in parentheses).

Note: It is not advisable to use measuring heads other than those supplied as standard accessories, or attempt to widen a measuring range by using any other heads. (The measuring accuracy in such cases is not guaranteed.)



Interchangeable-head sets (interchangeable measuring heads type).



Non-interchangeable-head sets.

# Holtest

## SERIES 468 – Digimatic Holtest Three-Point Bore Micrometer Interchangeable-Head Sets

MeasurLink<sup>®</sup> ENABLED  
Data Management Software by Mitutoyo



468-976



468-977



468-979

### Specifications

Inch/Metric

Code No.	Range	Content of set	Price
468-976	.275 - .5" (6.985 - 12.7 mm)	Display unit	1 pc
		Measuring head	.275 - .35" 1 pc .35 - .425" 1 pc .425 - .5" 1 pc
		Setting ring	∅.35" 1 pc ∅.425" 1 pc
		Extension rod	100 mm 1 pc
		Spanner	2 pcs
		Hex wrench	1 pc
		Phillips screw driver	1 pc
		Price	£1710.00
468-977	.5 - .8" (12.7 - 20.32 mm)	Display unit	1 pc
		Measuring head	.5 - .65" 1 pc .65 - .8" 1 pc
		Setting ring	∅.65" 1 pc
		Extension rod	150 mm 1 pc
		Spanner	2 pc
		Hex wrench	1 pc
		Phillips screw driver	1 pc
		Price	£1420.00
468-978	.8 - 2" (20.32 - 50.8 mm)	Display unit	1 pc
		Measuring head	.8 - 1" 1 pc 1 - 1.2" 1 pc 1.2 - 1.6" 1 pc 1.6 - 2" 1 pc
		Setting ring	∅1" 1 pc ∅1.6" 1 pc
		Extension rod	150 mm 1 pc
		Spanner	2 pc
		Hex wrench	1 pc
		Phillips screw driver	1 pc
		Price	£2400.00
468-979	2 - 4" (50.8 - 101.6 mm)	Display unit	1 pc
		Measuring head	2 - 2.5" 1 pc 2.5 - 3" 1 pc 3 - 3.5" 1 pc 3.5 - 4" 1 pc
		Setting ring	∅2.5" 1 pc ∅3.5" 1 pc
		Extension rod	150 mm 1 pc
		Spanner	2 pc
		Hex wrench	1 pc
		Phillips screw driver	1 pc
		Price	£3450.00
468-980	4 - 8" (101.6 - 203.2 mm)	Display unit	1 pc
		Measuring head	4 - 5" 1 pc 5 - 6" 1 pc 6 - 7" 1 pc 7 - 8" 1 pc
		Setting ring	∅5" 1 pc ∅7" 1 pc
		Extension rod	150 mm 1 pc
		Spanner	2 pc
		Hex wrench	1 pc
		Phillips screw driver	1 pc
		Price	£4630.00

Note: It is not advisable to use measuring heads other than those supplied as standard accessories, or attempt to widen a measuring range by using any other heads. (The measuring accuracy in such cases is not guaranteed.)

### Optional Accessories

Code No.	Description	Price
02AZD790B	U-WAVE-T data cable with pushbutton (160 mm)	£62.00
02AZE140B	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	£142.00
04AZB157	Mounting bracket	£29.10
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB Input Tool Direct USB-ITN-B (2 m)	£126.00

## Optional Accessories

Code No.	Description	Price
02AZD790B	U-WAVE-T data cable with pushbutton (160 mm)	£62.00
02AZE140B	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	£142.00
04AZB157	Mounting bracket	£29.10
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB Input Tool Direct USB-ITN-B (2 m)	£126.00
Extension rods (refer to Specifications table)		
952322	100 mm	£74.50
952621	150 mm	£60.50
952622	150 mm	£67.60
952623	150 mm	£108.00

## SERIES 468 – Digimatic Holtest Three-Point Bore Micrometer Non-Interchangeable-Head Sets

**MeasurLink<sup>®</sup> ENABLED**  
Data Management Software by Mitutoyo

**IP65**



468-987



468-990

## Specifications

Inch/Metric

Code No.	Range	Content of set	Extension rod (optional accessory)	Price	
468-986	.275 - 5" (6.985 - 12.7 mm)	Display unit	.275 - .35" 1 pc .35 - .425" 1 pc .425 - .5" 1 pc	952322	£2930.00
		Setting ring	ø.35" 1 pc ø.425" 1 pc		
		Spanner	2 pcs		
		Hex wrench	1 pc		
		Phillips screw driver	1 pc		
		468-987	.5 - 1" (12.7 - 25.4 mm)		
Setting ring	ø.65" 1 pc ø.8" 1 pc				
Spanner	2 pcs				
Hex wrench	1 pc				
Phillips screw driver	1 pc				
468-988	1 - 2" (25.4 - 50.8 mm)			Display unit	1 - 1.2" 1 pc 1.2 - 1.6" 1 pc 1.6 - 2" 1 pc
		Setting ring	ø1.2" 1 pc ø1.6" 1 pc		
		Spanner	1 pc		
		Hex wrench	1 pc		
		Phillips screw driver	1 pc		
		468-989	2 - 3" (50.8 - 76.2 mm)	Display unit	2 - 2.5" 1 pc 2.5 - 3" 1 pc
Setting ring	ø2.5" 1 pc				
Spanner	1 pc				
Hex wrench	1 pc				
Phillips screw driver	1 pc				
468-990	3 - 4" (76.2 - 101.6 mm)			Display unit	3 - 3.5" 1 pc 3.5 - 4" 1 pc
		Setting ring	ø3.5" 1 pc		
		Spanner	1 pc		
		Hex wrench	1 pc		
		Phillips screw driver	1 pc		

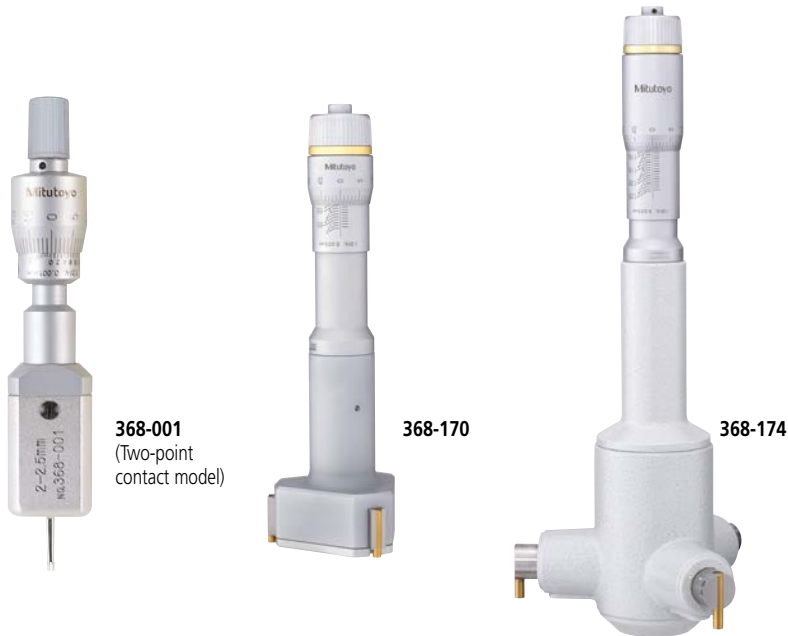
\* 952621 for measuring range 12.7 - 16.51 mm and 16.51 - 20.32 mm, 952622 for measuring range 20.32 - 25.4 mm

Note: It is not advisable to use measuring heads other than those supplied as standard accessories, or attempt to widen a measuring range by using any other heads. (The measuring accuracy in such cases is not guaranteed.)

# Holtest

## SERIES 368 – Holtest Three-Point/Two-Point Bore Micrometers

- Titanium-coated measuring pins on the three-point type (over 6 mm range models) provide excellent durability and impact resistance and allow the instrument to measure right to the bottom of a blind hole.
- Three-point bore micrometer with measuring range 6 mm or larger allows stable measurement through automatic centering.
- Can measure deep holes using an Extension rod (optional) which is available on models over 6 mm (.275") measuring range.
- Ratchet Stop ensures constant-force, repeatable measurement.
- Optional setting rings are available for setting the instrument accurately before measurement (see pages C-37 to C-38).



### Specifications

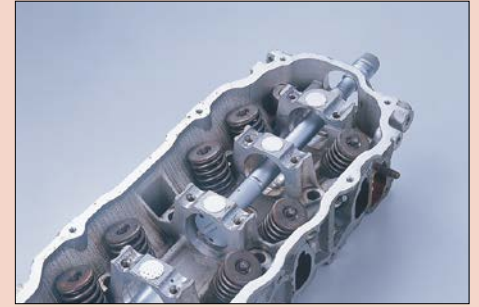
#### Metric

Code No.	Range	Graduation	Accuracy*	Extension rod (optional accessory)	Price		
<b>Two-point</b>							
368-001	2 - 2.5 mm	0.001 mm	±2 μm (range 2 μm)	—	£841.00		
368-002	2.5 - 3 mm				£841.00		
368-003	3 - 4 mm				£701.00		
368-004	4 - 5 mm				£701.00		
368-005	5 - 6 mm				£701.00		
<b>Three-point</b>							
368-161	6 - 8 mm	0.001 mm	±2 μm (range 2 μm)	952322	£275.00		
368-162	8 - 10 mm				£275.00		
368-163	10 - 12 mm			0.005 mm	±3 μm (range 3 μm)	952621	£275.00
368-164	12 - 16 mm						£335.00
368-165	16 - 20 mm					952622	£352.00
368-166	20 - 25 mm						£352.00
368-167	25 - 30 mm						£352.00
368-168	30 - 40 mm						£438.00
368-169	40 - 50 mm						£448.00
368-170	50 - 63 mm						952623
368-171	62 - 75 mm	£485.00					
368-172	75 - 88 mm	£500.00					
368-173	87 - 100 mm	£510.00					
368-174	100 - 125 mm	£735.00					
368-175	125 - 150 mm	£782.00					
368-176	150 - 175 mm	£889.00					
368-177	175 - 200 mm	£913.00					
368-178	200 - 225 mm	£913.00					
368-179	225 - 250 mm	£913.00					
368-180	250 - 275 mm	£976.00					
368-181	275 - 300 mm	£1140.00					
<b>Three-point</b>							
368-174	100 - 125 mm	0.005 mm	±5 μm (range 5 μm)	952623	£735.00		
368-175	125 - 150 mm				£782.00		
368-176	150 - 175 mm				£889.00		
368-177	175 - 200 mm				£913.00		
368-178	200 - 225 mm				£913.00		
368-179	225 - 250 mm				£913.00		
368-180	250 - 275 mm				£976.00		
368-181	275 - 300 mm				£1140.00		

\* Accuracy specifications apply to the whole length of the measuring pins, and are given both in terms of the limits of deviation of a measurement and the total width of the deviation range (in parentheses).

### Optional Accessories

Code No.	Description	Price
Extension rods (refer to Specifications table)		
952322	100 mm	£74.50
952621	150 mm	£60.50
952622	150 mm	£67.60
952623	150 mm	£108.00



Rocker-arm bearing housing measurement using an extension rod.



Measuring diameters down to 2 mm with the two-point model.



Ball-bearing inner-race inside diameter measurement.

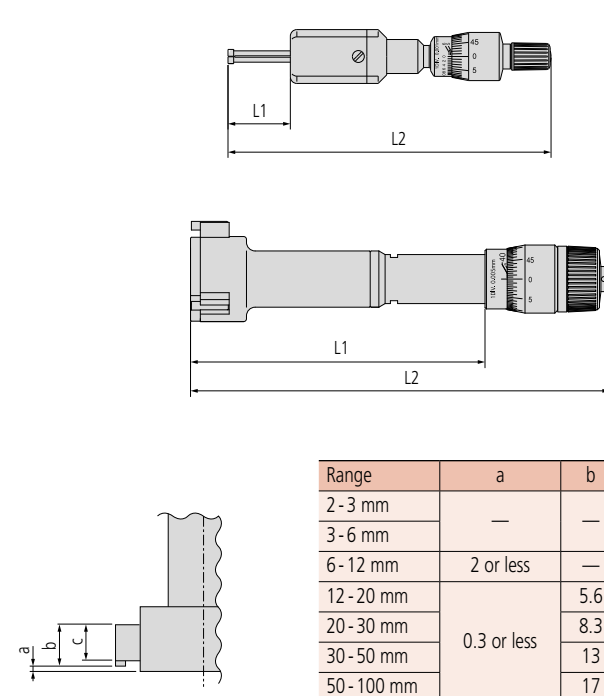
## Specifications

Inch							
Code No.	Range	Graduation	Accuracy*	Extension rod (optional accessory)	Price		
Two-point							
368-021	.08 - .1"	.0001"	±.0001" (range .0001")	—	£841.00		
368-022	.1 - .12"				£841.00		
368-023	.12 - .16"				£701.00		
368-024	.16 - .2"				£701.00		
368-025	.2 - .24"				£701.00		
368-026	.24 - .28"				£701.00		
Three-point							
368-261	.275 - .35"	.0001"	±.0001" (range .0001")	952322	£275.00		
368-262	.35 - .425"				£275.00		
368-263	.425 - .5"			.0002"	±.00015" (range .00015")	952621	£335.00
368-264	.5 - .65"						£352.00
368-265	.65 - .8"					952622	£352.00
368-266	.8 - 1"						£352.00
368-267	1 - 1.2"	£438.00					
368-268	1.2 - 1.6"	£448.00					
368-269	1.6 - 2"	£451.00					
368-270	2 - 2.5"	952623	£485.00				
368-271	2.5 - 3"		£500.00				
368-272	3 - 3.5"		£510.00				
368-273	3.5 - 4"		£735.00				
368-274	4 - 5"		£782.00				
368-275	5 - 6"		£882.00				
368-276	6 - 7"		£911.00				
368-277	7 - 8"		£911.00				
368-278	8 - 9"		£911.00				
368-279	9 - 10"		£976.00				
368-280	10 - 11"	±.00025" (range .00025")	£1130.00				
368-281	11 - 12"		£1130.00				

\* Accuracy specifications apply to the whole length of the measuring pins, and are given both in terms of the limits of deviation of a measurement and the total width of the deviation range (in parentheses).

## Dimensions

Unit: mm



Range	a	b	c	L1	L2
2 - 3 mm	—	—	2	12	103.5 - 104
3 - 6 mm	—	—	2	22	113 - 114
6 - 12 mm	2 or less	—	2.5	59	102 - 104
12 - 20 mm	0.3 or less	5.6	3.5	82	126 - 130
20 - 30 mm		8.3	5.2	94	137 - 142
30 - 50 mm		13	10	102	145 - 155
50 - 100 mm		17	14	105	150 - 163
100 - 300 mm		12.4 or less	21	13.8	161

Note: External view differs depending on measurement range.

# Holtest

## SERIES 368 – Holtest Three-Point/Two-Point Bore Micrometer Sets



368-907



368-912

### Specifications

#### Metric

Code No.	Range	Graduation	Content of Set	Price					
<b>Two-point</b>									
368-906	2 - 3 mm	0.001 mm	Micrometer head unit	2 - 2.5 mm 1 pc 2.5 - 3 mm 1 pc	£1640.00				
			Setting ring	ø2.5 mm 1 pc					
			Hex wrench	1 pc					
368-907	3 - 6 mm	0.001 mm	Micrometer head unit	3 - 4 mm 1 pc 4 - 5 mm 1 pc 5 - 6 mm 1 pc	£1930.00				
			Setting ring	ø4 mm 1 pc					
			Hex wrench	ø5 mm 1 pc					
				1 pc					
<b>Three-point</b>									
368-911	6 - 12 mm	0.001 mm	Micrometer head unit	6 - 8 mm 1 pc 8 - 10 mm 1 pc 10 - 12 mm 1 pc	£890.00				
			Setting ring	ø8 mm 1 pc ø10 mm 1 pc					
			Extension rod	100 mm 1 pc					
			Spanner	2 pcs					
			Hex wrench	1 pc					
			368-912	12 - 20 mm		0.001 mm	Micrometer head unit	12 - 16 mm 1 pc 16 - 20 mm 1 pc	£670.00
							Setting ring	ø16 mm 1 pc	
Extension rod	150 mm 1 pc								
Spanner	2 pcs								
Hex wrench	1 pc								
368-913	20 - 50 mm	0.005 mm			Micrometer head unit		20 - 25 mm 1 pc 25 - 30 mm 1 pc 30 - 40 mm 1 pc 40 - 50 mm 1 pc	£2040.00	
			Setting ring	ø25 mm 1 pc ø40 mm 1 pc					
			Extension rod	150 mm 1 pc					
			Spanner	2 pcs					
			Hex wrench	1 pc					
			368-914	50 - 100 mm	0.005 mm	Micrometer head unit	50 - 63 mm 1 pc 62 - 75 mm 1 pc 75 - 88 mm 1 pc 87 - 100 mm 1 pc		£2550.00
						Setting ring	ø62 mm 1 pc ø87 mm 1 pc		
Extension rod	150 mm 1 pc								
Spanner	2 pcs								
Hex wrench	1 pc								
368-915	100 - 200 mm	0.005 mm				Micrometer head unit	100 - 125 mm 1 pc 125 - 150 mm 1 pc 150 - 175 mm 1 pc 175 - 200 mm 1 pc	£4160.00	
						Setting ring	ø125 mm 1 pc ø175 mm 1 pc		
			Extension rod	150 mm 1 pc					
			Spanner	1 pc					
			Hex wrench	1 pc					

Note: It is not advisable to use measuring heads other than those supplied as standard accessories, or attempt to widen a measuring range by using any other heads. (The measuring accuracy in such cases is not guaranteed.)



368-913



368-915

### Specifications

Inch						
Code No.	Range	Graduation	Content of Set	Price		
<b>Two-point</b>						
368-926	.08 - .12"	.0001"	Micrometer head unit	.08 - .1"	1 pc	<b>£1640.00</b>
			Setting ring	.1 - .12"	1 pc	
			Hex wrench	ø.1"	1 pc	
Hex wrench	ø.1"	1 pc				
368-927	.12 - .28"	.0001"	Micrometer head unit	.12 - .16"	1 pc	<b>£2560.00</b>
			Setting ring	.16 - .2"	1 pc	
			Setting ring	.2 - .24"	1 pc	
			Setting ring	.24 - .28"	1 pc	
			Setting ring	ø.16"	1 pc	
Hex wrench	ø.24"	1 pc				
<b>Three-point</b>						
368-916	.275 - .5"	.0001"	Micrometer head unit	.275 - .35"	1 pc	<b>£890.00</b>
			Micrometer head unit	.35 - .425"	1 pc	
			Micrometer head unit	.425 - .5"	1 pc	
			Setting ring	ø.35"	1 pc	
			Setting ring	ø.5"	1 pc	
			Extension rod	100 mm	1 pc	
Spanner		2 pcs				
Hex wrench		1 pc				
368-917	.5 - .8"	.0001"	Micrometer head unit	.5 - .65"	1 pc	<b>£645.00</b>
			Micrometer head unit	.65" - .8"	1 pc	
			Setting ring	ø.65"	1 pc	
			Extension rod	150 mm	1 pc	
			Spanner		2 pcs	
Hex wrench		1 pc				
368-918	.8 - 2"	.0002"	Micrometer head unit	.8 - 1"	1 pc	<b>£2040.00</b>
			Micrometer head unit	1 - 1.2"	1 pc	
			Micrometer head unit	1.2 - 1.6"	1 pc	
			Micrometer head unit	1.6 - 2"	1 pc	
			Setting ring	ø1"	1 pc	
			Setting ring	ø1.6"	1 pc	
Extension rod	150 mm	1 pc				
Spanner		2 pcs				
Hex wrench		1 pc				
368-919	2 - 4"	.0002"	Micrometer head unit	2 - 2.5"	1 pc	<b>£2550.00</b>
			Micrometer head unit	2.5 - 3"	1 pc	
			Micrometer head unit	3 - 3.5"	1 pc	
			Micrometer head unit	3.5 - 4"	1 pc	
			Setting ring	ø2.5"	1 pc	
			Setting ring	ø3.5"	1 pc	
			Extension rod	150 mm	1 pc	
Spanner		2 pcs				
Hex wrench		1 pc				
368-920	4 - 8"	.0002"	Micrometer head unit	4 - 5"	1 pc	<b>£4160.00</b>
			Micrometer head unit	5 - 6"	1 pc	
			Micrometer head unit	6 - 7"	1 pc	
			Micrometer head unit	7 - 8"	1 pc	
			Setting ring	ø5"	1 pc	
			Setting ring	ø7"	1 pc	
			Extension rod	150 mm	1 pc	
Spanner		1 pc				
Hex wrench		1 pc				

Note: It is not advisable to use measuring heads other than those supplied as standard accessories, or attempt to widen a measuring range by using any other heads. (The measuring accuracy in such cases is not guaranteed.)

# Holtest

## SERIES 368 – Holtest (Type II) Three-Point Bore Micrometer

- Hardened tool-steel anvils (instead of titanium-coated carbide) allow a more economically priced tool.
- Same accuracy as the titanium-coated Holtest models.
- Constant-force device allows repeatable measurement.
- Measurement can be made close to the bottom of a blind hole.
- Can measure deep holes using an Extension Rod (optional).
- Optional setting rings are available for setting the instrument accurately before measurement (see pages C-37 to C-38).



368-769



368-770



368-774

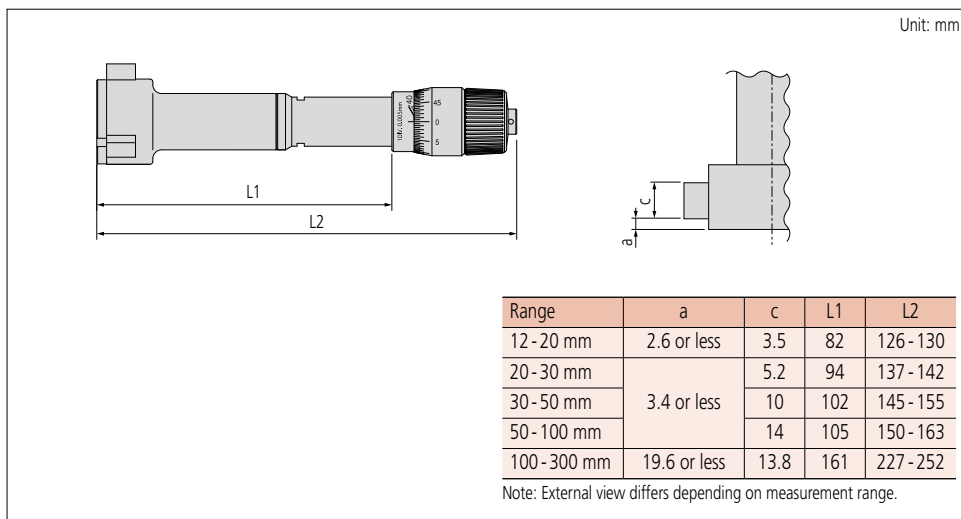
### Optional Accessories

Code No.	Description	Price
Extension rods (refer to Specifications table)		
952621	150 mm	£60.50
952622	150 mm	£67.60
952623	150 mm	£108.00

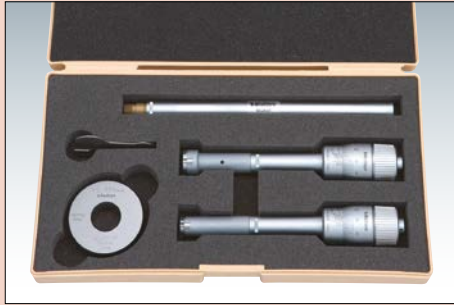


Constant-force device ensures repeatable measurement.

### Dimensions







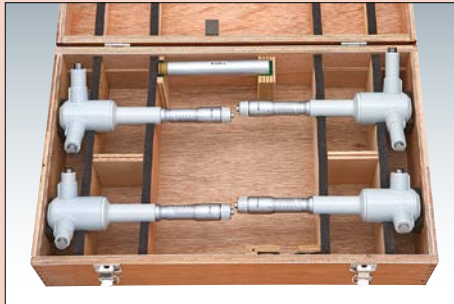
368-991



368-992



368-993



368-994

## Specifications

### Metric

Code No.	Range	Graduation	Accuracy*	Extension rod (optional accessory)	Price
368-764	12 - 16 mm	0.005 mm	±2 μm (range 2 μm)	952621	£260.00
368-765	16 - 20 mm				£275.00
368-766	20 - 25 mm		±3 μm (range 3 μm)	952622	£290.00
368-767	25 - 30 mm				£310.00
368-768	30 - 40 mm				£340.00
368-769	40 - 50 mm				£340.00
368-770	50 - 63 mm		±5 μm (range 5 μm)	952623	£391.00
368-771	62 - 75 mm				£405.00
368-772	75 - 88 mm				£419.00
368-773	87 - 100 mm				£433.00
368-774	100 - 125 mm				£688.00
368-775	125 - 150 mm				£735.00
368-776	150 - 175 mm				£806.00
368-777	175 - 200 mm				£818.00
368-778	200 - 225 mm				£818.00
368-779	225 - 250 mm				£818.00
368-780	250 - 275 mm	£842.00			
368-781	275 - 300 mm	£937.00			

### Sets

Code No.	Range	Micrometer head units	Setting rings	Extension rod (included)	Price
368-991	12 - 20 mm	12 - 16, 16 - 20 mm	∅16 mm	150 mm	£614.00
368-992	20 - 50 mm	20 - 25, 25 - 30, 30 - 40, 40 - 50 mm	∅25, ∅40 mm		£1510.00
368-993	50 - 100 mm	50 - 63, 62 - 75, 75 - 88, 87 - 100 mm	∅62, ∅87 mm		£2240.00
368-994	100 - 200 mm	100 - 125, 125 - 150, 150 - 175, 175 - 200 mm	∅125, ∅175 mm		£3290.00

### Inch

Code No.	Range	Graduation	Accuracy*	Extension rod (optional accessory)	Price
368-864	.5 - .65"	.0002"	±.0001" (range .0001")	952621	£260.00
368-865	.65 - .8"				£275.00
368-866	.8 - 1"		±.00015 (range .00015")	952622	£290.00
368-867	1 - 1.2"				£310.00
368-868	1.2 - 1.6"				£340.00
368-869	1.6 - 2"				£340.00
368-870	2 - 2.5"		±.00025" (range .00025")	952623	£391.00
368-871	2.5 - 3"				£405.00
368-872	3 - 3.5"				£419.00
368-873	3.5 - 4"				£433.00
368-874	4 - 5"				£688.00
368-875	5 - 6"				£735.00
368-876	6 - 7"				£806.00
368-877	7 - 8"				£818.00
368-878	8 - 9"				£818.00
368-879	9 - 10"				£818.00
368-880	10 - 11"	£842.00			
368-881	11 - 12"	£937.00			

### Sets

Code No.	Range	Micrometer head units	Setting rings	Extension rod (included)	Price
368-995	.5 - .8"	.5 - .65, .65 - .8"	∅.65"	150 mm	£614.00
368-996	.8 - 2"	.8 - 1, 1 - 1.2, 1.2 - 1.6, 1.6 - 2"	∅1, 1.6"		£1510.00
368-997	2 - 4"	2 - 2.5, 2.5 - 3, 3 - 3.5, 3.5 - 4"	∅2.5, ∅3.5"		£2240.00
368-998	4 - 8"	4 - 5, 5 - 6, 6 - 7, 7 - 8"	∅5, ∅7"		£3290.00

\* Accuracy specifications apply to the whole length of the measuring jaws, and are given both in terms of the limits of deviation of a measurement and the total width of the deviation range (in parentheses).

Note: It is not advisable to use measuring heads other than those supplied as standard accessories, or attempt to widen a measuring range by using any other heads. (The measuring accuracy in such cases is not guaranteed.)

# Holtest

## SERIES 568 – ABSOLUTE Digimatic Borematic Snap-Open Bore Gauge

- A snap-type digital display, inside-diameter measuring instrument allows easy and speedy measurement by lever operation.
- Titanium-coated measuring pins provide excellent durability and impact resistance and allow the instrument to measure right to the bottom of a blind hole.
- Three-Point contact measuring head enables highly repeatable measurement data to be obtained.
- The ABSOLUTE linear encoder eliminates overspeed errors.
- GO/NO-GO judgement function.
- Dual HOLD function buttons, optimally located, enable high operability.
- 330° rotatable display unit for easy reading at any angle.
- Can measure deep holes by attaching an optional extension rod.
- Digimatic output port enables inclusion in a statistical process control or networked measurement system.
- Interface Input Tools are available that enable the conversion of measurement data to keyboard signals that are then directly input to cells in off-the-shelf spreadsheet software such as Excel.
- Interchangeable-Head Bore Gauges are available in part sets and full sets.
- Optional setting rings are available for setting the instrument accurately before measurement (see pages C-37 to C-38).

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**ABSOLUTE**

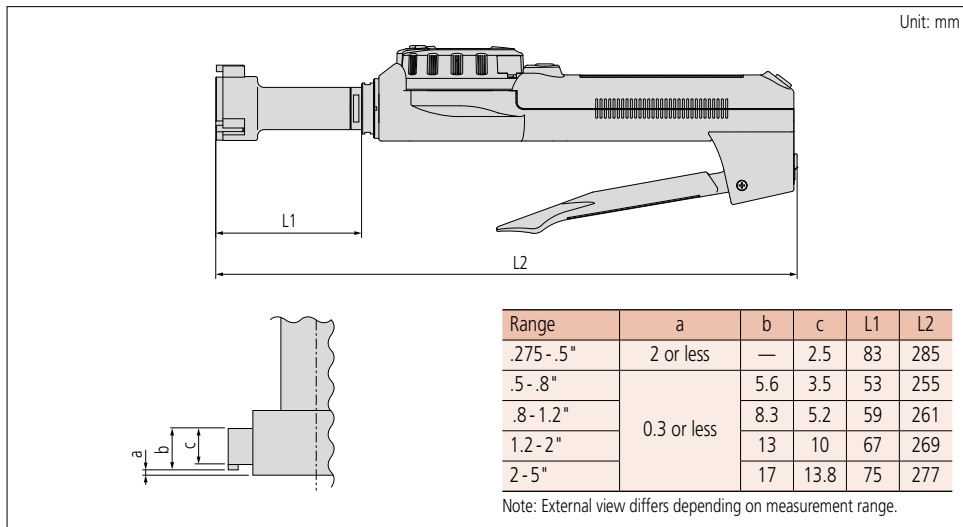


568-464



568-468

### Dimensions



### Technical Data

Display:	LCD
Response speed:	Infinite
Battery:	SR44 (1 pc), <b>938882</b>
Battery life:	Approx. 5,000 hours in continuous use

### Functions

- GO/±NG judgement
- GO/±NG judgement zoom
- 2-point preset
- Zero-setting
- Data hold, error alarm
- Low battery voltage alert
- Data output
- Function lock
- 330° rotatable display



Function lock prevents accidental change of settings.



Large LCD ensures easy reading of measurement values.



Constant-force device ensures repeatable measurement.

## Optional Accessories

Code No.	Description	Price
905338	SPC data cable with pushbutton (1 m)	£33.90
905409	SPC data cable with pushbutton (2 m)	£38.00
02AZD790F	U-WAVE-T data cable (160 mm)	£62.00
02AZE140F	U-WAVE-T data cable with footswitch connection (160/500 mm)	£127.00
06AFM380B	USB Input Tool Direct USB-ITN-B (2 m)	£126.00
Extension rods (refer to Specifications table)		
952322	100 mm	£74.50
952621	150 mm	£60.50
952622	150 mm	£67.60
952623	150 mm	£108.00

## Specifications

Inch/Metric					
Code No.	Range	Resolution	Accuracy*	Extension rod (optional accessory)	Price
568-461	.275 - .35" (6.985 - 8.89 mm)	.00005" (0.001 mm)	±5 µm (range 5 µm) / ±.00025" (range .00025")	952322	£1090.00
568-462	.35 - .425" (8.89 - 10.795 mm)				£1080.00
568-463	.425 - .5" (10.795 - 12.7 mm)				£1080.00
568-464	.5 - .65" (12.7 - 16.51 mm)			952621	£1080.00
568-465	.65 - .8" (16.51 - 20.32 mm)				£1080.00
568-466	.8 - 1" (20.32 - 25.4 mm)				£1120.00
568-467	1 - 1.2" (25.4 - 30.48 mm)		±6 µm (range 6 µm) / ±.0003" (range .0003")	952622	£1120.00
568-468	1.2 - 1.6" (30.48 - 40.64 mm)				£1220.00
568-469	1.6 - 2" (40.64 - 50.8 mm)				£1220.00
568-470	2 - 2.5" (50.8 - 63.5 mm)			952623	£1250.00
568-471	2.5 - 3" (63.5 - 76.2 mm)				£1250.00
568-472	3 - 3.5" (76.2 - 88.9 mm)				£1400.00
568-473	3.5 - 4" (88.9 - 101.6 mm)				£1400.00
568-474	4 - 4.5" (101.6 - 114.3 mm)				£1460.00
568-475	4.5 - 5" (114.3 - 127 mm)				£1480.00

Code No.	Range	Measuring head units	Setting rings	Price
<b>Interchangeable-head bore gauge sets</b>				
568-928	.275 - .5" (6.985 - 12.7 mm)	.275 - .35", .35 - .425", .425 - .5"	ø.35", ø.425"	£1590.00
568-929	.5 - 1" (12.7 - 25.4 mm)	.5 - .65", .65 - .8", .8 - 1"	ø.65", ø.8"	£1750.00
568-930	1 - 2" (25.4 - 50.8 mm)	1 - 1.2", 1.2 - 1.6", 1.6 - 2"	ø1.2", ø1.6"	£2090.00
568-936	2 - 4" (50.8 - 101.6 mm)	2 - 2.5", 2.5 - 3", 3 - 3.5", 3.5 - 4"	ø2.5", ø3.5"	£3460.00
<b>Non-interchangeable-head bore gauge sets</b>				
568-965	.275 - .5" (6.985 - 12.7 mm)	.275 - .35", .35 - .425", .425 - .5"	ø.35", ø.425"	£3620.00
568-966	.5 - 1" (12.7 - 25.4 mm)	.5 - .65", .65 - .8", .8 - 1"	ø.65", ø.8"	£3760.00
568-967	1 - 2" (25.4 - 50.8 mm)	1 - 1.2", 1.2 - 1.6", 1.6 - 2"	ø1.2", ø1.6"	£4190.00
568-968	2 - 3" (50.8 - 76.2 mm)	2 - 2.5", 2.5 - 3"	ø2.5"	£3000.00
568-969	3 - 4" (76.2 - 101.6 mm)	3 - 3.5", 3.5 - 4"	ø2.5", ø3.5"	£3350.00

\* Accuracy specifications apply to the whole length of the measuring jaws, and are given both in terms of the limits of deviation of a measurement and the total width of the deviation range (in parentheses).

Note: It is not advisable to use measuring heads other than those supplied as standard accessories, or attempt to widen a measuring range by using any other heads. (The measuring accuracy in such cases is not guaranteed.)



568-930



568-969

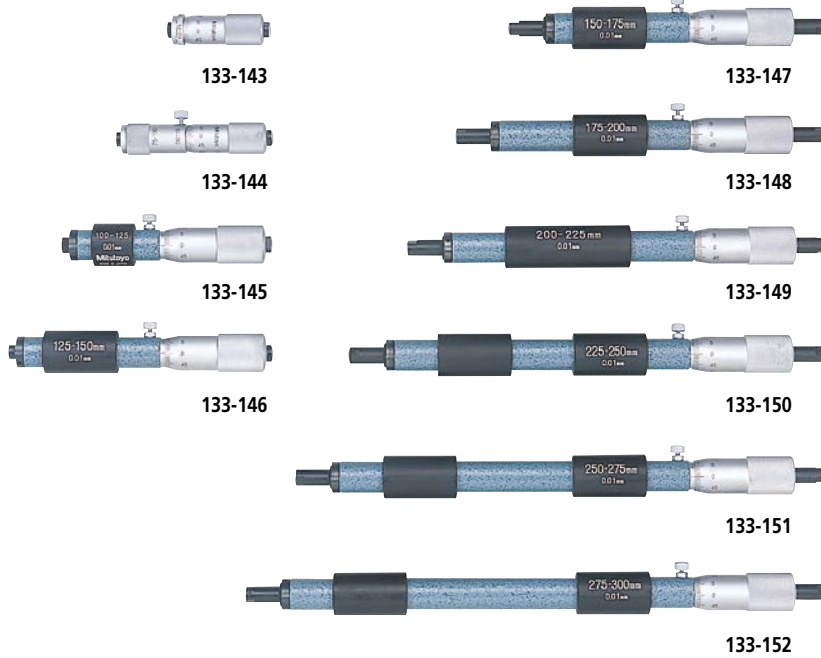
# Inside Micrometers

## SERIES 133 – Tubular Inside Micrometer

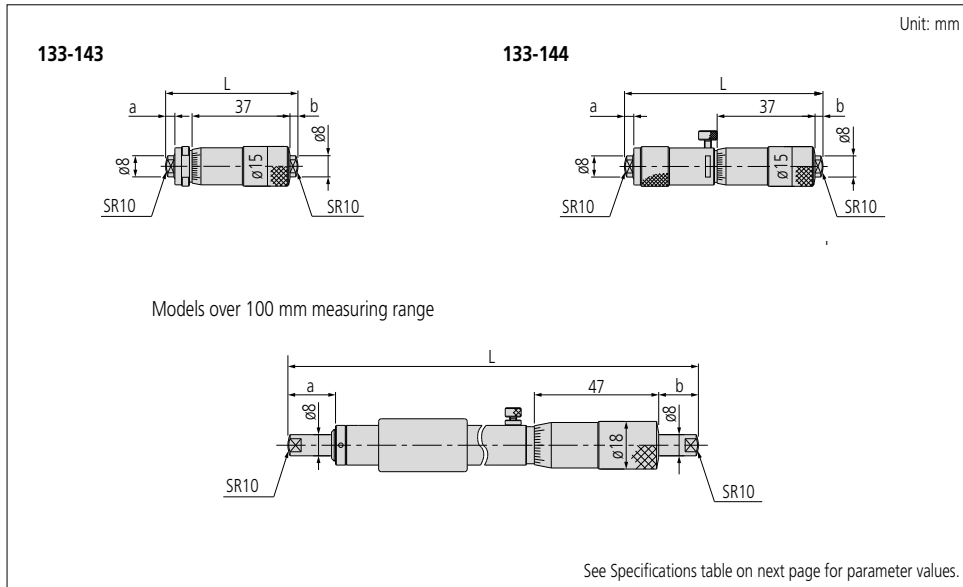
- Standard single tube type inside micrometer.
- The sleeve is rotated to adjust the index line position when setting to a length standard.
- Carbide measuring faces.
- An optional inside-length standard, such as a setting ring or Inside Micro Checker (see pages C-37 to C-38 or page C-24, respectively), is required for accurately setting the micrometer before measurement.



133-902 Inside Micrometer Set.



### Dimensions



## Optional Accessory

Setting rings (up to  $\varnothing 300$  mm/ $\varnothing 12$ "") refer to pages C-37 to C-38.

## Specifications

Metric							
Code No.	Range	Graduation	Accuracy	L	a	b	Price
133-143	50 - 75 mm	0.01 mm	$\pm 3 \mu\text{m}$	50	3.5	3	£90.00
133-144	75 - 100 mm		$\pm 4 \mu\text{m}$	75			£92.00
133-145	100 - 125 mm			100			£96.10
133-146	125 - 150 mm			125	5	15	£101.00
133-147	150 - 175 mm		$\pm 5 \mu\text{m}$	150			£109.00
133-148	175 - 200 mm			175		£118.00	
133-149	200 - 225 mm			200		£125.00	
133-150	225 - 250 mm			225		£129.00	
133-151	250 - 275 mm		$\pm 6 \mu\text{m}$	250		£139.00	
133-152	275 - 300 mm			275		£147.00	
133-153	300 - 325 mm			300		£150.00	
133-154	325 - 350 mm		$\pm 7 \mu\text{m}$	325	18	15	£154.00
133-155	350 - 375 mm			350			£156.00
133-156	375 - 400 mm			375		£160.00	
133-157	400 - 425 mm		$\pm 8 \mu\text{m}$	400		£162.00	
133-158	425 - 450 mm			425		£164.00	
133-159	450 - 475 mm			450		£166.00	
133-160	475 - 500 mm		$\pm 9 \mu\text{m}$	475		£169.00	
133-161	500 - 525 mm			500		£174.00	
133-162	525 - 550 mm			525		£179.00	
133-163	550 - 575 mm		$\pm 10 \mu\text{m}$	550		£181.00	
133-164	575 - 600 mm			575		£184.00	
133-165	600 - 625 mm			600		£186.00	
133-166	625 - 650 mm		$\pm 11 \mu\text{m}$	625		£190.00	
133-167	650 - 675 mm			650		£193.00	
133-168	675 - 700 mm			675		£197.00	
133-169	700 - 725 mm		$\pm 12 \mu\text{m}$	700		£203.00	
133-170	725 - 750 mm			725		£205.00	
133-171	750 - 775 mm			750		£209.00	
133-172	775 - 800 mm		$\pm 13 \mu\text{m}$	775		£211.00	
133-173	800 - 825 mm			800		£212.00	
133-174	825 - 850 mm			825		£214.00	
133-175	850 - 875 mm		$\pm 14 \mu\text{m}$	850		£220.00	
133-176	875 - 900 mm			875		£224.00	
133-177	900 - 925 mm		900		£226.00		
133-178	925 - 950 mm	$\pm 15 \mu\text{m}$	925		£232.00		
133-179	950 - 975 mm		950		£235.00		
133-180	975 - 1000 mm	$\pm 16 \mu\text{m}$	975		£236.00		

### Micrometer sets

Code No.	Range	Models included	Price
133-901	50 - 150 mm (4 heads/set)	133-143/4/5/6	£482.00
133-902	50 - 300 mm (10 heads/set)	133-143/44/45/46/47/48/49/50/51/52	£1170.00

### Inch

Code No.	Range	Graduation	Accuracy	L	a	b	Price
133-223	2 - 3"	.001"	$\pm .00015$ "				£90.00
133-224	3 - 4"		$\pm .0002$ "				£92.00
133-225	4 - 5"						£96.10
133-226	5 - 6"						£101.00
133-227	6 - 7"		$\pm .00025$ "				£109.00
133-228	7 - 8"						£118.00
133-229	8 - 9"						£125.00
133-230	9 - 10"						£129.00
133-231	10 - 11"		$\pm .0003$ "				£139.00
133-232	11 - 12"						£147.00

### Micrometer sets

Code No.	Range	Models included	Price
133-903	2 - 6" (4 heads/set)	133-223/4/5/6	£482.00
133-904	2 - 12" (10 heads/set)	133-223/24/25/26/27/28/29/30/31/32	£1170.00

# Inside Micrometers

## SERIES 337 – Digimatic Extension Tube Inside Micrometer

- Wide range of inside measurements possible by combining extension tubes with the micrometer head.
- The sleeve is rotated to adjust the index line position when setting to a length standard.
- An optional inside-length standard, such as a setting ring or Inside Micro Checker (see pages C-37 to C-38 or page C-24, respectively), is required for accurately setting the micrometer before measurement.

### 337-303/304 features:

- IP65 (water-proof) protection level that enables use in the presence of cutting fluid.
- A large-character LCD display.
- Storage of 2 preset values for use when setting to an inside length standard.
- A function lock that prevents accidental changing of the reference setting during measurement.
- An output port for measurement data that enables inclusion in a statistical process control or networked measurement system.
- Ability to use Interface Input Tools that enable conversion of measurement data to keyboard signals that are then directly input to cells in off-the-shelf spreadsheet software.

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**IP65**

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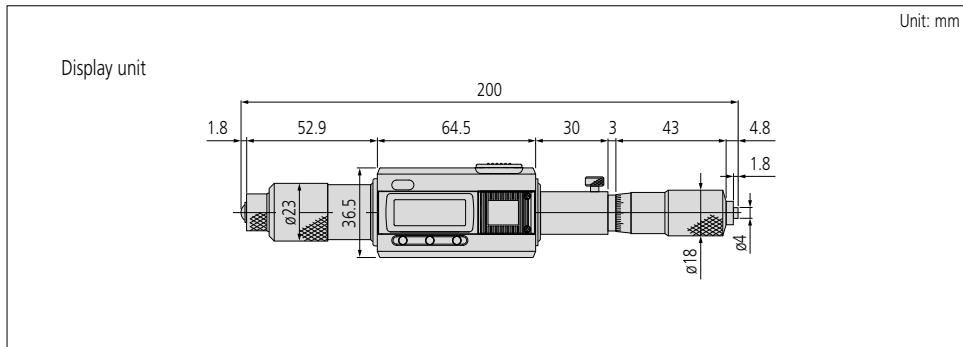


## Specifications

Inch/Metric

Code No.	Range	Micrometer head stroke	Extension tubes	Display unit	Price
337-102	8 - 9" (203.2 - 228.6 mm)	1" (25 mm)	—	8 - 9" (200 - 225 mm)	£853.00
337-303	8 - 40" (203.2 - 1016 mm)		1", 2", 4" (2 pcs.), 8", 12"		£1140.00
337-304	8 - 60" (203.2 - 1524 mm)		1", 2", 4", 8", 12" (3 pcs.)		£1240.00

## Dimensions



## Technical Data

Dust/water protection level:	IP65 (IEC60529)
Resolution:	0.001 mm / .0001"
Battery:	SR44 (1 pc) <b>938882</b>
Accuracy*1:	$\pm(3+n+L/50) \mu\text{m}^{*2} / \pm[.00015+.00005n+.00005 (L/2)]^{*2}$

\*1 Excluding quantizing error.

\*2 n = number of tubes, L = maximum measuring length (mm/inch)

Note: Fractions rounded up

## Functions (for 337-303/304)

Zero-setting  
Origin restoration  
Data hold  
2-point preset  
Function lock  
Automatic power ON/OFF  
Error alarm  
Data output

## Optional Accessories

Code No.	Description	Price
02AZD790B	U-WAVE-T data cable with pushbutton (160 mm)	£62.00
02AZE140B	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	£142.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB Input Tool Direct USB-ITN-B (2 m)	£126.00

Setting rings (up to  $\varnothing 300$  mm /  $\varnothing 12$ " ) refer to pages C-37 to C-38.



Using a setting ring to accurately set an inside micrometer.

### Technical Data

Graduation: 0.01 mm / .001"  
 Micrometer head  
 stroke: 13 mm / .5"  
 Accuracy:  $\pm(3+n+L/50) \mu\text{m}^* /$   
 $\pm[.00015+.00005n+.00005 (L/2)]''^*$   
 \* n = number of tubes, L = maximum measuring length (mm/inch)  
 Note: Fractions rounded up

### Optional Accessory

Setting rings (up to  $\varnothing 300 \text{ mm} / \varnothing 12''$ ) refer to pages C-37 to C-38.

## SERIES 137 – Extension Tube Inside Micrometer

- Wide range of inside measurements possible by combining extension tubes with the micrometer head.
- The sleeve is rotated to adjust the index line position when setting to a length standard.
- An optional inside-length standard, such as a setting ring or Inside Micro Checker (see pages C-37 to C-38 or page C-24, respectively), is required for accurately setting the micrometer before measurement.
- Carbide measuring faces on the micrometer head are available.



137-205

### Specifications

Metric				
Code No.	Range	Extension tubes	Main unit	Price
137-011	50-63 mm	—	50-63 mm	£147.00
137-201	50-150 mm	13, 25, 50 mm		£169.00
137-202	50-300 mm	13, 25, 50 (2 pcs.), 100 mm		£257.00
137-203	50-500 mm	13, 25, 50 (2 pcs.), 100, 200 mm		£317.00
137-204	50-1000 mm	13, 25, 50 (2 pcs.), 100, 200 (2 pcs.), 300 mm		£427.00
137-205	50-1500 mm	13, 25, 50 (2 pcs.), 100, 200 (3 pcs.), 300 (2 pcs.) mm		£563.00

#### Carbide measuring faces

137-013	50-63 mm	—	50-63 mm	£201.00
137-206	50-150 mm	13, 25, 50 mm		£213.00
137-207	50-300 mm	13, 25, 50 (2 pcs.), 100 mm		£287.00
137-208	50-500 mm	13, 25, 50 (2 pcs.), 100, 200 mm		£419.00
137-209	50-1000 mm	13, 25, 50 (2 pcs.), 100, 200 (2 pcs.), 300 mm		£517.00
137-210	50-1500 mm	13, 25, 50 (2 pcs.), 100, 200 (3 pcs.), 300 (2 pcs.) mm		£661.00

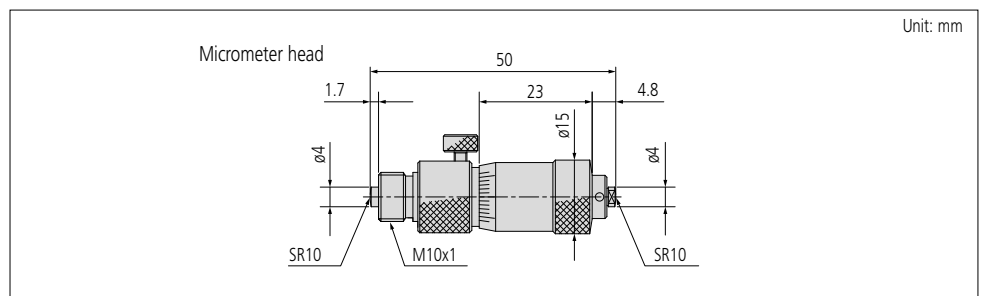
### Inch

Code No.	Range	Extension tubes	Main unit	Price
137-012	2-2.5"	—	2-2.5"	£147.00
137-211	2-6"	.5", 1", 2"		£169.00
137-212	2-12"	.5", 1", 2" (2 pcs.), 4"		£257.00
137-213	2-20"	.5", 1", 2" (2 pcs.), 4", 8"		£317.00
137-214	2-40"	.5", 1", 2" (2 pcs.), 4", 8" (2 pcs.), 12"		£427.00
137-215	2-60"	.5", 1", 2" (2 pcs.), 4", 8" (3 pcs.), 12" (2 pcs.)		£563.00

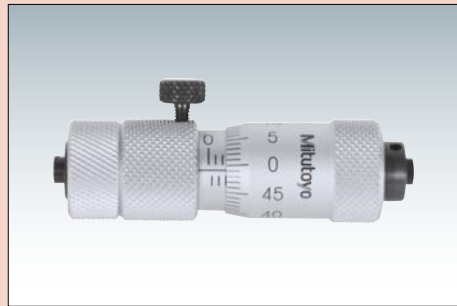
#### Carbide measuring faces

137-014	2-2.5"	—	2-2.5"	£201.00
137-216	2-6"	.5", 1", 2"		£213.00
137-217	2-12"	.5", 1", 2" (2 pcs.), 4"		£287.00
137-218	2-20"	.5", 1", 2" (2 pcs.), 4", 8"		£419.00
137-219	2-40"	.5", 1", 2" (2 pcs.), 4", 8" (2 pcs.), 12"		£517.00
137-220	2-60"	.5", 1", 2" (2 pcs.), 4", 8" (3 pcs.), 12" (2 pcs.)		£661.00

### Dimensions



Unit: mm



137-011

# Inside Micrometers

## SERIES 339 – Digimatic Long Range Extension Tube Inside Micrometer

- Wide range of inside measurements possible by combining extension tubes with the micrometer head.
- The sleeve is rotated to adjust the index line position when setting to a length standard.
- An optional inside-length standard, such as a setting ring or Inside Micro Checker (see pages C-37 to C-38 or page C-24, respectively), is required for accurately setting the micrometer before measurement.

### 339-303/304 features:

- IP65 (water-proof) protection level that enables use in the presence of cutting fluid.
- A large-character LCD display.
- Storage of 2 preset values for use when setting to an inside length standard.
- A function lock that prevents accidental changing of the reference setting during measurement.
- An output port for measurement data that enables inclusion in a statistical process control or networked measurement system.
- Ability to use Interface Input Tools that enable conversion of measurement data to keyboard signals that are then directly input to cells in off-the-shelf spreadsheet software.

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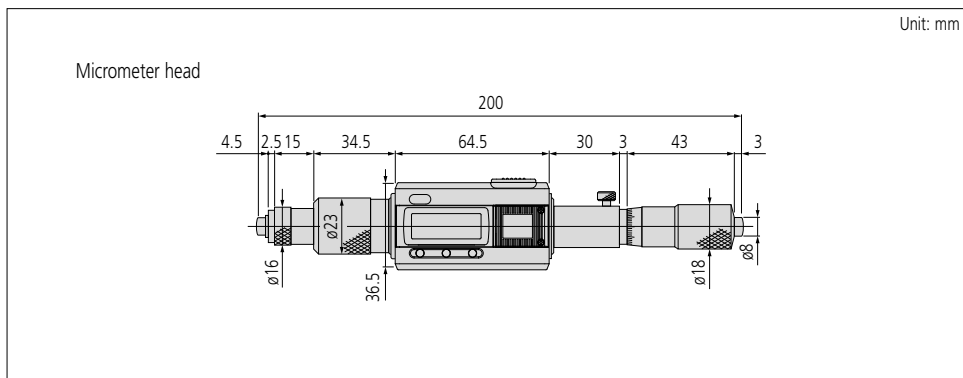
339-303

### Specifications

Inch/Metric

Code No.	Range	Micrometer head stroke	Extension tubes	Display unit	Price
339-102	8-9" (203.2-228.6 mm)	1" (25 mm)	—	8-9" (200-225 mm)	£853.00
339-303	8-40" (203.2-1016 mm)		1", 2", 4", 8", 16"		£1180.00
339-304	8-60" (203.2-1524 mm)		1", 2", 4", 8" (2 pcs.), 16" (3 pcs.)		£1500.00

### Dimensions



### Technical Data

Dust/water protection level:	IP65 (IEC60529)
Resolution:	0.001 mm / .0001"
Battery:	SR44 (1 pc) <b>938882</b>
Accuracy*1:	$\pm(3+n+L/50) \mu\text{m}^{*2} / \pm[.00015+.00005n+.00005 (L/2)]^{*2}$

\*1 Excluding quantizing error.  
\*2 n = number of tubes, L = maximum measuring length (mm/inch)  
Note: Fractions rounded up

### Functions (for 339-303/304)

- Zero-setting
- Origin restoration
- Data hold
- 2-point preset
- Function lock
- Automatic power ON/OFF
- Error alarm
- Data output

### Optional Accessories

Code No.	Description	Price
02AZD790B	U-WAVE-T data cable with pushbutton (160 mm)	£62.00
02AZE140B	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	£142.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB Input Tool Direct USB-ITN-B (2 m)	£126.00

Setting rings (up to  $\varnothing 300$  mm /  $\varnothing 12$ " ) refer to pages C-37 to C-38.



Using a setting ring to accurately set an inside micrometer.



## Technical Data

Graduation: 0.01 mm / .001"  
 Accuracy:  $\pm(3+n+L/50) \mu\text{m}^*$  /  $\pm[.00015+.00005n+.00005(L/2)]^*$   
 \* n = number of tubes, L = maximum measuring length (mm/inch)  
 Note: Fractions rounded up

## Optional Accessory

Setting rings (up to  $\varnothing 300 \text{ mm} / \varnothing 12''$ ) refer to pages C-37 to C-38.

## SERIES 139/140 – Long Range Extension Tube Inside Micrometer

- Wide range of inside measurements possible by combining extension tubes with the micrometer head.
- The sleeve is rotated to adjust the index line position when setting to a length standard.
- An optional inside-length standard, such as a setting ring or Inside Micro Checker (see pages C-37 to C-38 or page C-24, respectively), is required for accurately setting the micrometer before measurement.



139-177

## Specifications

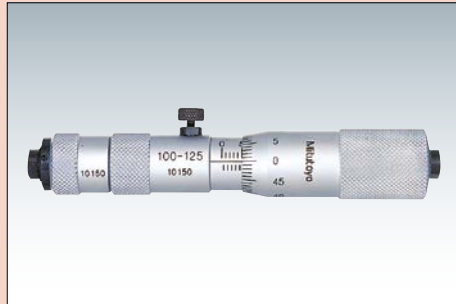
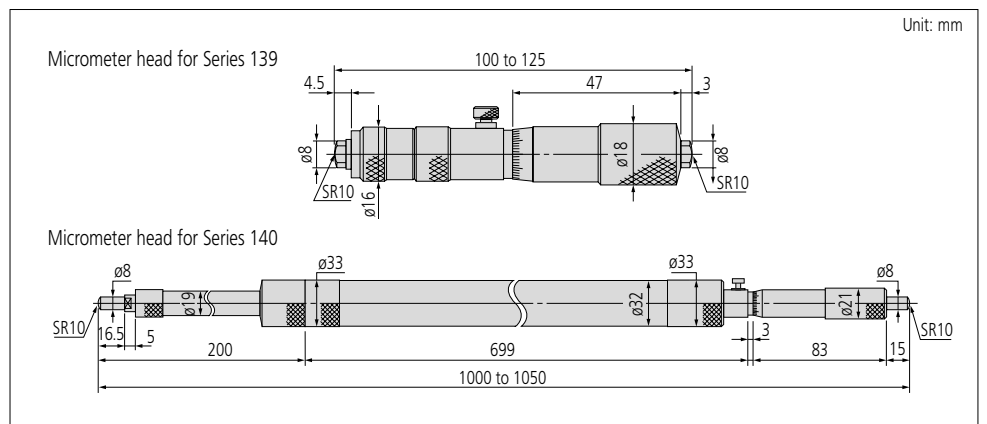
### Metric

Code No.	Range	Head adjustment range	Extension tubes	Main unit	Price
139-001	100 - 125 mm	25 mm	—	100 - 125 mm	£147.00
139-173	100 - 500 mm		25, 50, 100, 200 mm		£497.00
139-174	100 - 900 mm		25, 50, 100, 200, 400 mm		£554.00
139-175	100 - 1300 mm		25, 50, 100, 200, 400 (2 pcs.) mm		£646.00
139-176	100 - 1700 mm		25, 50, 100, 200, 400 (3 pcs.) mm		£749.00
139-177	100 - 2100 mm		25, 50, 100, 200, 400 (4 pcs.) mm		£818.00
140-157	1000 - 2000 mm	50 mm	50, 100 (2 pcs.), 200, 500 mm	1000 - 1050 mm	£2120.00
140-158	1000 - 3000 mm		50, 100 (2 pcs.), 200, 500, 1000 mm		£2220.00
140-159	1000 - 4000 mm		50, 100 (2 pcs.), 200, 500, 1000 (2 pcs.) mm		£2920.00
140-160	1000 - 5000 mm		50, 100 (2 pcs.), 200, 500, 1000 (3 pcs.) mm		£3630.00

### Inch

Code No.	Range	Head adjustment range	Extension tubes	Main unit	Price
139-002	4 - 5"	1"	—	4 - 5"	£147.00
139-178	4 - 20"		1", 2", 4", 8"		£497.00
139-179	4 - 36"		1", 2", 4", 8", 16"		£554.00
139-180	4 - 52"		1", 2", 4", 8", 16" (2 pcs.)		£646.00
139-181	4 - 68"		1", 2", 4", 8", 16" (3 pcs.)		£749.00
139-182	4 - 84"		1", 2", 4", 8", 16" (4 pcs.)		£818.00
140-161	40 - 80"	2"	2", 4" (2 pcs.), 8", 20"	40 - 42"	£2120.00
140-162	40 - 120"		2", 4" (2 pcs.), 8", 20", 40"		£2220.00
140-163	40 - 160"		2", 4" (2 pcs.), 8", 20", 40" (2 pcs.)		£2920.00
140-164	40 - 200"		2", 4" (2 pcs.), 8", 20", 40" (3 pcs.)		£3630.00

## Dimensions



139-001

# Inside Micrometers

## SERIES 345 – Digimatic Inside Caliper Micrometer

- Designed for accurate measurement of the diameter of small and short holes or bores.
- Carbide measuring faces.
- Equipped with a constant measuring-force device.
- An optional inside-length standard, such as a setting ring or Inside Micro Checker (see pages C-37 to C-38 or page C-24, respectively), is required for accurately setting the micrometer before measurement.

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345-350-30



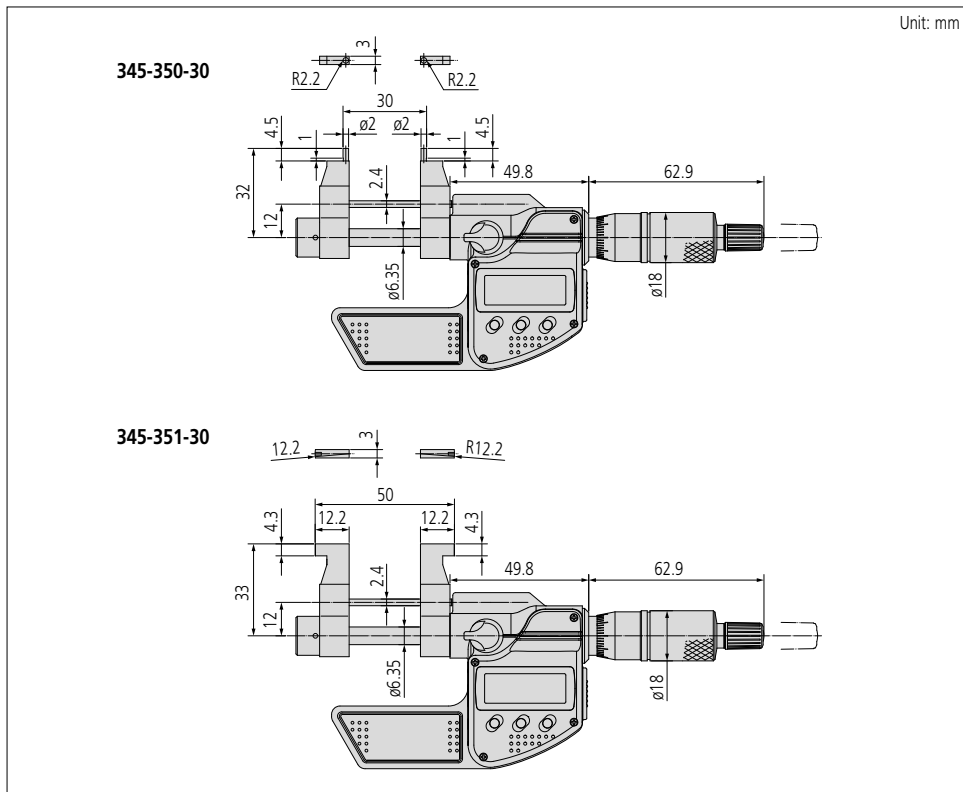
345-351-30

### Specifications

Inch/Metric				
Code No.	Range	Resolution	Accuracy*	Price
345-350-30	.2 - 1.2" (5.08 - 30.48 mm)	.00005" (0.001 mm)	±.00025" (±5 μm)	£569.00
345-351-30	1 - 2" (25.4 - 50.8 mm)		±.0003" (±6 μm)	£685.00

\* Excluding quantizing error

### Dimensions



### Optional Accessories

Code No.	Description	Price
264-622	U-WAVE-TM transmitter	£193.00
02AZF310	U-WAVE-TM connection unit	£62.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB Input Tool Direct USB-ITN-B (2 m)	£126.00

Setting rings (up to  $\varnothing 300$  mm/ $\varnothing 12$ " ) refer to pages C-37 to C-38.



Measuring a small inside diameter.



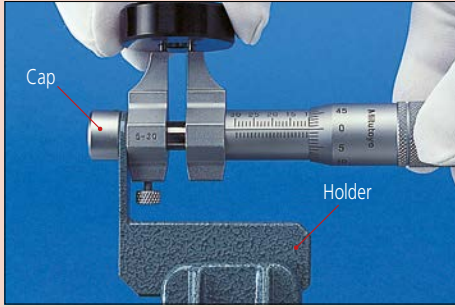
Using an Inside Micro Checker to accurately set an inside micrometer.

### Optional Accessories

Code No.	Description	Price
300401	Micrometer stand cap*	£3.40
300400	Micrometer stand holder*	£9.80

Setting rings (up to  $\varnothing 300$  mm /  $\varnothing 12$ " ) refer to pages C-37 to C-38.

\* Only for models with measuring range up to 50 mm / 2".



This instrument requires the cap and the holder for mounting on a micrometer stand.

### SERIES 145 – Inside Caliper Micrometer

- Designed for accurate diameter measurement of short holes or bores.
- Carbide measuring faces.
- Equipped with a constant measuring-force device.
- An optional inside-length standard, such as a setting ring or Inside Micro Checker (see pages C-37 to C-38 or page C-24, respectively), is required for accurately setting the micrometer before measurement.



145-185



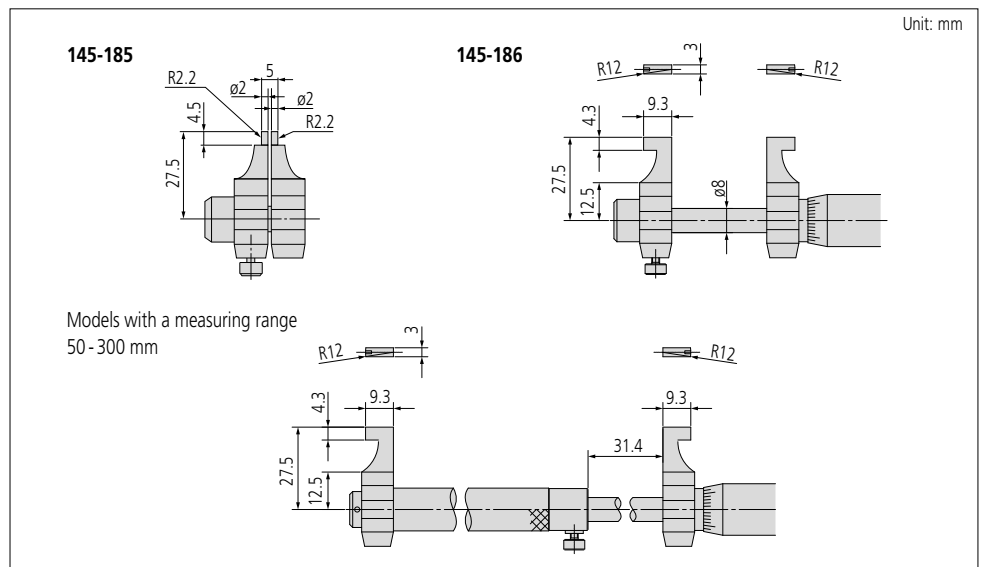
145-187

### Specifications

Metric				
Code No.	Range	Graduation	Accuracy	Price
145-185	5 - 30 mm	0.01 mm	$\pm 5 \mu\text{m}$	£242.00
145-186	25 - 50 mm		$\pm 6 \mu\text{m}$	£256.00
145-187	50 - 75 mm		$\pm 7 \mu\text{m}$	£269.00
145-188	75 - 100 mm		$\pm 8 \mu\text{m}$	£284.00
145-189	100 - 125 mm		$\pm 9 \mu\text{m}$	£432.00
145-190	125 - 150 mm		$\pm 9 \mu\text{m}$	£490.00
145-191	150 - 175 mm		$\pm 10 \mu\text{m}$	£532.00
145-192	175 - 200 mm		$\pm 10 \mu\text{m}$	£571.00
145-217	200 - 225 mm		$\pm 11 \mu\text{m}$	£596.00
145-218	225 - 250 mm		$\pm 11 \mu\text{m}$	£604.00
145-219	250 - 275 mm		$\pm 12 \mu\text{m}$	£622.00
145-220	275 - 300 mm		$\pm 12 \mu\text{m}$	£644.00

Inch				
Code No.	Range	Graduation	Accuracy	Price
145-193	.2 - 1.2"	.001"	$\pm .00025$ "	£242.00
145-194	1 - 2"		$\pm .0003$ "	£256.00
145-195	2 - 3"		$\pm .00035$ "	£269.00
145-196	3 - 4"		$\pm .0004$ "	£284.00

### Dimensions



# Inside Micrometers

## SERIES 141 – Interchangeable Rod Inside Micrometer

- Wide range of inside diameter measurements possible by combining one or more interchangeable rods.
- Each interchangeable rod is marked with its measuring range.
- For models supplied with more than one interchangeable rod, the full measuring range is achieved by combining spacing collars with the rods.
- Both micrometer head and rods are satin-chrome finished throughout.
- A handle extension that screws into the fixed handle on the micrometer head enables the head to be inserted deep into a hole.
- The sleeve is rotated to adjust the index line position when setting to a length standard.
- An optional inside-length standard, such as a setting ring or Inside Micro Checker (see pages C-37 to C-38 or page C-24, respectively), is required for accurately setting the micrometer before measurement.

141-101



### Specifications

#### Metric

Code No.	Range	Graduation	Stroke	No. of rods	Price
141-101	25-50 mm	0.01 mm	7 mm	2	£120.00
141-205	50-200 mm		13 mm	3	£198.00
141-206	50-300 mm		5	£240.00	
141-117	200-500 mm		3	£290.00	
141-118	200-1000 mm		8	£430.00	

#### Carbide measuring face

141-103	25-50 mm	0.01 mm	7 mm	2	£150.00
141-211	50-200 mm		13 mm	3	£345.00
141-212	50-300 mm		5	£439.00	

#### Inch

Code No.	Range	Graduation	Stroke	No. of rods	Price
141-102	1-2"	.001"	.25"	2	£120.00
141-208	2-8"		5"	3	£198.00
141-233	2-12"		5	£240.00	
141-121	8-20"		3	£290.00	
141-122	8-40"		8	£430.00	

#### Carbide measuring face

141-104	1-2"	.001"	.25"	2	£150.00
141-214	2-8"		5"	3	£345.00
141-215	2-12"		5	£439.00	

### Technical Data

Accuracy:  $\pm(6+L/50) \mu\text{m}^* / \pm[.0003+.00005 (L/2)]^* *$

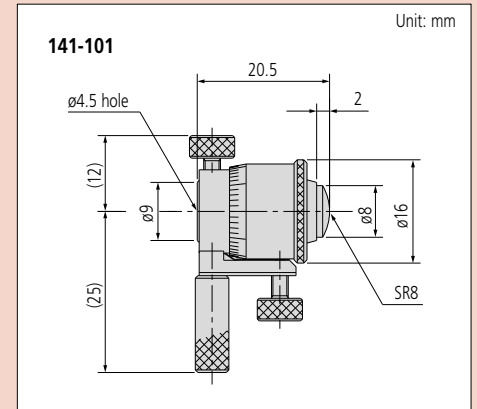
\* L = maximum measuring length (mm/inch)

Note: Fractions rounded up

### Optional Accessory

Setting rings (up to  $\phi 300 \text{ mm} / \phi 12''$ ) refer to pages C-37 to C-38.

### Dimensions



The handle extension enables measurement deep within a hole.



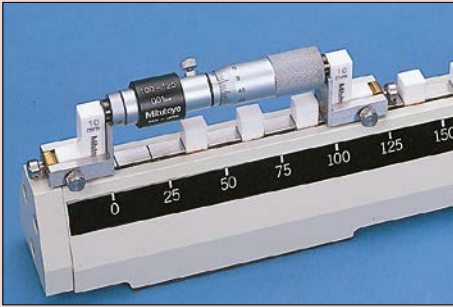
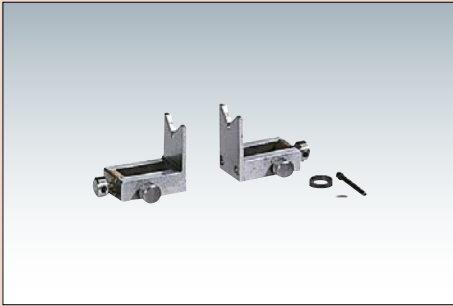
Interchangeable rod inside micrometer.



Fitted with one of the extension rods supplied.

### Standard Accessories

- 600324:** Clamp screwdriver
- 602195:** Collar
- 940286:** Support clamps (x2)



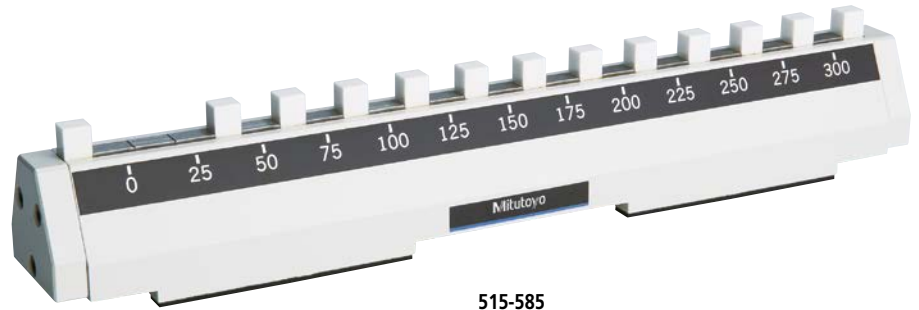
The two auxiliary gauge blocks are held against the appropriate measuring blocks by the support clamps, which also provide accurate location for the inside micrometer by means of the V-grooved extensions.

### Optional Accessories

Code No.	Description	Price
<b>602160</b>	Wooden box (for 515-585)	<b>£153.00</b>
<b>602163</b>	Wooden box (for 515-586)	<b>£337.00</b>

## SERIES 515 – Inside Micro Checker

- The Inside Micro Checker is designed to act as a setting standard for inside micrometers.
- Each measuring block is made of zirconia based ceramic that is free from deterioration and dimensional changes over time.
- Can be used for calibration in conjunction with a set of gauge blocks (optional).



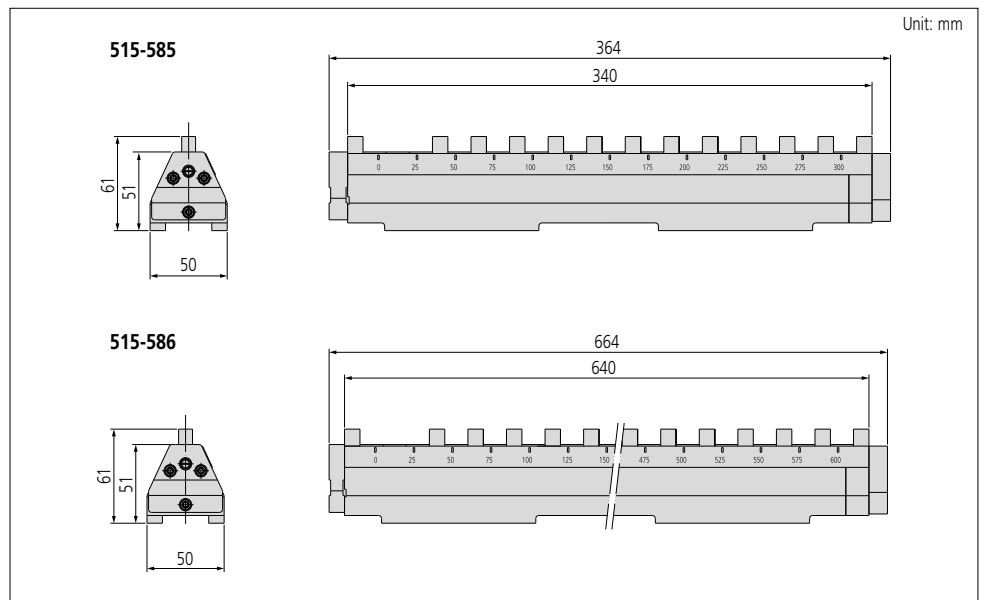
**515-585**

### Specifications

Metric			
Code No.	Range	Accuracy	Price
<b>515-585</b>	25 - 300 mm	$\pm(1+L/150) \mu\text{m}$ L: Length to check (mm)	<b>£1450.00</b>
<b>515-586</b>	25 - 600 mm		<b>£2790.00</b>

Note: The bottom surface and the contact faces are not perpendicular to each other.

### Dimensions



# Bore Gauges

## SERIES 526 – Extra Small Hole Bore Gauge

- This gauge is designed to measure the diameters of very small holes. The radial displacement of the split-ball anvil is converted to axial displacement of the measuring rod, which is shown on the dial indicator.
- An optional stand (**215-120-10**) is available for efficient measurement of multiple small holes.



526-172-1

526-125

### Specifications

#### Metric

Code No.	Range	Content of set					Probing depth	Price
		Bore gauge	Dial indicator	Anvils	Pin point	Setting rings		
Graduation 0.001 mm								
526-172-1	0.95 - 1.55 mm	526-170-10	2109SB-10	5 pcs.	1 pc.	—	11.5 mm	£877.00
526-162-1	1.50 - 4.00 mm	526-160-10		9 pcs.	2 pcs.	—	17.5, 22.5 mm	£1130.00
526-152-1	3.70 - 7.30 mm	526-150-10		7 pcs.	1 pc.	—	32 mm	£818.00
526-124	7 - 10 mm	526-101		6 pcs.	—	—		£346.00
526-125	10 - 18 mm	526-102		8 pcs.	—	—	62 mm	£423.00

#### Graduation 0.01 mm

526-173-1	0.95 - 1.55 mm	526-170-10	2046SB	5 pcs.	1 pc.	—	11.5 mm	£708.00
526-163-1	1.50 - 4.00 mm	526-160-10		9 pcs.	2 pcs.	—	17.5, 22.5 mm	£897.00
526-153-1	3.70 - 7.30 mm	526-150-10		7 pcs.	1 pc.	—	32 mm	£771.00
526-126	7 - 10 mm	526-101		6 pcs.	—	—		£299.00
526-127	10 - 18 mm	526-102		8 pcs.	—	—	62 mm	£368.00

#### Inch

Code No.	Range	Content of set					Probing depth	Price
		Bore gauge	Dial indicator	Anvils	Pin point	Setting rings		
Graduation .0001"								
526-176-10	.037 - .061"	526-175-10	2923SB-10	5 pcs.	1 pc.	5 pcs.	.45"	£1780.00
526-166-10	.06 - .155"	526-165-10		9 pcs.	2 pcs.	9 pcs.	.68, .88"	£2570.00
526-156-10	.145 - .29"	526-155-10		7 pcs.	1 pc.	7 pcs.	1.25"	£1500.00
526-122	.3 - .4"	526-103		6 pcs.	—	—		£346.00
526-123	.4 - .7"	526-104		8 pcs.	—	—	2.42"	£423.00

#### Graduation .0005"

526-119	.3 - .4"	526-103	2922SB	6 pcs.	—	—	1.25"	£368.00
526-120	.4 - .7"	526-104		8 pcs.	—	—	2.42"	£368.00

### Technical Data

#### Accuracy

Range 0.95 - 10 mm: 4 µm

Range 10 - 18 mm: 6 µm

Range .037 - .4": .00016"

Range .4 - .7": .00024"

Repeatability: 2 µm / .00008"

### Optional Accessory

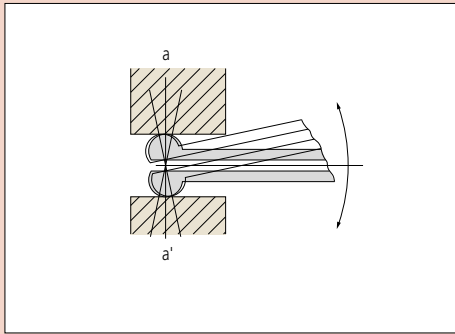
Code No.	Description	Price
215-120-10	Stand for small holes	£1080.00



A heatshield prevents accuracy degradation due to hand heat during prolonged use.

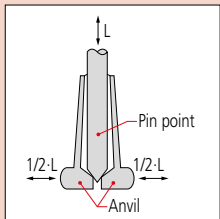


526-156-10



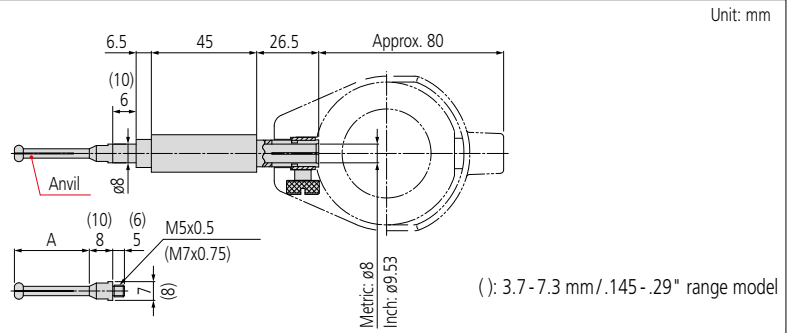
### How to measure a hole diameter

The 526 series has a gauge head with high curvature to ensure accurate reading in use. Aligning the measuring direction of the gauge with the diameter (a-a') is achieved by rocking the gauge head within the hole as indicated, and the required diameter is the minimum value seen (at the reversal point) on the dial indicator.

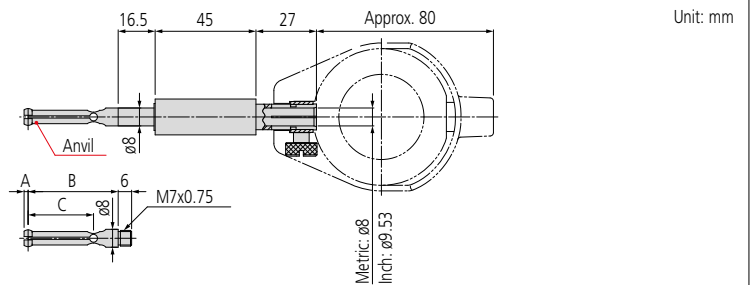


Measurement principle

### Dimensions



Measuring range	Anvil			Setting ring
	Marked No.	Measuring range	A	mm/inch
0.95 - 1.55 mm / .037 - .061"	1.0	0.95 - 1.15 mm / .037 - .045"	11.5 mm / .45"	1.0 mm / .04"
	1.1	1.07 - 1.25 mm / .042 - .049"		1.1 mm / .045"
	1.2	1.17 - 1.35 mm / .046 - .053"		1.2 mm / .05"
	1.3	1.27 - 1.45 mm / .050 - .057"		1.3 mm / .055"
	1.4	1.37 - 1.55 mm / .054 - .061"		1.4 mm / .06"
1.50 - 4.00 mm / .60 - .155"	1.75	1.50 - 1.90 mm / .060 - .075"	17.5 mm / .68"	1.75 mm / .07"
	2.00	1.80 - 2.20 mm / .070 - .085"		2.00 mm / .08"
	2.25	2.05 - 2.45 mm / .080 - .095"		2.25 mm / .09"
	2.50	2.25 - 2.75 mm / .090 - .105"		2.50 mm / .10"
	2.75	2.50 - 3.00 mm / .100 - .115"	22.5 mm / .88"	2.75 mm / .11"
	3.00	2.75 - 3.25 mm / .110 - .125"		3.00 mm / .12"
	3.25	3.00 - 3.50 mm / .120 - .135"		3.25 mm / .13"
	3.50	3.25 - 3.75 mm / .130 - .145"		3.50 mm / .14"
3.70 - 7.30 mm / .145 - .29"	3.75	3.50 - 4.00 mm / .140 - .155"	32.0 mm / 1.25"	3.75 mm / .15"
	4.0	3.70 - 4.30 mm / .145 - .170"		4.0 mm / .16"
	4.5	4.20 - 4.80 mm / .165 - .190"		4.5 mm / .18"
	5.0	4.70 - 5.30 mm / .185 - .210"		5.0 mm / .20"
	5.5	5.20 - 5.80 mm / .205 - .230"		5.5 mm / .22"
	6.0	5.70 - 6.30 mm / .225 - .250"		6.0 mm / .24"
	6.5	6.20 - 6.80 mm / .245 - .270"		6.5 mm / .26"
7.0	6.70 - 7.30 mm / .265 - .290"	7.0 mm / .28"		



Measuring range	Anvil				
	Marked No.	Measuring range	A	B	C
7 - 10 mm / .3 - .4"	1	7.0 - 7.5 mm / .28 - .30"	1.8 mm / .07"	40 mm / 1.57"	29.2 mm / 1.15"
	2	7.5 - 8.0 mm / .28 - .30"			
	3	8.0 - 8.5 mm / .32 - .34"			
	4	8.5 - 9.0 mm / .34 - .36"			
	5	9.0 - 9.5 mm / .36 - .38"			
	6	9.5 - 10.0 mm / .38 - .40"			
10 - 18 mm / .4 - .7"	1	10 - 11 mm / .40 - .44"	2.1 mm / .08"	46 mm / 1.81"	38 mm / 1.50"
	2	11 - 12 mm / .44 - .48"	2.7 mm / .11"		
	3	12 - 13 mm / .48 - .52"			
	4	13 - 14 mm / .52 - .56"			
	5	14 - 15 mm / .56 - .60"			
	6	15 - 16 mm / .60 - .64"			
	7	16 - 17 mm / .64 - .68"			
	8	17 - 18 mm / .68 - .72"			

# Bore Gauges

## SERIES 511 – Small Hole Bore Gauge

- The interchangeable anvils used on this gauge are made of high-grade tool steel.
- Interchangeable washers 0.5 mm thick are supplied as standard accessories to enable setting the 10 - 18.5 mm / .4 - .74" models in small steps.
- The dial indicator is fully protected by a rugged cover.
- An optional inside-length standard, such as a setting ring or Inside Micro Checker (see pages C-37 to C-38 or page C-24, respectively), is required for accurately setting the gauge before measurement.



### Technical Data

Accuracy: 5  $\mu\text{m}$  / .0002"  
 Repeatability: 2  $\mu\text{m}$  / .00008"  
 Narrow-range accuracy: 2  $\mu\text{m}$  / .00008"



A heatshield prevents accuracy degradation due to hand heat during prolonged use.

### Specifications

#### Metric

Code No.	Range	Measuring force	Content of set			Probing depth	Price
			Bore gauge	Dial indicator	Anvils		
Graduation 0.001 mm							
511-210	6 - 10 mm	2 N or less	511-209	2109SB-10	9 pcs.	50 mm	£439.00
511-203	10 - 18.5 mm		511-201			100 mm	
Graduation 0.01 mm							
511-211	6 - 10 mm	2 N or less	511-209	2046SB	9 pcs.	50 mm	£392.00
511-204	10 - 18.5 mm		511-201			100 mm	

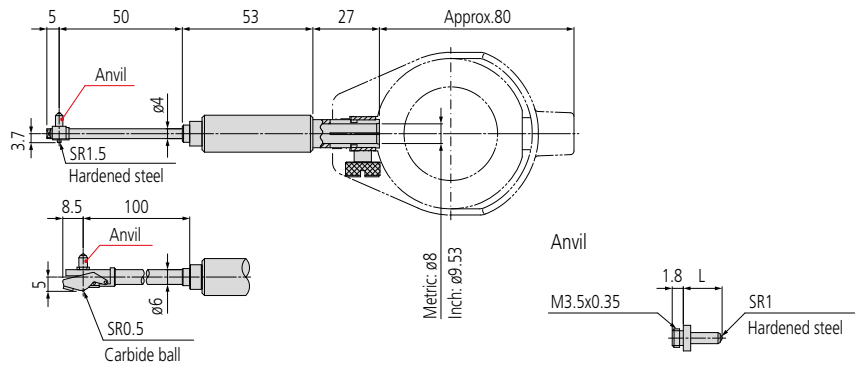
#### Inch

Code No.	Range	Measuring force	Content of set			Probing depth	Price
			Bore gauge	Dial indicator	Anvils		
Graduation .0001"							
511-212	.24 - .4"	2 N or less	511-214	2923SB-10	9 pcs.	2"	£439.00
511-206	.4 - .74"		511-205			4"	
Graduation .0005"							
511-213	.24 - .4"	2 N or less	511-214	2922SB	9 pcs.	2"	£392.00
511-207	.4 - .74"		511-205			4"	

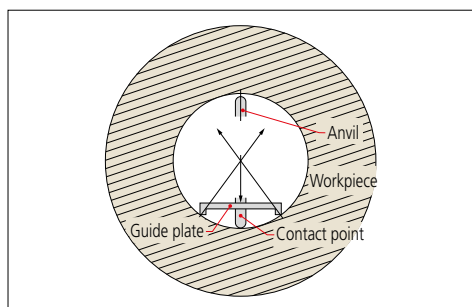


## Dimensions

Unit: mm



Measuring range	Anvil		
	Marked No.	Size	L
6 - 10 mm/ .24 - .4"	1	6.0 mm / .24"	1.2 mm / .05"
	2	6.5 mm / .26"	1.7 mm / .07"
	3	7.0 mm / .28"	2.2 mm / .09"
	4	7.5 mm / .30"	2.7 mm / .11"
	5	8.0 mm / .32"	3.2 mm / .13"
	6	8.5 mm / .34"	3.7 mm / .15"
	7	9.0 mm / .36"	4.2 mm / .17"
	8	9.5 mm / .38"	4.7 mm / .19"
	9	10.0 mm / .40"	5.2 mm / .21"
10 - 18.5 mm/ .4 - .74"	1	10 mm / .40"	2 mm / .08"
	2	11 mm / .44"	3 mm / .12"
	3	12 mm / .48"	4 mm / .16"
	4	13 mm / .52"	5 mm / .20"
	5	14 mm / .56"	6 mm / .24"
	6	15 mm / .60"	7 mm / .28"
	7	16 mm / .64"	8 mm / .32"
	8	17 mm / .68"	9 mm / .36"
	9	18 mm / .72"	10 mm / .40"



### How to measure a hole diameter

The 511 series provides a guide plate to align the hole or bore diameter with the measurement axis of the bore gauge.

# Bore Gauges

## SERIES 511 – Bore Gauge

- Now offers a longer plunger stroke while maintaining original accuracy.
- Carbide is used for the contact point ensuring high durability and wear resistance.
- This model reduces the influence of heat from the operator's hand by 50% by increasing the grip size and making the grip hollow-structured, thereby retaining high-accuracy measurement.
- Interchangeable washers 0.5 mm thick are supplied as standard accessories to enable setting in small steps.
- Optional extension rods can be attached for measuring deep holes (see page C-35).
- An optional inside-length standard, such as a setting ring or Inside Micro Checker (see pages C-37 to C-38 or page C-24, respectively), is required for accurately setting the gauge before measurement.



511-723



511-712

### Specifications

#### Metric

Code No.	Range	Measuring force	Content of set			Probing depth	Price
			Bore gauge	Dial indicator	Anvils		
Graduation 0.001 mm							
511-721	18 - 35 mm	4 N or less	511-701	2109SB-10	9 pcs.	100 mm	£292.00
511-722	35 - 60 mm		511-702		6 pcs.		150 mm
511-723	50 - 150 mm	5 N or less	511-703		11 pcs.	£321.00	
511-724	100 - 160 mm		511-704		13 pcs.		250 mm
511-725	160 - 250 mm	6 N or less	511-705		6 pcs.	£520.00	
511-726	250 - 400 mm		511-706		5 pcs.	£614.00	

#### Graduation 0.01 mm

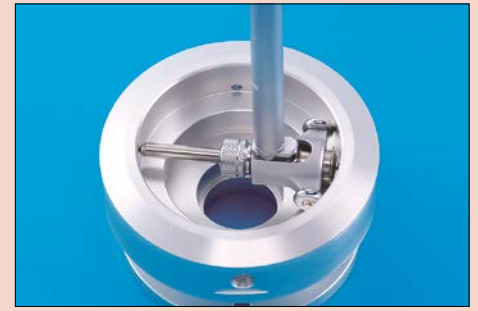
511-711	18 - 35 mm	4 N or less	511-701	2046SB	9 pcs.	100 mm	£232.00
511-712	35 - 60 mm		511-702		6 pcs.		150 mm
511-713	50 - 150 mm	5 N or less	511-703		11 pcs.	£258.00	
511-714	100 - 160 mm		511-704		13 pcs.		250 mm
511-715	160 - 250 mm	6 N or less	511-705		6 pcs.	£472.00	
511-716	250 - 400 mm		511-706		5 pcs.	£566.00	

#### Bore gauge sets

Code No.	Range	Bore gauge	Dial indicator	Price
511-921	18 - 150 mm	511-701	2046SB	£580.00
511-922		511-702	2109SB-10	£668.00
511-925-10		511-703	543-310B	£771.00

### Technical Data

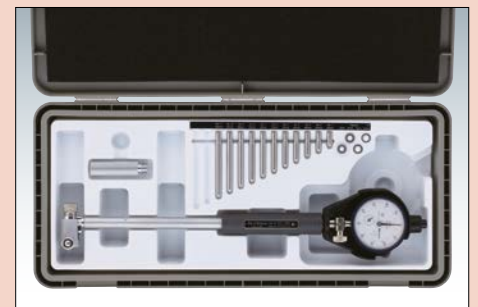
Accuracy:	2 µm / .00008"
Repeatability:	0.5 µm / .00002"
Narrow-range accuracy:	1 µm / .00004"



The powerful self-centering action ensures accuracy.



New grip improves accuracy during prolonged use.



511-713



511-921

## Contact Points



18-35 mm / .7-1.4"



35-60 mm / 1.4-2.5"



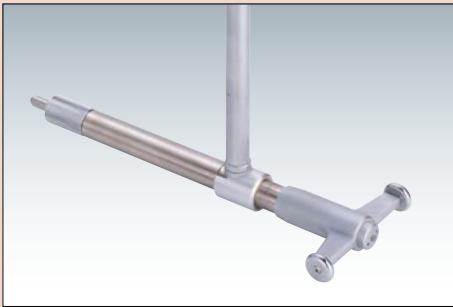
50-150 mm / 2.0-6.0"



100-160 mm / 4.0-6.5"



160-250 mm / 6.5-10.0"

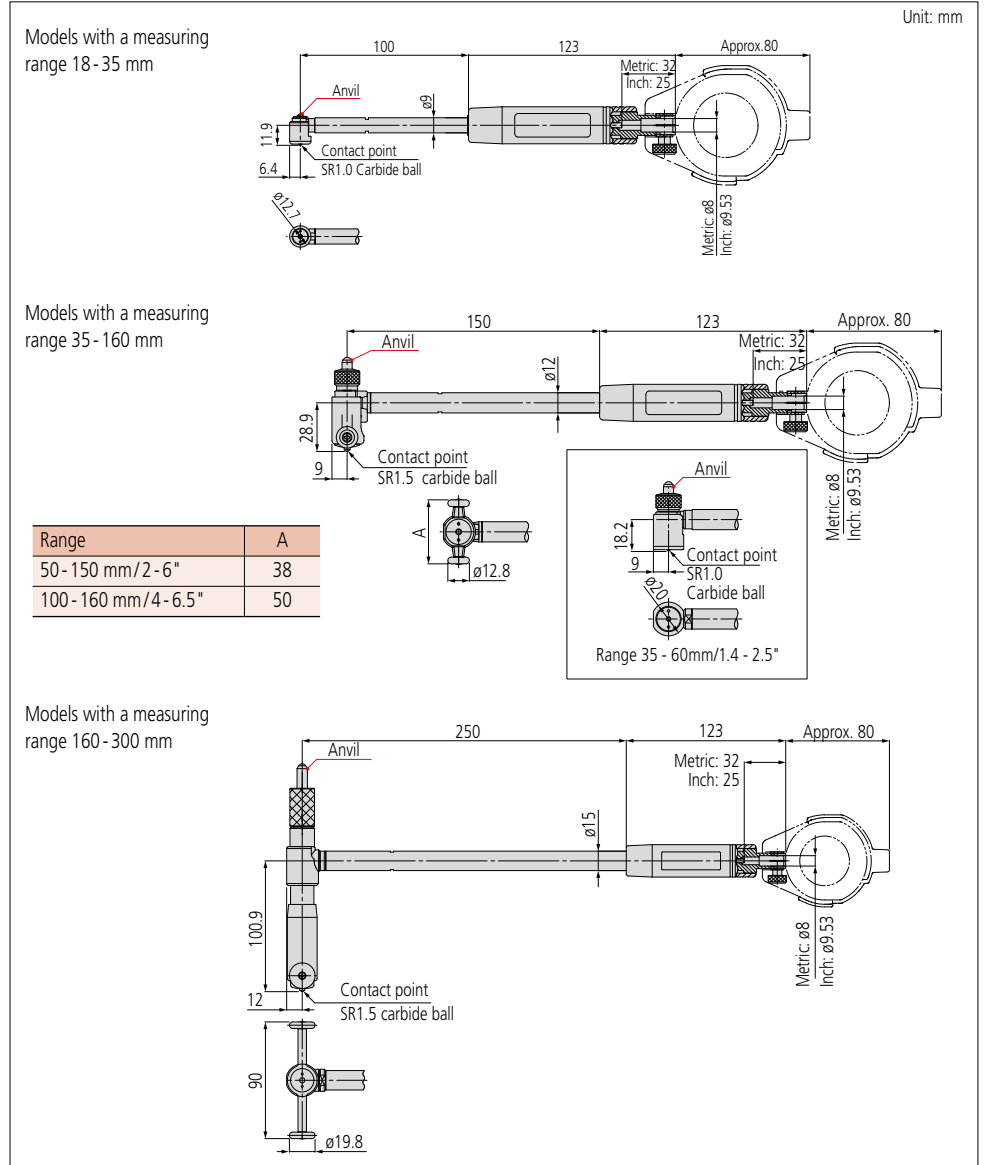


250-400 mm / 10.0-16.0"

## Specifications

Inch							
Code No.	Range	Measuring force	Content of set			Probing depth	Price
			Bore gauge	Dial indicator	Anvils		
<b>Graduation .0001"</b>							
511-751	.7-1.4"	4 N or less	511-731	2923SB-10	9 pcs.	4"	£292.00
511-752	1.4-2.5"		511-732		6 pcs.		£292.00
511-753	2.0-6.0"	5 N or less	511-733		11 pcs.	6"	£321.00
511-754	4.0-6.5"		511-734		13 pcs.		£439.00
511-755	6.5-10.0"	6 N or less	511-735		6 pcs.	10"	£520.00
511-756	10.0-16.0"		511-736		5 pcs.		£614.00
<b>Graduation .0005"</b>							
511-741	.7-1.4"	4 N or less	511-731	2922SB	9 pcs.	4"	£232.00
511-742	1.4-2.5"		511-732		6 pcs.		£232.00
511-743	2.0-6.0"	5 N or less	511-733		11 pcs.	6"	£258.00
511-744	4.0-6.5"		511-734		13 pcs.		£392.00
511-745	6.5-10.0"	6 N or less	511-735		6 pcs.	10"	£472.00
511-746	10.0-16.0"		511-736		5 pcs.		£566.00
<b>Bore gauge sets</b>							
Code No.	Range	Measuring head units	Dial indicator	Price			
511-931	.7-6.0"	511-731	2922SB	£580.00			
511-932		511-732	2923SB-10	£668.00			
511-935-10		511-733	543-312B	£771.00			

## Dimensions



# Bore Gauges

## SERIES 511 – Micrometer Head Bore Gauge

- Micrometer head is attached to the anvil for convenient and accurate dimensional setting.
- Now offers a longer plunger stroke while maintaining original accuracy.
- Carbide is used for the contact point ensuring high durability and wear resistance.
- High-accuracy measurement is aided by a large grip with a sponge-like structure that reduces heat transfer from the operator's hand by 50%.
- Wide measuring range with sub-anvils.
- Optional extension rods can be attached for measuring deep holes (see page C-35).
- An optional inside-length standard, such as a setting ring or Inside Micro Checker (see pages C-37 to C-38 or page C-24, respectively), is required for accurately setting the gauge before measurement.

### Technical Data

Accuracy:	2 $\mu\text{m}$ / .00008"
Repeatability:	0.5 $\mu\text{m}$ / .00002"
Narrow-range accuracy:	1 $\mu\text{m}$ / .00004"



511-813



511-814



511-824



511-816

## Contact Points



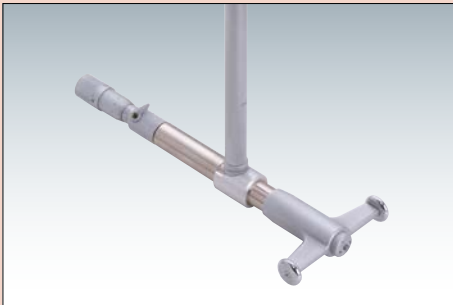
60 - 100 mm / 2.4 - 4"



100 - 160 mm / 4 - 6.4"



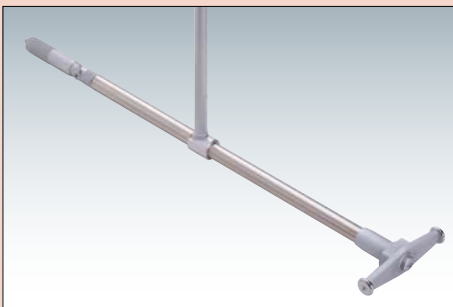
150 - 250 mm / 6 - 10"



250 - 400 mm / 10 - 16"



400 - 600 mm / 16 - 24"



600 - 800 mm / 24 - 32"

## Specifications

### Metric

Code No.	Range	Measuring force	Content of set			Probing depth	Price
			Bore gauge	Dial indicator	Sub-anvils		
Graduation 0.001 mm							
511-823	60 - 100 mm	5 N or less	511-803	2109SB-10	2 pcs.	150 mm	£451.00
511-824	100 - 160 mm		511-804		3 pcs.		£474.00
511-825	150 - 250 mm	6 N or less	511-805		4 pcs.	250 mm	£549.00
511-826	250 - 400 mm		511-806		3 pcs.		£652.00
511-827	400 - 600 mm		511-807		2 pcs.		£942.00
511-828	600 - 800 mm		511-808		2 pcs.		£1070.00

### Graduation 0.01 mm

511-813	60 - 100 mm	5 N or less	511-803	2046SB	2 pcs.	150 mm	£409.00
511-814	100 - 160 mm		511-804		3 pcs.		£449.00
511-815	150 - 250 mm	6 N or less	511-805		4 pcs.	250 mm	£535.00
511-816	250 - 400 mm		511-806		3 pcs.		£604.00
511-817	400 - 600 mm		511-807		2 pcs.		£820.00
511-818	600 - 800 mm		511-808		2 pcs.		£1020.00

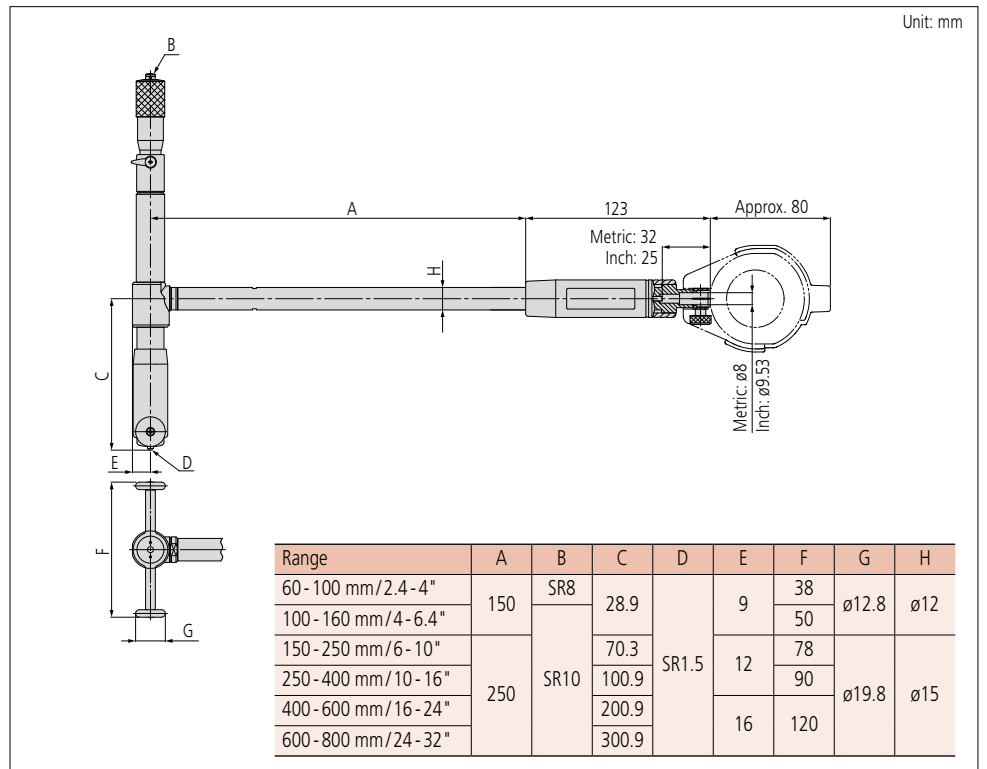
### Inch

Code No.	Range	Measuring force	Content of set			Probing depth	Price
			Bore gauge	Dial indicator	Sub-anvils		
Graduation .0001"							
511-853	2.4 - 4.0"	5 N or less	511-833	2923SB-10	2 pcs.	4"	£451.00
511-854	4.0 - 6.4"		511-834		3 pcs.		£474.00
511-855	6.0 - 10.0"	6 N or less	511-835		4 pcs.	6"	£549.00
511-856	10.0 - 16.0"		511-836		3 pcs.		£652.00
511-857	16.0 - 24.0"		511-837		2 pcs.		£942.00
511-858	24.0 - 32.0"		511-838		2 pcs.		£1070.00

### Graduation .0005"

511-843	2.4 - 4.0"	5 N or less	511-833	2922SB	2 pcs.	4"	£409.00
511-844	4.0 - 6.4"		511-834		3 pcs.		£449.00
511-845	6.0 - 10.0"	6 N or less	511-835		4 pcs.	6"	£535.00
511-846	10.0 - 16.0"		511-836		3 pcs.		£604.00
511-847	16.0 - 24.0"		511-837		2 pcs.		£820.00
511-848	24.0 - 32.0"		511-838		2 pcs.		£1020.00

## Dimensions



# Bore Gauges

## SERIES 511 – Blind Hole Bore Gauge



511-425

511-437

- Flat-bottomed head design enables measurement right down to the bottom of blind holes or bores.
- Carbide-tipped contact point for durability.
- Extension rods (optional) can be attached for measuring deep holes (see page C-35).
- Wide measuring range with sub-anvils.
- An optional inside-length standard, such as a setting ring or Inside Micro Checker (see pages C-37 to C-38 or page C-24, respectively), is required for accurately setting the gauge before measurement.

### Specifications

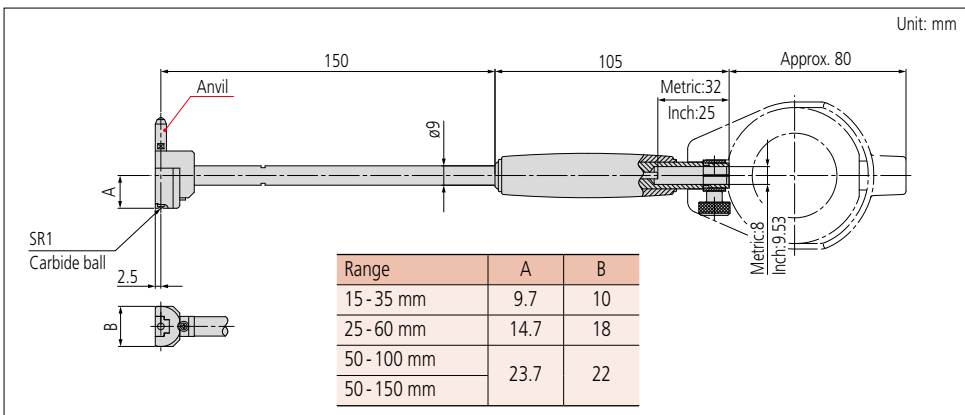
#### Metric

Code No.	Range	Measuring force	Content of set			Probing depth	Price
			Bore gauge	Dial indicator	Anvils		
Graduation 0.001 mm							
511-435	15 - 35 mm	4 N or less	511-415	2109SB-10	11 pcs.	150 mm	£479.00
511-436	35 - 60 mm		511-416		6 pcs.		£490.00
511-437	50 - 150 mm	5 N or less	511-417		11 pcs.		£540.00
Graduation 0.01 mm							
511-425	15 - 35 mm	4 N or less	511-415	2046SB	11 pcs.	150 mm	£414.00
511-426	35 - 60 mm		511-416		6 pcs.		£423.00
511-427	50 - 150 mm	5 N or less	511-417		11 pcs.		£475.00

#### Inch

Code No.	Range	Measuring force	Content of set			Probing depth	Price
			Bore gauge	Dial indicator	Anvils		
Graduation .0001"							
511-438	.6 - 1.4"	4 N or less	511-418	2923SB-10	11 pcs.	6"	£479.00
511-439	1.4 - 2.4"		511-419		6 pcs.		£490.00
511-440	2.0 - 6.0"	5 N or less	511-420		11 pcs.		£540.00
Graduation .0005"							
511-428	.6 - 1.4"	4 N or less	511-418	2922SB	11 pcs.	6"	£414.00
511-429	1.4 - 2.4"		511-419		6 pcs.		£423.00
511-430	2.0 - 6.0"	5 N or less	511-420		11 pcs.		£475.00

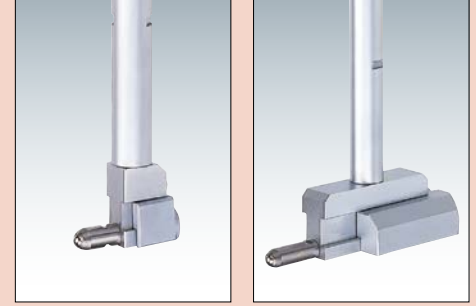
### Dimensions



### Technical Data

Accuracy: 5  $\mu\text{m}$  / .0002"  
 Repeatability: 2  $\mu\text{m}$  / .00008"  
 Narrow-range accuracy: 2  $\mu\text{m}$  / .00008"

### Contact Points



15 - 35 mm / .6 - 1.4"

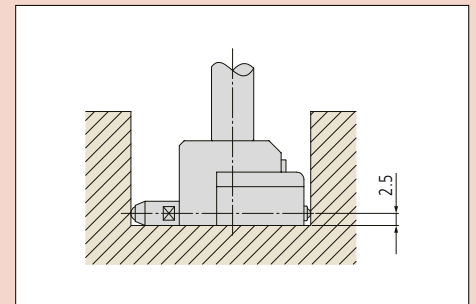
50 - 100 mm / 2 - 4",  
50 - 150 mm / 2 - 6"



The powerful self-centering action ensures accuracy.



511-426



## Technical Data

Accuracy*:	3 µm / .00012"
Repeatability:	2 µm / .00008"
Narrow-range accuracy:	2 µm / .00008"
Scale type:	ABSOLUTE electrostatic linear encoder
Max. response speed:	Unlimited
Battery:	SR44 (2 pcs.), <b>938882</b>
Battery life:	Approx. 2000 hours under normal use

\* Excluding quantizing error

## Functions

Presetting  
 Preset  
 Power on/off  
 Inch/mm conversion  
 Data output  
 GO/±NG tolerance judgement  
 Min value holding  
 Data hold  
 Alarm: Low battery voltage, scale contamination, overflow error, tolerance limit setting error



## Optional Accessories

Code No.	Description	Price
516-118-10	Setup metric rectangular gauge block set	£760.00
905338	SPC data cable (1 m)	£33.90
905409	SPC data cable (2 m)	£38.00
02AZD790F	U-WAVE-T data cable (160 mm)	£62.00
02AZE140F	U-WAVE-T data cable with footswitch connection (160/500 mm)	£127.00
06AFM380F	USB input tool direct (2 m)	£109.00
21DZA081	Extension rod 500 mm (20")	£307.00
21DZA089	Extension rod 250 mm (10")	£338.00



Setting the Bore Gauge to a master value using a gauge block set.

## SERIES 511 – ABSOLUTE Digimatic Bore Gauge

**MeasurLink** ENABLED  
Data Management Software by Mitutoyo

**ABSOLUTE**



511-521

With optional extension rods

- This ABSOLUTE Digimatic bore gauge is exclusively designed for inside diameter measurement.
- Up to four extension rods (250 mm or 500 mm) can be used for measuring at the bottom of a hole 2 m deep.
- The display and grip can be rotated up to 320° and the display can be inclined up to 90°, so that it is easily readable from any direction.
- The minimum value holding function provides easy measurement of hole diameter.
- Interchangeable washers are supplied as standard accessories to enable setting in small steps.
- Setting the bore gauge to a master value using a gauge block set allows quick and accurate setting.
- An optional inside-length standard, such as a setting ring or Inside Micro Checker (see pages C-37 to C-38 or page C-24, respectively), is required for accurately setting the gauge before measurement.

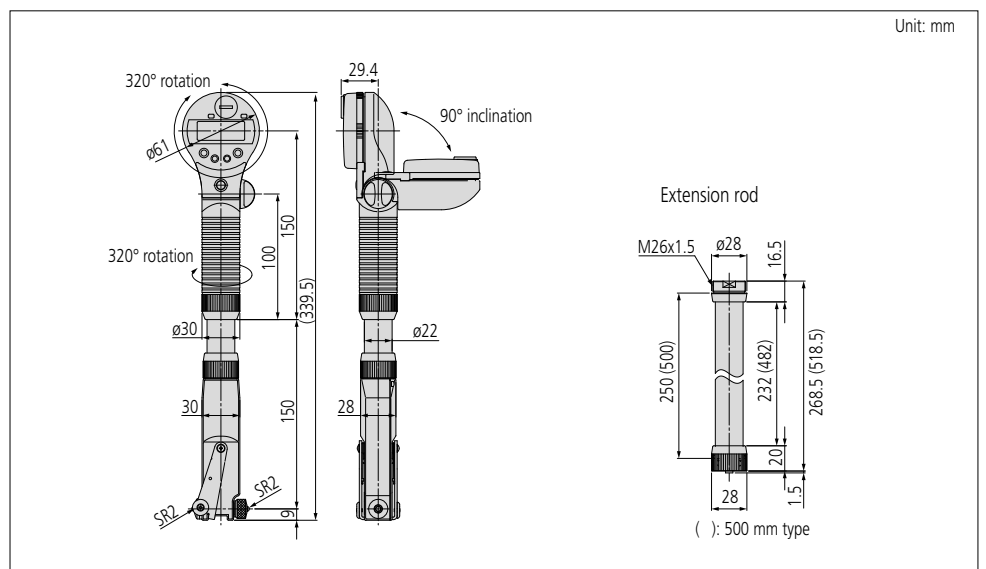


## Specifications

### Inch/Metric

Code No.	Range	Measuring force	Resolution	Anvils	Probing depth	Price
511-521	1.8 - 4.0" (45.72 - 101.6 mm)	5 N or less	.0005" (0.001 mm)	12 pcs.	6" (150 mm)	£1120.00
511-522	4.0 - 6.5" (101.6 - 165.1 mm)			13 pcs.		£1290.00

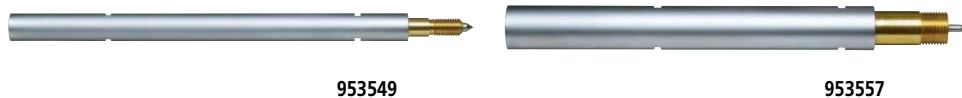
## Dimensions



# Optional Accessories

## Bore Gauge Extension Rods

- Extension rods are available to assist in deep-hole measurement.
- If two or more extension rods are connected together, measurement errors may occur due to flexure of the rod assembly. Therefore it is best to use no more than a single extension rod.
- Extension rods are available in sizes up to 1000 mm long.
- When using a 500 mm (or longer) extension rod, use the bore gauge in an upright position.
- The accuracy and security of the assembly should be confirmed after connecting a rod.



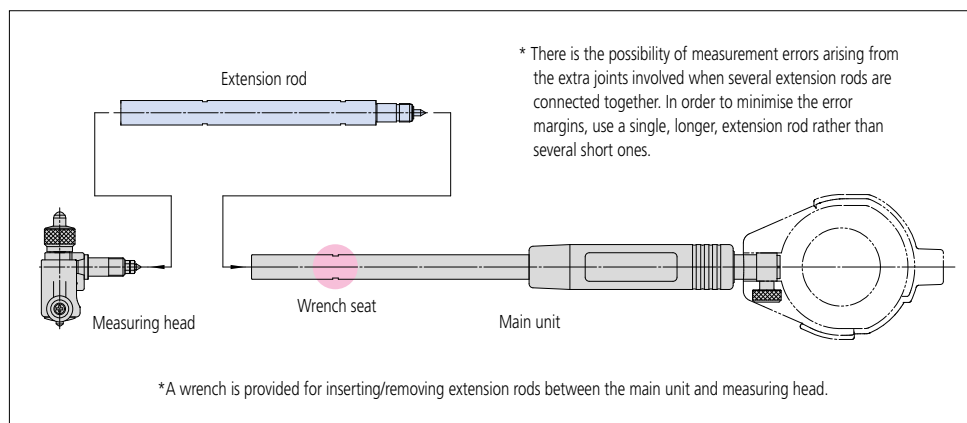
### Specifications

Inch/Metric

Code No.	Length	Diameter	Applicable measuring range	Price
953549	125 mm / 5"	ø9 mm / .342"	18 - 35 mm / .7 - 1.4"	£126.00
953550	250 mm / 10"			£146.00
953551	500 mm / 20"			£227.00
953552	125 mm / 5"	ø12 mm / .472"	35 - 160 mm / 1.4 - 6.5"	£136.00
953553	250 mm / 10"			£157.00
953554	500 mm / 20"			£271.00
953555	750 mm / 30"			£360.00
953556	1000 mm / 40"			£495.00
953557	125 mm / 5"	ø15 mm / .59"	160 - 400 mm / 6.5 - 16.0"	£146.00
952361	250 mm / 10"			£209.00
953558	500 mm / 20"			£338.00
953559	750 mm / 30"			£450.00
953560	1000 mm / 40"			£583.00



Extension rods enable extremely deep holes to be measured.







## SERIES 515 – Dial Bore Gauge Checker

- The Bore Gauge Checker allows easy setting of dial bore gauges with ranges of 18 mm (.7") through 400 mm (16") using gauge blocks.



515-590

Standard configuration: Stand  
Attachment A, B, C (1 pc each)  
Parallel jaw (2 pcs)

### Specifications

Code No.	Applicable range	Flatness of parallel jaw	Price
515-590	18 - 400 mm / .7 - 16"	0.5 $\mu$ m (parallelism 1 $\mu$ m)	£1450.00

# Optional Accessories

## SERIES 177 – Steel Setting Rings for Inside Micrometers, Holtest and Dial Bore Gauges

- Used for quick and accurate setting of dial bore gauges, Holtest, and inside micrometers.
- A setting ring should be selected that is closest in size to the dimension to be measured and that falls within the measuring range of the instrument.

177-140



177-139



### Specifications

Inch

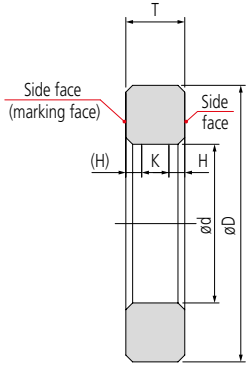
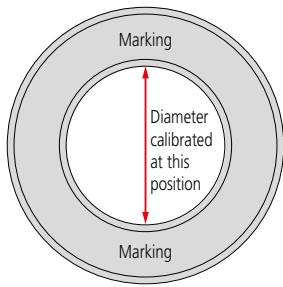
Code No.	Nominal size $\phi$ D	Dimensions (mm)			Type	Accuracy					Price
		$\phi$ D	$\phi$ E	T		Tolerance between the nominal size and the actual diameter (inch)	Uncertainty of marked diameter value (inch)*1	Roundness/Cylindricity (inch)*2	Distance from the side face H (mm)	Size of warranted calibration surface K (mm)	
177-209	.1"	25	—	7	A	$\pm$ .0004"	$\pm$ .00006"	.00004"	1.5	4.0	£97.60
177-206	.16"	25	—	7	A	$\pm$ .0004"	$\pm$ .00006"	.00004"	1.5	4.0	£97.60
177-207	.24"	25	—	7	A	$\pm$ .0004"	$\pm$ .00006"	.00004"	1.5	4.0	£97.60
177-281	.275"	25	—	7	A	$\pm$ .0004"	$\pm$ .00006"	.00004"	1.8	3.4	£97.60
177-179	.35"	32	—	10	A	$\pm$ .0004"	$\pm$ .00006"	.00004"	1.8	6.4	£97.60
177-283	.425"	32	—	10	A	$\pm$ .0004"	$\pm$ .00006"	.00004"	1.8	6.4	£97.60
177-180	.5"	32	—	10	A	$\pm$ .0004"	$\pm$ .00006"	.00004"	1.8	6.4	£97.60
177-181	.6"	38	—	10	A	$\pm$ .0004"	$\pm$ .00006"	.00004"	1.8	6.4	£97.60
177-182	.65"	45	—	10	A	$\pm$ .0004"	$\pm$ .00006"	.00004"	1.8	6.4	£97.60
177-183	.7"	45	—	10	A	$\pm$ .0004"	$\pm$ .00006"	.00004"	1.8	6.4	£97.60
177-287	.8"	45	—	10	A	$\pm$ .0004"	$\pm$ .00006"	.00004"	1.8	6.4	£106.00
177-184	1"	53	—	15	A	$\pm$ .0004"	$\pm$ .00006"	.00004"	3.0	9.0	£114.00
177-289	1.2"	71	—	15	A	$\pm$ .0004"	$\pm$ .00006"	.00004"	3.0	9.0	£131.00
177-185	1.4"	71	—	15	A	$\pm$ .0004"	$\pm$ .00006"	.00004"	3.0	9.0	£166.00
177-291	1.6"	71	—	15	A	$\pm$ .0004"	$\pm$ .00006"	.00004"	3.0	9.0	£155.00
177-186	1.8"	85	—	15	A	$\pm$ .0004"	$\pm$ .00006"	.00004"	3.5	8.0	£166.00
177-187	2"	85	—	20	A	$\pm$ .0008"	$\pm$ .00006"	.00004"	3.5	13.0	£166.00
177-293	2.4"	112	—	20	A	$\pm$ .0008"	$\pm$ .00006"	.00004"	3.5	13.0	£204.00
177-315	2.5"	112	—	20	A	$\pm$ .0008"	$\pm$ .00006"	.00006"	4.0	12.0	£261.00
177-188	2.8"	112	—	20	A	$\pm$ .0008"	$\pm$ .00006"	.00006"	4.0	12.0	£226.00
177-317	3"	125	—	25	A	$\pm$ .0008"	$\pm$ .00006"	.00006"	4.0	17.0	£271.00
177-295	3.2"	125	—	25	A	$\pm$ .0008"	$\pm$ .00006"	.00006"	4.0	17.0	£270.00
177-319	3.5"	140	—	25	A	$\pm$ .0008"	$\pm$ .00006"	.00006"	4.0	17.0	£356.00
177-189	3.6"	140	—	25	A	$\pm$ .0008"	$\pm$ .00006"	.00006"	4.0	17.0	£361.00
177-297	4"	160	—	25	A	$\pm$ .0008"	$\pm$ .00006"	.00008"	4.0	17.0	£405.00
177-299	5"	210	168	38.1	B	$\pm$ .0008"	$\pm$ .00010"	.00008"	5.0	28.1	£747.00
177-301	6"	235	187	38.1	B	$\pm$ .0008"	$\pm$ .00010"	.00008"	5.0	28.1	£806.00
177-303	7"	260	215	38.1	B	$\pm$ .0008"	$\pm$ .00010"	.00010"	5.0	28.1	£1150.00
177-305	8"	311	244	38.1	B	$\pm$ .0008"	$\pm$ .00010"	.00010"	5.0	28.1	£1470.00
177-307	9"	337	264	38.1	B	$\pm$ .0008"	$\pm$ .00010"	.00010"	5.0	28.1	£1650.00
177-309	10"	362	290	38.1	B	$\pm$ .0008"	$\pm$ .00010"	.00012"	5.0	28.1	£1790.00
177-311	11"	413	321	38.1	B	$\pm$ .0008"	$\pm$ .00010"	.00012"	5.0	28.1	£2050.00
177-313	12"	438	340	38.1	B	$\pm$ .0008"	$\pm$ .00010"	.00012"	5.0	28.1	£2510.00

\*1 Actual diameter is marked in 0.00001" increments.

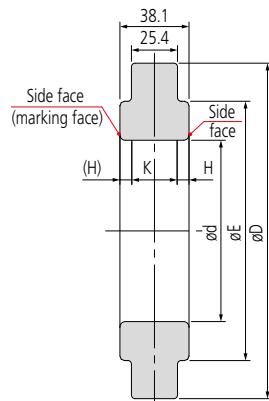
\*2 Cylindricity is defined as per JIS B 0621 Definitions and designations of geometrical deviations, Section 4.4 "Cylindricity." Cylindricity is measured using three cross-sections between the top and bottom face of a ring, namely, close to the face near each side and the centre.

## Dimensions

Unit: mm



Type A



Type B

## Specifications

### Metric

Code No.	Nominal size $\phi D$	Dimensions (mm)			Type	Accuracy					Price
		$\phi D$	$\phi E$	T		Tolerance between the nominal size and the actual diameter ( $\mu m$ )	Uncertainty of marked diameter value ( $\mu m$ )* <sup>1</sup>	Roundness/Cylindricity ( $\mu m$ )* <sup>2</sup>	Distance from the side face H (mm)	Size of warranted calibration surface K (mm)	
177-220	1 mm	20	—	4	A	$\pm 10$	$\pm 1.5$	1	1.6	0.8	£97.60
177-222	1.1 mm	20	—	4	A	$\pm 10$	$\pm 1.5$	1	1.6	0.8	£97.60
177-225	1.2 mm	20	—	4	A	$\pm 10$	$\pm 1.5$	1	1.6	0.8	£97.60
177-227	1.3 mm	20	—	4	A	$\pm 10$	$\pm 1.5$	1	1.6	0.8	£97.60
177-230	1.4 mm	20	—	4	A	$\pm 10$	$\pm 1.5$	1	1.6	0.8	£97.60
177-236	1.75 mm	25	—	5	A	$\pm 10$	$\pm 1.5$	1	1.6	1.8	£97.60
177-239	2 mm	25	—	5	A	$\pm 10$	$\pm 1.5$	1	1.6	1.8	£97.60
177-242	2.25 mm	25	—	5	A	$\pm 10$	$\pm 1.5$	1	1.6	1.8	£97.60
177-208	2.5 mm	25	—	7	A	$\pm 10$	$\pm 1.5$	1	1.7	3.6	£97.60
177-246	2.75 mm	25	—	7	A	$\pm 10$	$\pm 1.5$	1	1.7	3.6	£97.60
177-248	3 mm	25	—	7	A	$\pm 10$	$\pm 1.5$	1	1.7	3.6	£97.60
177-250	3.25 mm	25	—	7	A	$\pm 10$	$\pm 1.5$	1	1.7	3.6	£97.60
177-252	3.5 mm	25	—	7	A	$\pm 10$	$\pm 1.5$	1	1.7	3.6	£97.60
177-255	3.75 mm	25	—	7	A	$\pm 10$	$\pm 1.5$	1	1.7	3.6	£97.60
177-204	4 mm	25	—	7	A	$\pm 10$	$\pm 1.5$	1	1.7	3.6	£97.60
177-257	4.5 mm	25	—	7	A	$\pm 10$	$\pm 1.5$	1	1.7	3.6	£97.60
177-205	5 mm	25	—	7	A	$\pm 10$	$\pm 1.5$	1	1.7	3.6	£97.60
177-263	5.5 mm	25	—	7	A	$\pm 10$	$\pm 1.5$	1	1.7	3.6	£97.60
177-267	6 mm	25	—	7	A	$\pm 10$	$\pm 1.5$	1	1.7	3.6	£97.60
177-271	6.5 mm	25	—	7	A	$\pm 10$	$\pm 1.5$	1	1.7	3.6	£97.60
177-275	7 mm	25	—	7	A	$\pm 10$	$\pm 1.5$	1	1.7	3.6	£97.60
177-125	8 mm	32	—	10	A	$\pm 10$	$\pm 1.5$	1	2.0	6.0	£97.60
177-279	9 mm	32	—	10	A	$\pm 10$	$\pm 1.5$	1	2.0	6.0	£97.60
177-126	10 mm	32	—	10	A	$\pm 10$	$\pm 1.5$	1	2.0	6.0	£97.60
177-284	12 mm	32	—	10	A	$\pm 10$	$\pm 1.5$	1	2.0	6.0	£97.60
177-132	14 mm	38	—	10	A	$\pm 10$	$\pm 1.5$	1	2.0	6.0	£97.60
177-177	16 mm	45	—	10	A	$\pm 10$	$\pm 1.5$	1	2.0	6.0	£97.60
177-133	17 mm	45	—	10	A	$\pm 10$	$\pm 1.5$	1	2.0	6.0	£97.60
177-285	18 mm	45	—	10	A	$\pm 10$	$\pm 1.5$	1	2.0	6.0	£108.00
177-286	20 mm	45	—	10	A	$\pm 10$	$\pm 1.5$	1	2.0	6.0	£106.00
177-139	25 mm	53	—	15	A	$\pm 10$	$\pm 1.5$	1	3.2	8.6	£114.00
177-288	30 mm	71	—	15	A	$\pm 10$	$\pm 1.5$	1	3.2	8.6	£131.00
177-140	35 mm	71	—	15	A	$\pm 10$	$\pm 1.5$	1	3.2	8.6	£166.00
177-290	40 mm	71	—	15	A	$\pm 10$	$\pm 1.5$	1	3.2	8.6	£155.00
177-178	45 mm	85	—	15	A	$\pm 10$	$\pm 1.5$	1	3.7	7.6	£166.00
177-146	50 mm	85	—	20	A	$\pm 20$	$\pm 1.5$	1	3.7	12.6	£166.00
177-292	60 mm	112	—	20	A	$\pm 20$	$\pm 1.5$	1	3.7	12.6	£204.00
177-314	62 mm	112	—	20	A	$\pm 20$	$\pm 1.5$	1.5	3.7	12.6	£220.00
177-147	70 mm	112	—	20	A	$\pm 20$	$\pm 1.5$	1.5	3.7	12.6	£226.00
177-316	75 mm	125	—	25	A	$\pm 20$	$\pm 1.5$	1.5	4.2	16.6	£273.00
177-294	80 mm	125	—	25	A	$\pm 20$	$\pm 1.5$	1.5	4.2	16.6	£270.00
177-318	87 mm	140	—	25	A	$\pm 20$	$\pm 1.5$	1.5	4.2	16.6	£297.00
177-148	90 mm	140	—	25	A	$\pm 20$	$\pm 1.5$	1.5	4.2	16.6	£303.00
177-296	100 mm	160	—	25	A	$\pm 20$	$\pm 1.5$	2	4.2	16.6	£405.00
177-298	125 mm	210	168	38.1 (25.4)	B	$\pm 20$	$\pm 2.5$	2	5.3	27.5	£747.00
177-300	150 mm	235	187		B	$\pm 20$	$\pm 2.5$	2	5.3	27.5	£771.00
177-302	175 mm	260	215		B	$\pm 20$	$\pm 2.5$	2.5	5.3	27.5	£924.00
177-304	200 mm	311	244		B	$\pm 20$	$\pm 2.5$	2.5	5.3	27.5	£1470.00
177-306	225 mm	337	264		B	$\pm 20$	$\pm 2.5$	2.5	5.3	27.5	£1650.00
177-308	250 mm	362	290		B	$\pm 20$	$\pm 2.5$	3	5.3	27.5	£1790.00
177-310	275 mm	413	321		B	$\pm 20$	$\pm 2.5$	3	5.3	27.5	£2050.00
177-312	300 mm	438	340		B	$\pm 20$	$\pm 2.5$	3	5.3	27.5	£2510.00

\*<sup>1</sup> Actual diameter is marked in 0.001 mm increments.

\*<sup>2</sup> Cylindricity is defined as per JIS B 0621 Definitions and designations of geometrical deviations, Section 4.4 "Cylindricity." Cylindricity is measured using three cross-sections between the top and bottom face of a ring, namely, close to the face near each side and the centre.

# CALIPERS HEIGHT GAUGES DEPTH GAUGES



## Calipers



## Height Gauges



## Depth Gauges



## Contents

## Calipers

Solar SuperCaliper	D-03
Coolant Proof Caliper	D-05
Standard Caliper	D-07
Long Beam Caliper	D-09
Solar Caliper	D-10
Vernier Caliper	D-11
Vernier Thumbwheel Caliper	D-13
Vernier Thumb Clamp Caliper	D-14
Nib Jaw Caliper	D-15
Nib/Standard Jaw Caliper	D-16
Carbon Fibre Caliper	D-17
Long Jaw Carbon Fibre Caliper	D-19
Ceramic Jaw Carbon Fibre Caliper	D-20
Interchangeable Jaw Carbon Fibre Caliper	D-21
Vernier Nib Jaw Thumbwheel Caliper	D-23
Vernier Long Jaw Thumbwheel Caliper	D-24
Dial Caliper	D-25
Offset Jaw Calipers	D-26
Offset Centreline Calipers	D-27
Back Jaw Centreline Caliper	D-28
Point Calipers	D-29
Blade Calipers	D-30
Knife Edge Inside Calipers	D-31
Inside Groove Calipers	D-32
Point Jaw Inside Calipers	D-33
Neck Jaw Calipers	D-34
Tube Thickness Calipers	D-35
Vernier Hook Jaw Caliper	D-36
Vernier Moving Jaw Caliper	D-37
Low Force Caliper	D-38
Snap Caliper	D-39

## Height Gauges

Vernier Adjustable Scale Height Gauge	D-40
Ergonomic Height Gauge	D-41
Height Gauge	D-42
Double Column Height Gauge	D-43
Optional Accessories	D-45
Linear Height 2D Measurement System	D-47
QM-Height High Precision Height Gauge	D-49

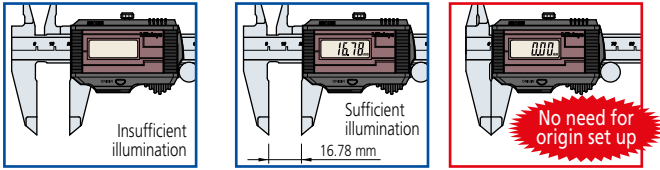
## Depth Gauges

Interchangeable Rod Depth Micrometer	D-51
Depth Micrometer	D-53
Depth Gauges	D-54
Hook End Depth Gauge	D-57
Dial Fine Adjustment Depth Gauge	D-58
Depth Gauges	D-59
Optional Accessories	D-61

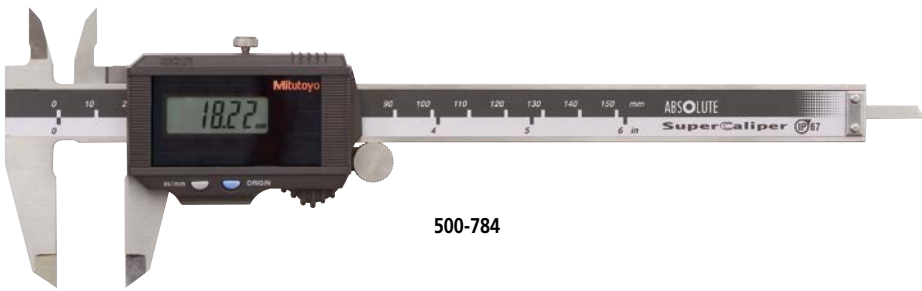
# Calipers

## SERIES 500 – ABSOLUTE Digimatic Coolant Proof Solar SuperCaliper

- Top-of-the-line digital caliper. Solar type caliper with no battery and IP67 protection assures waterproof reliability.
- With no annoying origin restoration necessary, a measurement can be started any time and there is no restriction on operating speed.



- SPC data output models can be integrated into statistical process control and measurement systems.
- Slider operation is smooth and comfortable.
- The impact resistance of the display unit has been increased for improved usability in workshop conditions.
- Waterproof design makes this SuperCaliper suitable for use in an environment containing large amounts of cutting fluid or coolant.
- 100% inspection by air leak test is performed to ensure quality and reliability.
- This SuperCaliper uses components that do not contain harmful substances and is compatible with RoHS Directives.



500-784

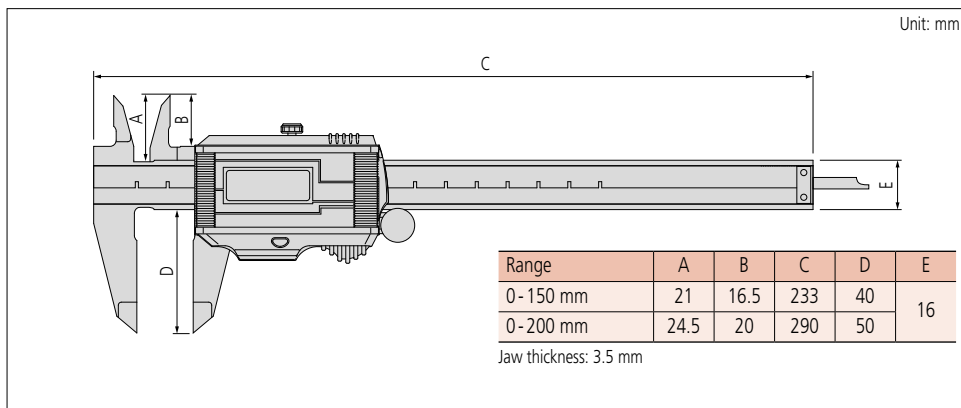
### Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy*1	Mass	Price
<b>With SPC data output</b>					
500-786	0-150 mm (0-6")	0.01 mm (.0005")	±0.02 mm	180 g	£250.00
500-787	0-200 mm (0-8")			210 g	£315.00
<b>Without SPC data output</b>					
500-784	0-150 mm (0-6")	0.01 mm (.0005")	±0.02 mm	180 g	£186.00
500-785	0-200 mm (0-8")			210 g	£260.00

\*1 Excluding quantizing error.

### Dimensions



### Technical Data

Repeatability: 0.01 mm  
 Quantizing error: ±1 count  
 Dust/water protection level: IP67\*2  
 Power supply: Solar cell\*3  
 Scale type: ABSOLUTE electromagnetic induction linear encoder  
 Max. response speed: Unlimited  
 \*2 Rustproofing treatment to be applied after use.  
 \*3 Can be used continuously above 60 lux ambient illumination.

### Functions

**ABSOLUTE system measurement:**  
 After power is turned ON, measurement can be started without zero-setting if origin-setting was previously performed. The ABS (absolute) origin position can be changed by the ORIGIN button.

**Zero-setting (INC measurement mode):**  
 Displayed value can be set to zero at any arbitrary position of the slider for comparative measurements.

**Data output:**  
 Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

**Inch/mm selection:**  
 Switches the units of measurement (at any time).

**Alerts:**  
 If the ambient illumination and the stored charge voltage are insufficient an error message is displayed and measurement stops. If contamination on the surface of the scale causes a calculation error, an error message is displayed and measurement stops.



Unaffected by splashing water and cutting oil.

### Optional Accessories\*

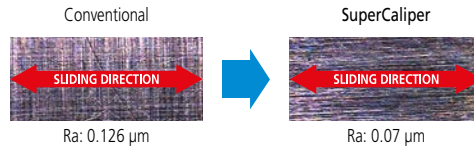
Code No.	Description	Price
02AZD790A	U-WAVE-T data cable with pushbutton (160 mm)	£62.00
02AZE140A	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	£142.00
05CZA624	SPC data cable with pushbutton (1 m)	£69.40
05CZA625	SPC data cable with pushbutton (2 m)	£83.50
06AFM380A	USB Input Tool Direct USB-ITN-A (2 m)	£126.00

\* Only for models with data output function.



SPC data output cable with pushbutton fitted to a Digimatic caliper.

Smooth slider movement makes for comfortable operation.  
High quality guide surface finish for smooth slider movement.



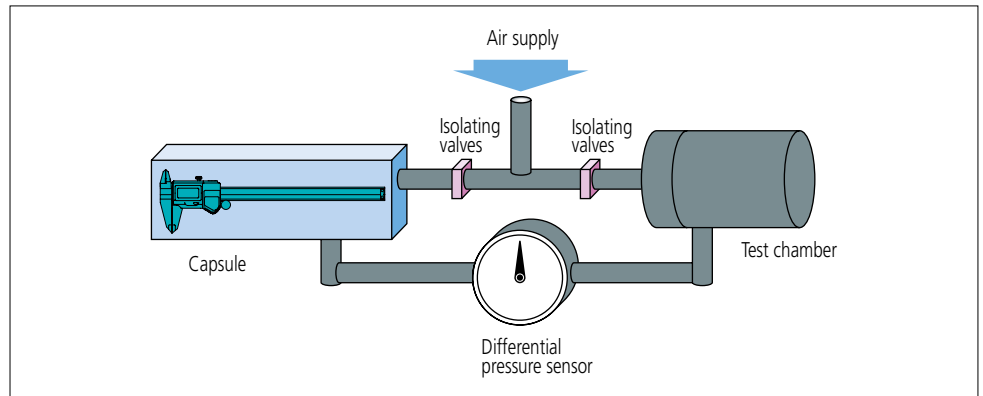
### Charge function

The minimum illumination required in the uncharged state is 60 lux. As shown in the table at right, this SuperCaliper can be used with confidence in a normal work environment. The charge function allows the operator to use the SuperCaliper without interrupting work even if the ambient illumination is temporarily insufficient. In the fully charged state this SuperCaliper can operate for approximately one hour in an environment of 50 lux illumination (less than the minimum necessary illumination intensity). The time necessary for full charge varies according to the charging conditions. If the SuperCaliper is left unused in an illumination of 500 lux (usual for manufacturing environments), it takes approximately one hour to reach full charge.

Illumination (lx)	Site (possible operations)
1500	
1000	Design room, drafting room (fine visual work)
750	
500	Conference room, control room (usual manufacturing environment) (normal visual work)
300	
200	Machine room, electric room, lecture hall (rough visual work)
150	
100	Corridor, passage, stairs (very rough visual work)
75	
50	Emergency staircase, warehouse (loading, unloading work)
30	
20	

Excerpts from JIS Z 9110 Artificial Illumination Intensity Standard

### Air leak test equipment for water resistance inspection



Generally, an air leak test is used for evaluating water resistance. Procedure: Place the measuring tool inside the capsule and seal it. Then fill the capsule and the test chamber with air at the required pressure and close the isolating valves. If there is no leak in the measuring tool the differential pressure sensor will read zero because the amount of air inside the test chamber is unchanging. However, if there is a leak in the measuring tool, the differential pressure sensor will show a non-zero reading due to a decrease in pressure inside the test chamber as air leaks into the tool. By detecting this differential pressure, GO/NO-GO judgement for the severity of the leak is performed. This air leak test is performed for all coolant proof calipers and coolant proof micrometers.



Air leak test equipment for coolant proof caliper.

# Calipers

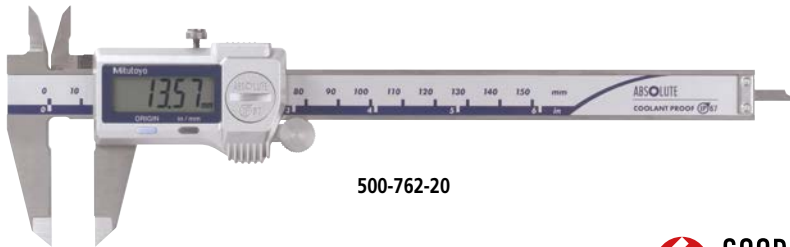
## SERIES 500 – ABSOLUTE Digimatic Coolant Proof Caliper

- Can be used in workshop conditions exposed to coolant, water, dust or oil. Other specifications and price are the same as the conventional products. 100% inspection by air leak test is performed to ensure quality and reliability.
- Large LCD characters make the display easy to read.
- Easy to use – advanced design styling with only 1 button.
- Incorporates Mitutoyo's ABSOLUTE measurement system. No need to reset the origin.
- SPC data output models can be integrated into statistical process control and measurement systems.
- Can measure outside and inside dimensions, depth, and steps.
- The automatic power-on/off function shuts down the LCD display after 20 minutes inactivity, but the ABS scale unit origin is stored. Power is restored when the slider is moved.
- A convenient interface input tool is available so that measurement data can be converted to keyboard signals and input directly to commercial spreadsheet software.
- An inspection certificate is supplied as standard. (However, this cannot be used as a calibration certificate as it is undated.)

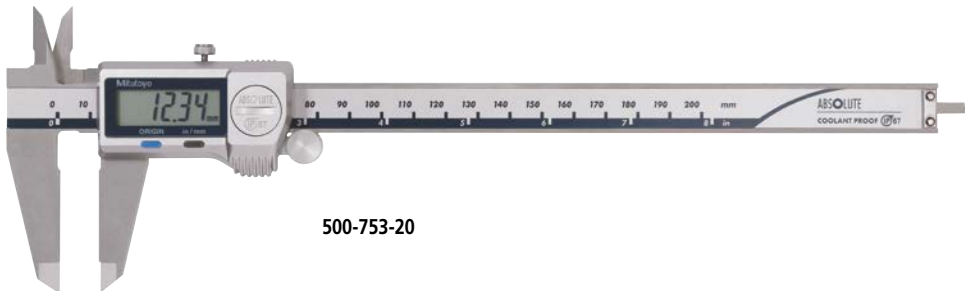
**MeasurLink<sup>®</sup> ENABLED**  
Data Management Software by Mitutoyo

**ABSOLUTE**

**IP67**



500-762-20



500-753-20



### Specifications

Inch/Metric

Code No.	Range	Accuracy*	Remarks	Price
<b>With SPC data output</b>				
500-762-20	0 - 150 mm (0 - 6")	±0.02 mm (.001")	—	<b>£210.00</b>
500-735-20			Carbide-tipped jaws for outside measurement	<b>£308.00</b>
500-737-20			Carbide-tipped jaws for outside and inside measurement	<b>£427.00</b>
500-763-20	0 - 200 mm (0 - 8")	±0.02 mm (.001")	—	<b>£285.00</b>
500-736-20			Carbide-tipped jaws for outside measurement	<b>£345.00</b>
500-738-20			Carbide-tipped jaws for outside and inside measurement	<b>£420.00</b>
500-764-20	0 - 300 mm (0 - 12")	±0.03 mm (.0015")	—	<b>£385.00</b>
<b>Without SPC data output</b>				
500-752-20	0 - 150 mm (0 - 6")	±0.02 mm (.001")	—	<b>£160.00</b>
500-731-20			Carbide-tipped jaws for outside measurement	<b>£279.00</b>
500-733-20			Carbide-tipped jaws for outside and inside measurement	<b>£326.00</b>
500-753-20	0 - 200 mm (0 - 8")	±0.02 mm (.001")	—	<b>£220.00</b>
500-732-20			Carbide-tipped jaws for outside measurement	<b>£308.00</b>
500-734-20			Carbide-tipped jaws for outside and inside measurement	<b>£345.00</b>
500-754-10	0 - 300 mm (0 - 12")	±0.03 mm (.0015")	—	<b>£310.00</b>

\* Excluding quantizing error.

### Technical Data

Resolution:	0.01 mm (.0005")
Repeatability:	0.01 mm
Quantizing error:	Not including ±1 count
Dust/water protection level:	IP67*
Scale type:	ABSOLUTE electromagnetic induction linear encoder
Max. response speed:	Unlimited
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	Approx. 5 years under normal use (1 year for models over 300 mm)

\* Rustproofing treatment to be applied after use.

### Functions

#### ABSOLUTE system measurement:

After power is turned ON, measurement can be started without zero-setting if origin-setting was previously performed. The ABS (absolute) origin position can be changed by the ORIGIN button.

#### Zero-setting (INC measurement mode):

Displayed value can be set to zero at any arbitrary position of the slider for comparative measurements.

#### Auto ON/OFF:

The reading on the LCD disappears after this instrument is idle for a short time, but the origin point is retained. Moving the slider causes the reading on the LCD to reappear.

#### Data output:

Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

#### Inch/mm selection:

Switches the units of measurement (at any time).

#### Alerts:

In the unlikely event of a display overflow or calculation error, an error message is displayed and measurement stops. Measurement cannot continue until the error is corrected. If the battery voltage drops below a certain point, the battery indicator will turn on before measurement becomes impossible, warning the user that the battery needs to be replaced. If contamination on the surface of the scale causes a calculation error, an error message is displayed and measurement stops.





### Optional Accessories\*

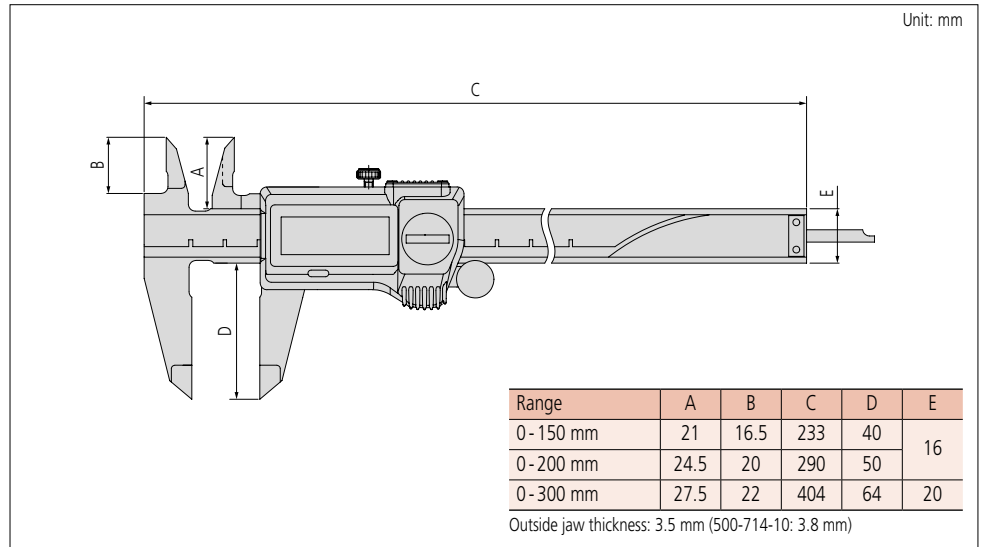
Code No.	Description	Price
264-620	U-WAVE-TC transmission unit	£193.00
02AZF310	U-WAVE-TC connection unit	£62.00
05CZA624	SPC data cable with pushbutton (1 m)	£69.40
05CZA625	SPC data cable with pushbutton (2 m)	£83.50
06AFM380A	USB input tool direct USB-ITN-C (2 m)	£126.00

\* Only for models with data output function.



U-WAVE transmitter with buzzer fitted to a Digimatic caliper.

### Dimensions

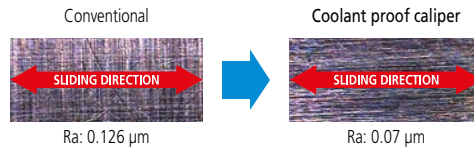


Carbide-tipped jaws for outside measurement.



Carbide-tipped jaws for inside measurement.

Smooth slider movement makes for comfortable operation.  
High quality guide surface finish for smooth slider movement.



Ra: 0.126 µm

Ra: 0.07 µm

D

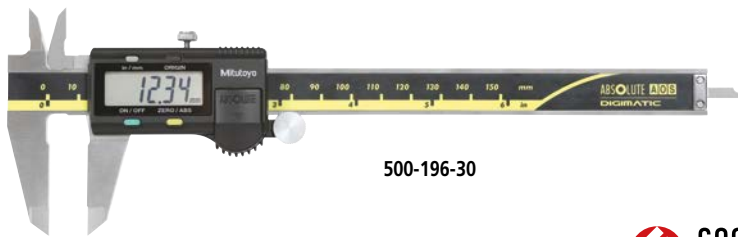
# Calipers

## SERIES 500 – ABSOLUTE Digimatic Caliper

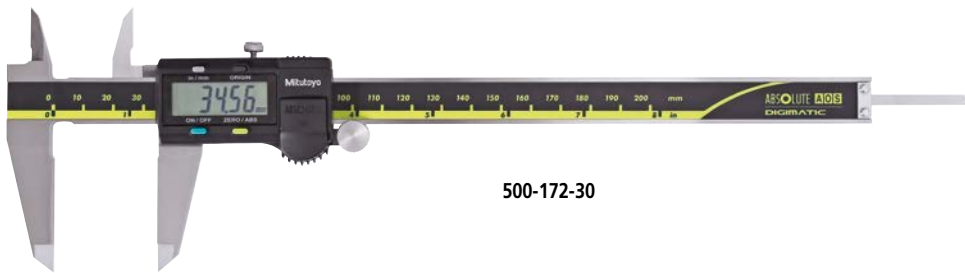
- The ZERO/ABS button allows the display to be Zero-Set at any slider position along the scale for comparison measurements. This button will also allow return to the absolute (ABS) mode and display of the true position from the origin (usually jaws closed point).
- Large and clear LCD readout.
- Smooth slider movement makes for comfortable operation.
- 20,000 hours battery life.
- Can measure outside and inside dimensions, depth, and steps.
- Carbide-tipped jaw calipers give the longest life when measuring rough finished parts, castings, grinding wheels, etc.
- Data output function allows integration into statistical process control and measurement systems.

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500-196-30



500-172-30

### Specifications

Inch/Metric

Code No.	Range	Accuracy*	Remarks	Price
<b>With SPC data output</b>				
500-171-30	0 - 150 mm (0 - 6")	±0.02 mm (.001")	—	£165.00
500-174-30			Carbide-tipped jaws for outside measurement	£270.00
500-175-30			Carbide-tipped jaws for outside and inside measurement	£403.00
500-172-30	0 - 200 mm (0 - 8")	±0.02 mm (.001")	—	£204.00
500-176-30			Carbide-tipped jaws for outside measurement	£284.00
500-177-30			Carbide-tipped jaws for outside and inside measurement	£455.00
500-173	0 - 300 mm (0 - 12")	±0.03 mm (.0015")	—	£382.00
500-167-30			Carbide-tipped jaws for outside measurement	£549.00
500-168-30			Carbide-tipped jaws for outside and inside measurement	£680.00
<b>Without SPC data output</b>				
500-196-30	0 - 150 mm (0 - 6")	±0.02 mm (.001")	—	£118.00
500-159-30			Carbide-tipped jaws for outside measurement	£255.00
500-160-30			Carbide-tipped jaws for outside and inside measurement	£366.00
500-197-30	0 - 200 mm (0 - 8")	±0.02 mm (.001")	—	£169.00
500-163-30			Carbide-tipped jaws for outside measurement	£261.00
500-164-30			Carbide-tipped jaws for outside and inside measurement	£440.00
500-193-30	0 - 300 mm (0 - 12")	±0.03 mm (.0015")	—	£339.00
500-165-30			Carbide-tipped jaws for outside measurement	£487.00
500-166-30			Carbide-tipped jaws for outside and inside measurement	£666.00

\* Excluding quantizing error.

### Technical Data

Resolution:	0.01 mm (.0005")
Repeatability:	0.01 mm
Scale type:	ABSOLUTE electrostatic linear encoder
Max. response speed:	Unlimited
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	Approx. 5 years under normal use (20,000 hours for continuous use)

### Functions

#### ABSOLUTE system measurement:

After power is turned ON, measurement can be started without zero-setting if origin-setting was previously performed. The ABS (absolute) origin position can be changed by the ORIGIN button.

#### Incremental measurement:

Display can be set to zero at any arbitrary position for comparative measurements.

#### Scale contamination detection:

Contamination on the surface of the scale is detected and an error message (ErrC) is displayed.

#### Low-voltage alert:

If the battery voltage becomes low, a "B" appears in the display to alert the user before measurement is no longer possible. A battery change advisory alert precedes this alert.

#### Data output:

Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

#### Data hold:

By using the data hold unit (option), the displayed value can be held. This cannot be used with the data output function.

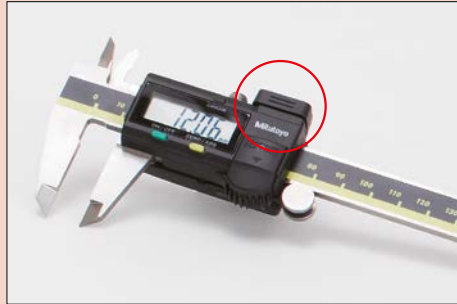


Actual size

### Optional Accessories\*

Code No.	Description	Price
264-621	U-WAVE-TC transmission unit	£193.00
959143	Data hold unit	£20.20
959149	SPC data cable with pushbutton (1 m)	£35.70
959150	SPC data cable with pushbutton (2 m)	£40.60
02AZF300	U-WAVE-TC connection unit	£62.00
06AFM380C	USB input tool direct USB-ITN-C (2 m)	£109.00

\* Only for models with data output function.

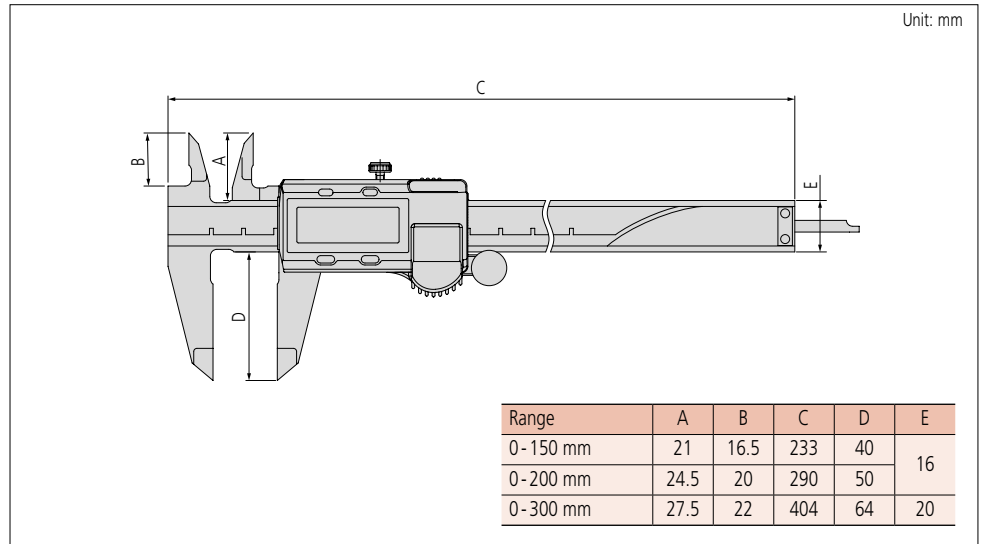


U-WAVE transmitter with buzzer fitted to a Digimatic caliper.



Data hold unit fitted to a Digimatic caliper (no data output possible).

### Dimensions

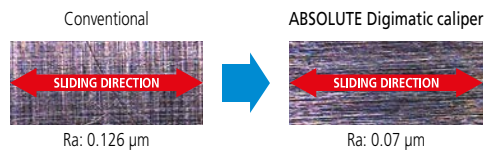


Carbide-tipped jaws for outside measurement.



Carbide-tipped jaws for inside measurement.

Smooth slider movement makes for comfortable operation.  
High quality guide surface finish for smooth slider movement.



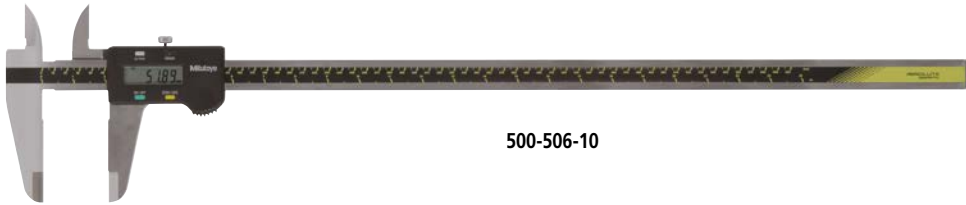
# Calipers

## SERIES 500 – ABSOLUTE Digimatic Long Beam Caliper

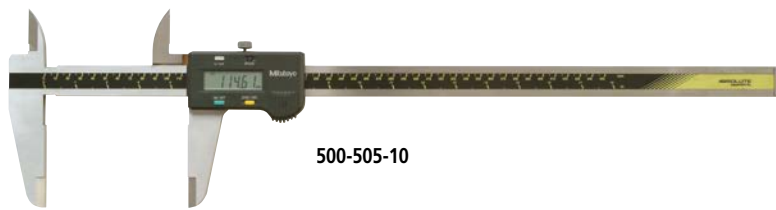
- Long Digimatic caliper incorporating Mitutoyo's ABSOLUTE scale and available with a measuring range from 450 mm to 1000 mm.
- Can measure outside and inside dimensions, depth, and steps.
- Data output function allows integration into statistical process control and measurement systems.

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500-506-10



500-505-10

### Specifications

Inch/Metric						
Code No.	Range	Resolution	Accuracy*	Repeatability		Price
500-505-10	0-450 mm (0-18")	0.01 mm (.0005")	±0.05 mm (±.002")	0.01 mm		£665.00
500-506-10	0-600 mm (0-24")					£705.00
500-507-10	0-1000 mm (0-40")					£1230.00

\* Excluding quantizing error.

### Dimensions

Range	A	B	C	D	Measuring surface width
0-450 mm	90	47	630	25	6
0-600 mm			780		
0-1000 mm	130	60	1240	32	8

### Technical Data

Scale type: ABSOLUTE electrostatic linear encoder  
 Max. response speed: Unlimited  
 Battery: SR44 (1 pc.), **938882**  
 Battery life: Approx. 3.5 years under normal use (20,000 hours for continuous use)

### Functions

#### ABSOLUTE system measurement:

After power is turned ON, measurement can be started without zero-setting if origin-setting was previously performed. The ABS (absolute) origin position can be changed by the ORIGIN button.

#### Incremental measurement:

Display can be set to zero at any arbitrary position for comparative measurements.

#### Scale contamination detection:

Contamination on the surface of the scale is detected and an error message (ErrC) is displayed.

#### Low-voltage alert:

If the battery voltage becomes low, a "B" appears in the display to alert the user before measurement is no longer possible. A battery change advisory alert precedes this alert.

#### Data output:

Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

#### Data hold:

By using the data hold unit (option), the displayed value can be held. This cannot be used with the data output function.

### Optional Accessories

Code No.	Description	Price
959143	Data hold unit	£20.20
959149	SPC data cable with pushbutton (1 m)	£35.70
959150	SPC data cable with pushbutton (2 m)	£40.60
02AZD790C	U-WAVE-T data cable with pushbutton (160 mm)	£62.00
02AZE140C	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	£127.00
06AFM380C	USB input tool direct USB-ITN-C (2 m)	£109.00



Data hold unit fitted to a Digimatic caliper (no data output possible).

## Technical Data

Scale type:	ABSOLUTE electrostatic linear encoder
Max. response speed:	Unlimited
Power supply:	Solar cell*1
Operational temperature:	0 to 40°C

\*1 Can be used continuously above 60 lux ambient illumination

## Functions

### ABSOLUTE system measurement:

After power is turned ON, measurement can be started without zero-setting if origin-setting was previously performed. The ABS (absolute) origin position can be changed by the ORIGIN button.

### Zero-setting (INC measurement mode):

Displayed value can be set to zero at any arbitrary position of the slider for comparative measurements.

### Data output:

Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

### Data hold:

By using the data hold unit (option), the displayed value can be held. This cannot be used with the data output function.

### Inch/mm selection:

Switches the units of measurement (at any time).

### Alerts:

In the unlikely event of a display overflow or calculation error, an error message is displayed and measurement stops. Measurement cannot continue until the error is corrected. If contamination on the surface of the scale causes a calculation error, an error message is displayed and measurement stops.

## Optional Accessories\*2

Code No.	Description	Price
264-621	U-WAVE-TC transmission unit	£193.00
959143	Data hold unit	£20.20
959149	SPC data cable with pushbutton (1 m)	£35.70
959150	SPC data cable with pushbutton (2 m)	£40.60
02AZF300	U-WAVE-TC connection unit	£62.00
06AFM380C	USB input tool direct USB-ITN-C (2 m)	£109.00

\*2 Only for models with data output function

## SERIES 500 – ABSOLUTE Digimatic Solar Caliper

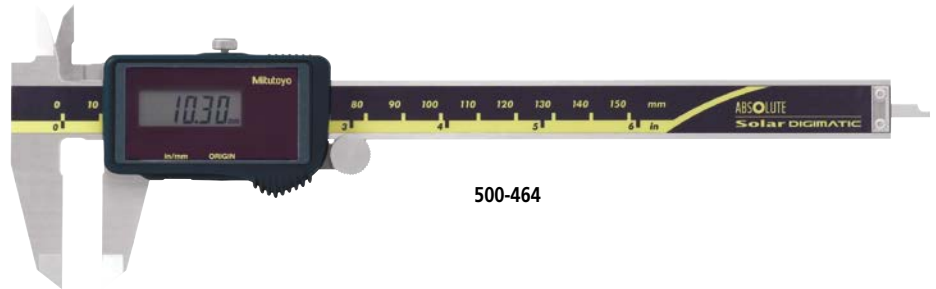
- Mitutoyo's ABSOLUTE Digimatic Solar Caliper retains its origin point indefinitely.
- At 60 Lux and above the ABSOLUTE Solar Caliper is ready to start measurement. No more repeated zero setting caused by a shortage of light.
- Can measure outside and inside dimensions, depth, and steps.
- Slider operation is smooth and comfortable.
- An ABSOLUTE scale is incorporated so that zero setting is not required at each power ON. No danger of overspeed errors.
- Allows integration into statistical process control and measurement systems for models with measurement data output connector.

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**ABSOLUTE**



**SOLAR**



500-464

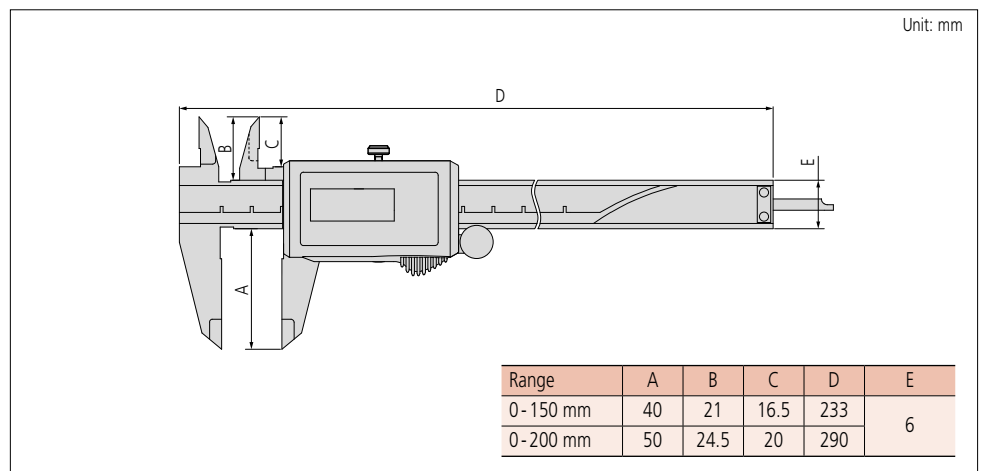
## Specifications

### Inch/Metric

Code No.	Range	Resolution	Accuracy*3	Repeatability	Price
<b>With SPC data output</b>					
500-464	0 - 150 mm (0 - 6")	0.01 mm (.0005")	±0.02 mm (±.001")	0.01 mm	£239.00
500-465	0 - 200 mm (0 - 8")				£283.00
<b>Without SPC data output</b>					
500-474	0 - 150 mm (0 - 6")	0.01 mm (.0005")	±0.02 mm (±.001")	0.01 mm	£170.00
500-475	0 - 200 mm (0 - 8")				£205.00

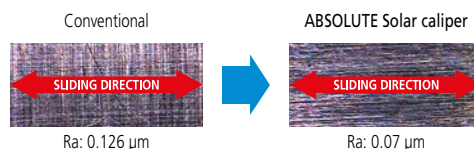
\*3 Excluding quantizing error.

## Dimensions



Smooth slider movement makes for comfortable operation.

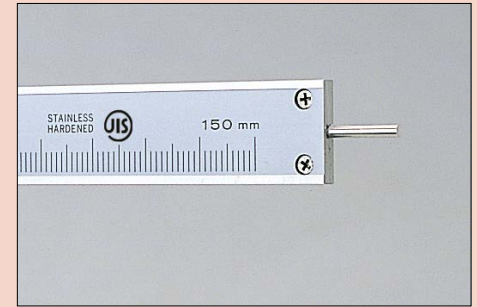
High quality guide surface finish for smooth slider movement.



# Calipers

## SERIES 530 – Vernier Caliper

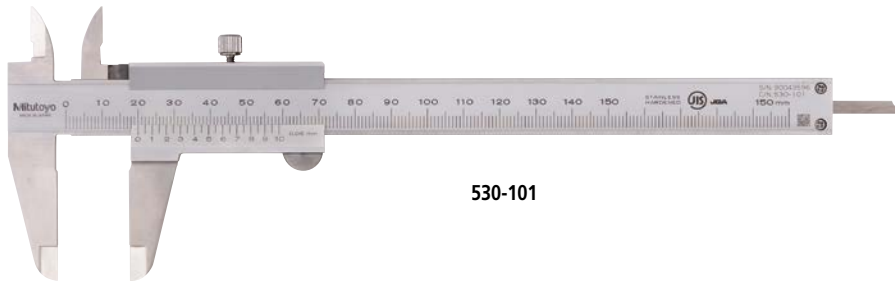
- Stepped graduation face prevents dust ingress between the main scale and slider.
- The small vernier face angle (14°) provides easy reading.
- Can measure outside and inside dimensions, depth, and steps.
- Carbide-tipped jaw calipers give the longest life when measuring rough finished parts, castings, grinding wheels, etc.
- Decimal and fractional graduated scales (metric/inch and inch models only).



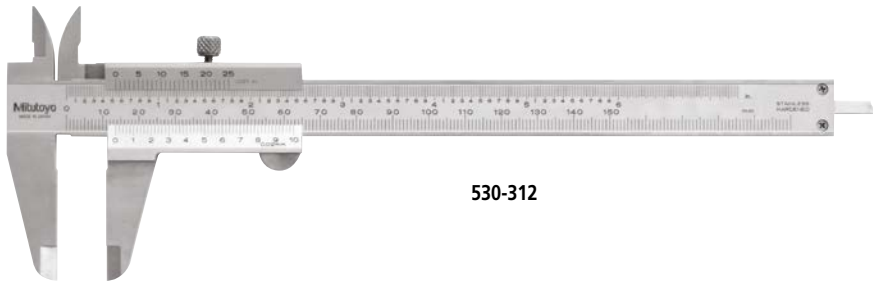
530-102 (round rod depth bar type).



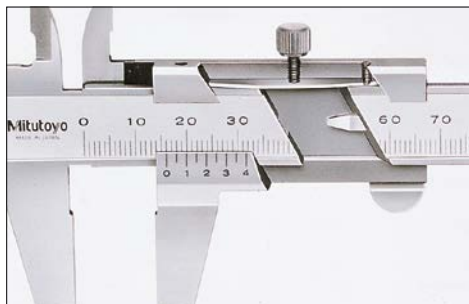
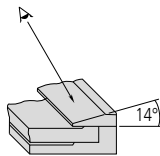
530-320 (carbide-tipped jaw type).



530-101



530-312



### Specifications

#### Metric

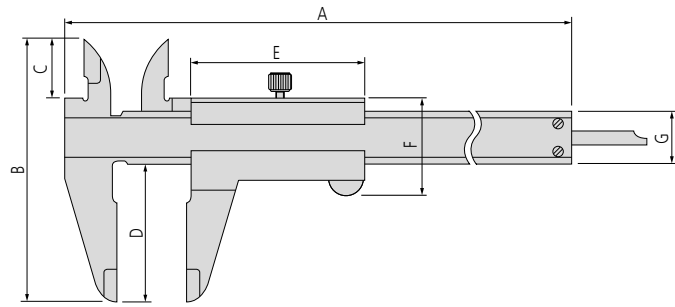
Code No.	Range	Accuracy	Graduation	Depth bar	Remarks	Price
530-102	0-150 mm	±0.05 mm	0.05 mm	ø1.9 mm rod	—	£51.70
530-101				—	£35.50	
530-320				Carbide-tipped jaws for outside measurement	£113.00	
530-108	0-200 mm	±0.08 mm	0.05 mm	Blade	—	£69.50
530-321				Carbide-tipped jaws for outside measurement	£125.00	
530-109				—	£170.00	
530-322	0-300 mm	±0.1 mm	0.05 mm	—	Carbide-tipped jaws for outside measurement	£297.00
530-501	0-600 mm			—	£515.00	
530-502	0-1000 mm	±0.15 mm	—	—	—	£1050.00

#### Inch/Metric

Code No.	Range	Accuracy	Graduation	Depth bar	Remarks	Price
530-104	0-150 mm	±0.05 mm	0.05 mm (1/128")	Blade	—	£35.50
530-312	(0-6")	±0.03 mm	0.02 mm (.001")		High accuracy model	£49.90
530-118	0-200 mm (0-8")	±0.03 mm	0.02 mm (.001")	Blade	High accuracy model: ±0.03 mm	£69.50
530-115	0-300 mm	±0.08 mm	0.05 mm (1/128")		—	£170.00
530-119	(0-12")	±0.04 mm	0.02 mm (.001")		High accuracy model: ±0.04 mm	£198.00

## Dimensions

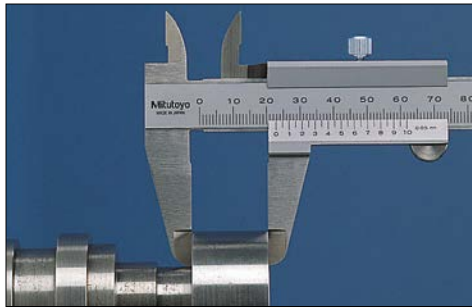
Unit: mm



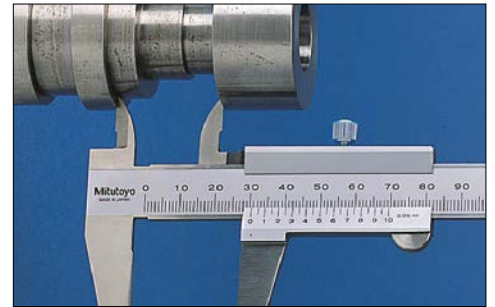
Range	A	B	C	D	E	F	G	Outside jaw thickness
0 - 100 mm	182	77.5	17	40	53.5	30	16	3
0 - 150 mm	229							
0 - 200 mm	288	91	20.5	50				
0 - 300 mm	404	111.5	22	64	66.5	36	20	3.8
0 - 600 mm	780	162	38	90	89	50	25	6
0 - 1000 mm	1240	222	50	130	111	61	32	8

Note: Code No. 530-102 incorporates a round rod depth bar ( $\phi 1.9$  mm). The depth bar shown above is a blade type.

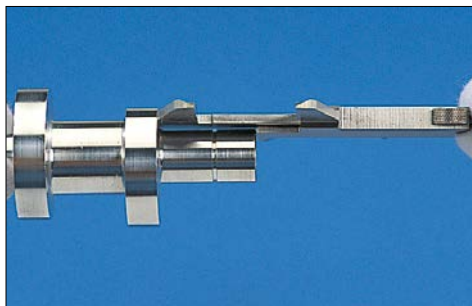
## Measurement Applications



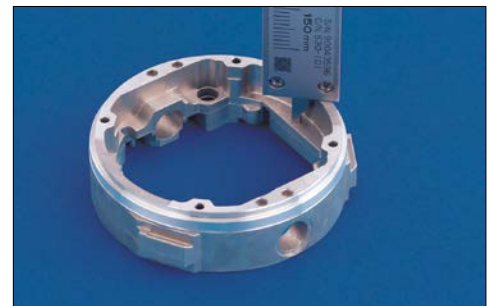
Outside measurement.



Inside measurement.



Step measurement.

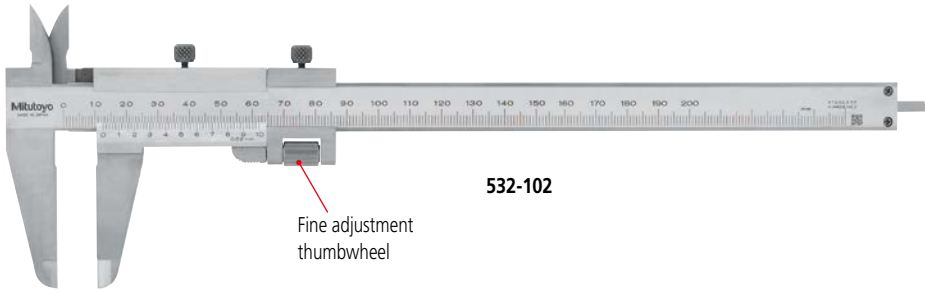


Depth measurement.

# Calipers

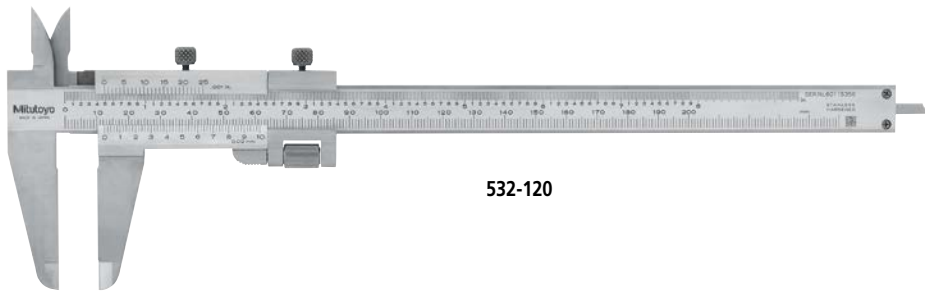
## SERIES 532 – Vernier Thumbwheel Caliper

- Fine-adjustment thumbwheel aids slider positioning.
- Can measure outside and inside dimensions, depth, and steps.



532-102

Fine adjustment thumbwheel



532-120

### Specifications

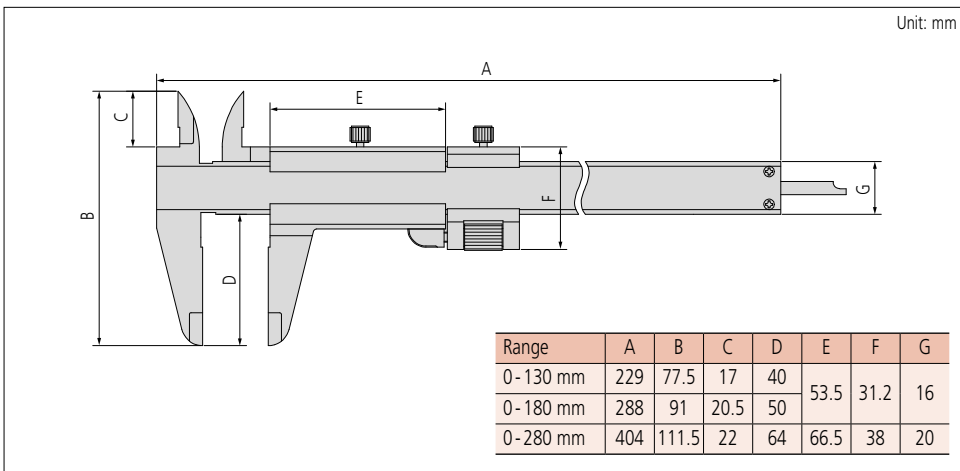
#### Metric

Code No.	Range	Accuracy	Graduation	Price
532-101	0 - 130 mm	±0.03 mm	0.02 mm	£72.20
532-102	0 - 180 mm			£94.80
532-103	0 - 280 mm	±0.04 mm		£212.00

#### Inch/Metric

Code No.	Range	Accuracy	Graduation	Price
532-119	0 - 130 mm (0 - 5")	±0.03 mm	0.02 mm (.001")	£72.20
532-120	0 - 180 mm (0 - 7")			£94.80
532-121	0 - 280 mm (0 - 11")	±0.04 mm		£212.00

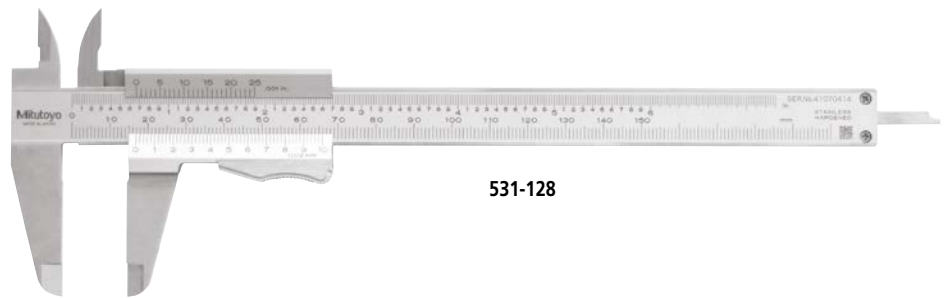
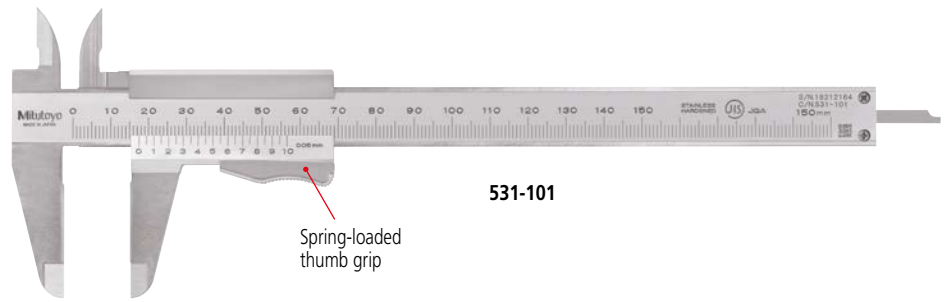
### Dimensions





## SERIES 531 – Vernier Thumb Clamp Caliper

- The slider moves only when the spring-loaded thumb clamp is depressed.
- Can measure outside and inside dimensions, depth, and steps.

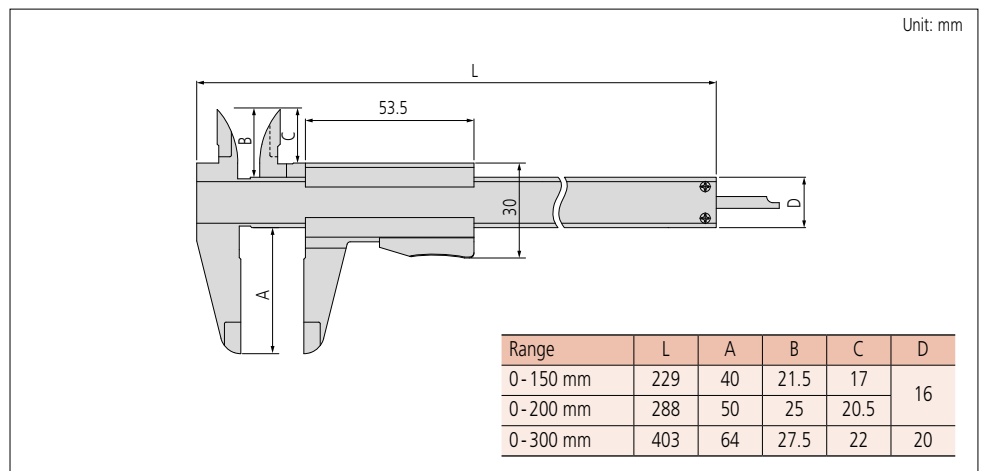


### Specifications

Metric					
Code No.	Range	Accuracy	Graduation	Remarks	Price
531-101	0 - 150 mm	±0.05 mm	0.05 mm	—	£49.00
531-102	0 - 200 mm				£79.50
531-103	0 - 300 mm	±0.08 mm	£193.00		

Inch/Metric					
Code No.	Range	Accuracy	Graduation	Remarks	Price
531-128	0 - 150 mm (0 - 6")	±0.03 mm	0.02 mm (.001")	High accuracy model	£49.00
531-129	0 - 200 mm (0 - 8")				£79.50
531-112	0 - 300 mm (0 - 12")	±0.04 mm			£193.00

### Dimensions



# Calipers

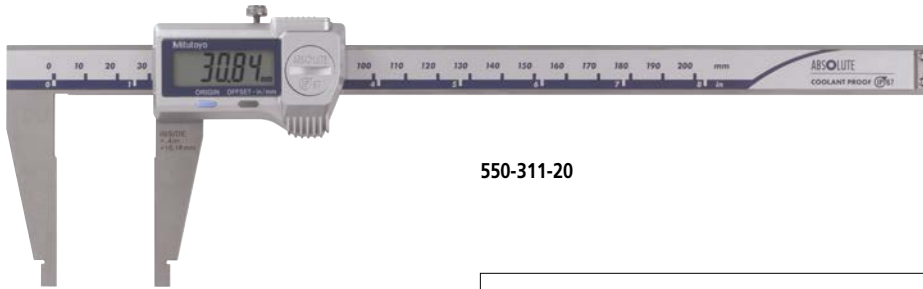
## SERIES 550 – ABSOLUTE Digimatic Nib Jaw Caliper

- Offers a resolution of 0.01 mm with corresponding accuracy.
- Incorporates Mitutoyo's ABSOLUTE measurement system. No need to reset the origin after switching on.
- Models 550-311-20 and 550-341-10 are IP67 rated.
- Data output function allows integration into statistical process control and measurement systems.
- OFFSET button automatically adds the thickness of the inside jaws to the measured value so that the result can be read directly (550-311-20 and 550-341-10). Preset function enables an arbitrary reference value to be added to the measured value for comparison measurements (550-341-10).

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**IP67**



550-311-20



550-223-10

### Specifications

Inch/Metric				
Code No.	Range*1	Accuracy*2	Remarks	Price
550-311-20	0-200 mm/0-8" (10-210 mm/.4-8.4")	±0.03 mm/±.0015"	IP67	£268.00
550-341-10	0-300 mm/0-12" (10-310 mm/.4-12.4")	±0.05 mm/±.002"	IP67, with offset/preset functions for easy inside and comparison measurement	£411.00
550-223-10	0-450 mm/0-18" (20-470 mm/.5-18.5")			£577.00
550-225-10	0-600 mm/0-24" (20-620 mm/.5-24.5")	±0.07 mm/±.003"	—	£648.00
550-227-10	0-1000 mm/0-40" (20-1020 mm/1-41")		£1220.00	

\*1 ( ): Inside measurement.

\*2 Excluding quantizing error.

Note: Series 550 is not equipped with a depth bar.

### Dimensions

Range	A	B	C	D	E	t	R
0-200 mm	60	76	8	5	16	3	5
0-300 mm	75	95	12		20	3.8	
0-450 mm	100	125	18	10	25	6	10
0-600 mm					32	8	
0-1000 mm	140	172	24				

Unit: mm

### Technical Data

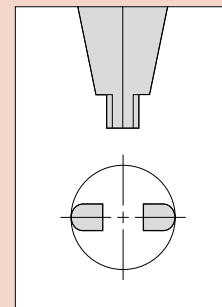
Resolution: 0.01 mm (.0005")  
 Scale type: ABSOLUTE electromagnetic induction linear encoder  
 Max. response speed: Unlimited  
 Battery: SR44 (1 pc.), **938882**  
 Battery life: Approx. 3 years under normal use (1 year for models over 300 mm)

Dust/water protection level: IP67\*3 (models up to 300 mm)

\*3 Rustproofing treatment to be applied after use.

### Optional Accessories

Code No.	Description	Price
For 550-311-20 and 550-341-10		
264-620	U-WAVE-TC transmission unit (IP67 type)	£193.00
02AZF310	U-WAVE-TC connection unit	£62.00
05CZA624	SPC data cable with pushbutton (1 m)	£69.40
05CZA625	SPC data cable with pushbutton (2 m)	£83.50
06AFM380A	USB input tool direct USB-ITN-A (2 m)	£126.00
For 550-223-10, 550-225-10 and 550-227-10		
959143	Data hold unit	£20.20
959149	SPC data cable with pushbutton (1 m)	£35.70
959150	SPC data cable with pushbutton (2 m)	£40.60
02AZD790C	U-WAVE-T data cable with pushbutton (160 mm)	£62.00
02AZE140C	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	£127.00
06AFM380C	USB input tool direct USB-ITN-C (2 m)	£109.00



Radiused jaws for accurate ID measurement.

## Technical Data

Resolution:	0.01 mm (.0005")
Scale type:	ABSOLUTE electromagnetic induction linear encoder
Max. response speed:	Unlimited
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	Approx. 3 years under normal use (1 year for models over 300 mm)

Dust/water protection level: IP67\*1 (models up to 300 mm)

\*1 Rustproofing treatment to be applied after use.

## Optional Accessories

Code No.	Description	Price
For 551-311-20 and 551-341-10		
<b>264-620</b>	U-WAVE-TC transmission unit (IP67 type)	<b>£193.00</b>
<b>02AZF310</b>	U-WAVE-TC connection unit	<b>£62.00</b>
<b>05CZA624</b>	SPC data cable with pushbutton (1 m)	<b>£69.40</b>
<b>05CZA625</b>	SPC data cable with pushbutton (2 m)	<b>£83.50</b>
<b>06AFM380A</b>	USB input tool direct USB-ITN-A (2 m)	<b>£126.00</b>
For 551-224-10, 551-226-10 and 551-227-10		
<b>959143</b>	Data hold unit	<b>£20.20</b>
<b>959149</b>	SPC data cable with pushbutton (1 m)	<b>£35.70</b>
<b>959150</b>	SPC data cable with pushbutton (2 m)	<b>£40.60</b>
<b>02AZD790C</b>	U-WAVE-T data cable with pushbutton (160 mm)	<b>£62.00</b>
<b>02AZE140C</b>	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	<b>£127.00</b>
<b>06AFM380C</b>	USB input tool direct USB-ITN-C (2 m)	<b>£109.00</b>

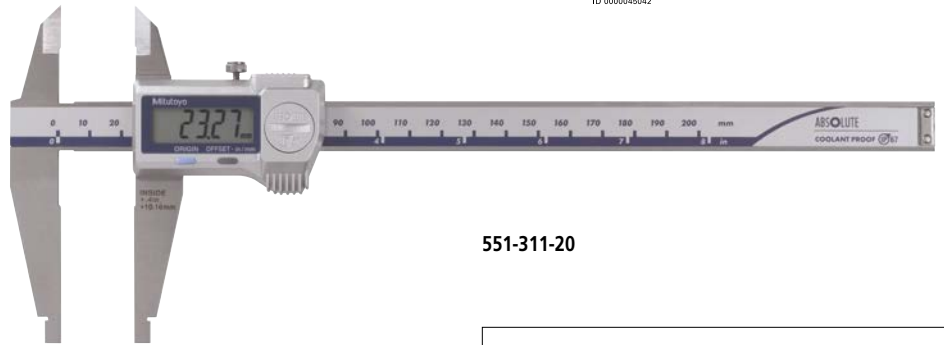
## SERIES 551 – ABSOLUTE Digimatic Nib/Standard Jaw Caliper

- Offers a resolution of 0.01 mm with corresponding accuracy.
- Incorporates Mitutoyo's ABSOLUTE measurement system. No need to reset the origin after switching on.
- Data output function allows integration into statistical process control and measurement systems.
- OFFSET button automatically adds the thickness of the inside jaws to the measured value so that the result can be read directly (551-311-20 and 551-341-10). Preset function enables an arbitrary reference value to be added to the measured value for comparison measurements (551-341-10).
- Tips of the outside measurement jaw are relieved for easy measurement of thin parts.

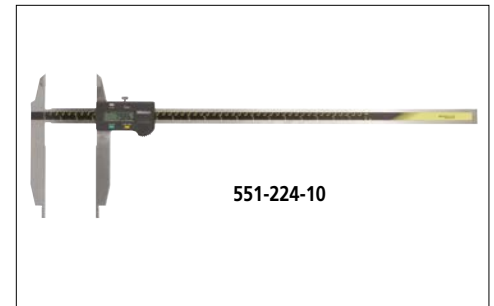
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**ABSOLUTE**

**IP67**



551-311-20



551-224-10

## Specifications

Inch/Metric

Code No.	Range*2	Accuracy*3	Remarks	Price
<b>551-311-20</b>	0 - 200 mm / 0 - 8" (10 - 210 mm / .4 - 8.4")	±0.03 mm / ±.0015"	IP67	<b>£317.00</b>
<b>551-341-10</b>	0 - 300 mm / 0 - 12" (10 - 310 mm / .4 - 12.4")	±0.04 mm / ±.002"	IP67, with offset/preset functions for easy inside and comparison measurement	<b>£468.00</b>
<b>551-224-10</b>	0 - 500 mm / 0 - 20" (20 - 520 mm / .5 - 20.5")	±0.06 mm / ±.0025"	—	<b>£787.00</b>
<b>551-226-10</b>	0 - 750 mm / 0 - 30" (20 - 770 mm / .5 - 30.5")			<b>£1260.00</b>
<b>551-227-10</b>	0 - 1000 mm / 0 - 40" (20 - 1020 mm / 1 - 41")			<b>£1410.00</b>

\*2 ( ): Inside measurement.

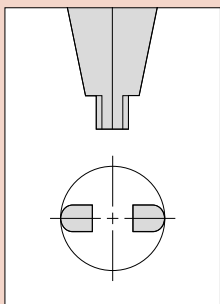
\*3 Excluding quantizing error.

Note: Series 551 is not equipped with a depth bar.

## Dimensions

Range	A	B	C	D	E	F	t	R
0 - 200 mm	60	5	8	30	23.6	16	3	5
0 - 300 mm	90		10	40.1	32.4	20	3.8	
0 - 500 mm	150	10	15	56	44.9	25	6	10
0 - 750 mm								
0 - 1000 mm								

Unit: mm



Radiused jaws for accurate ID measurement.

# Calipers

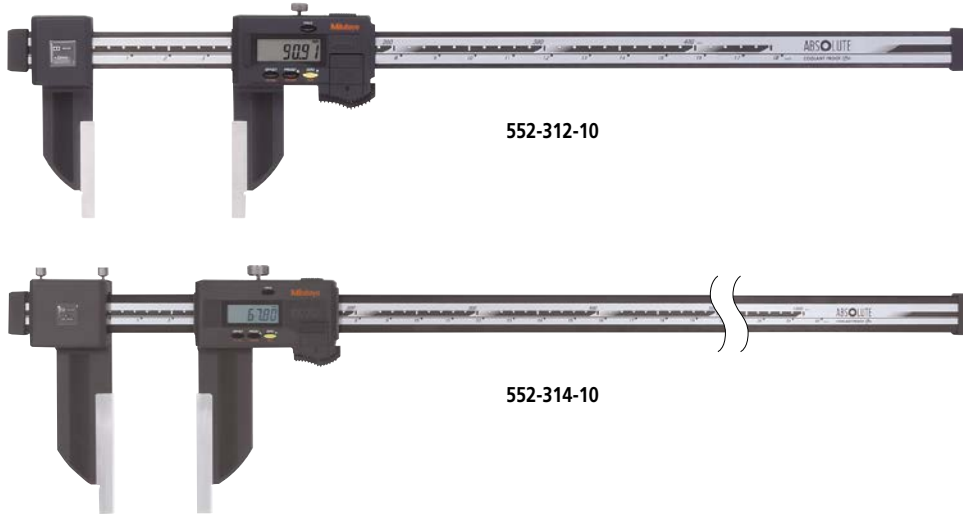
## SERIES 552 – ABSOLUTE Digimatic Coolant Proof Carbon Fibre Caliper

- A lightweight Digimatic caliper that uses CFRP (Carbon Fibre Reinforced Plastics) in the beam and jaws.
- Interchangeable measuring jaws available as optional accessories.
- Data output function allows integration into statistical process control and measurement systems.

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**IP66**



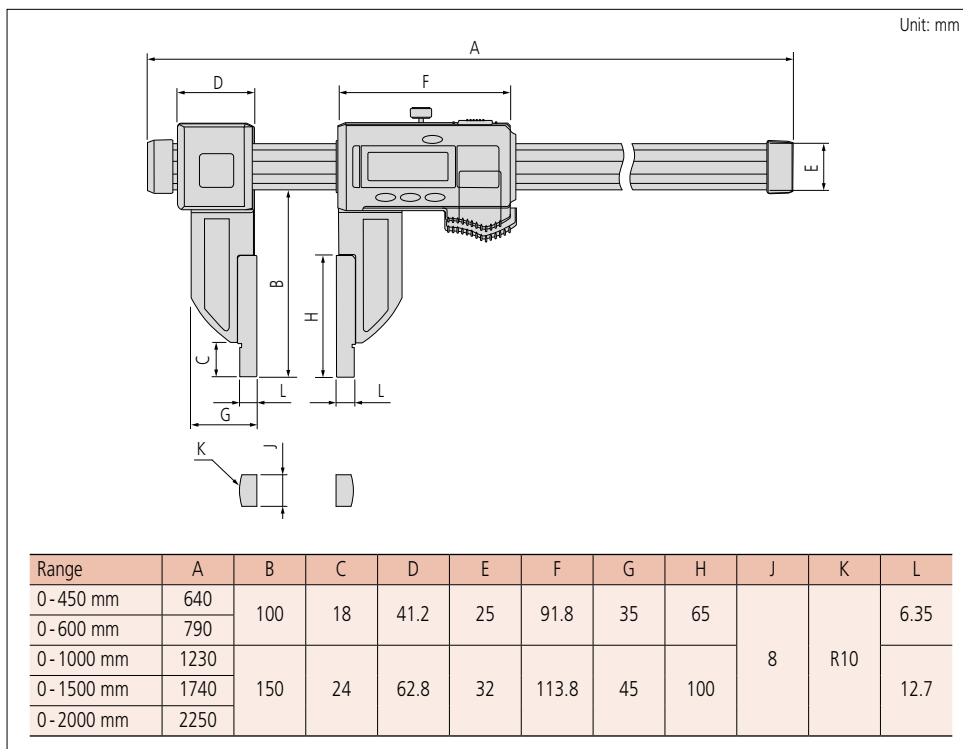
### Specifications

Inch/Metric				
Code No.	Range* <sup>1</sup>	Resolution	Accuracy* <sup>2</sup>	Price
552-312-10	0 (20) - 450 mm / 0 (.5") - 18"	0.01 mm / .0005"	±0.04 mm / ±.002"	£864.00
552-313-10	0 (20) - 600 mm / 0 (.5") - 24"			£897.00
552-314-10	0 (20) - 1000 mm / 0 (1") - 40"		±0.05 mm / ±.003"	£1460.00
552-315-10	0 (20) - 1500 mm / 0 (1") - 60"		±0.09 mm / ±.004"	£1700.00
552-316-10	0 (20) - 2000 mm / 0 (1") - 80"		±0.12 mm / ±.005"	£2240.00

\*1 ( ) : Minimum dimension in inside measurement.

\*2 Excluding quantizing error.

### Dimensions



### Technical Data

Scale type: ABSOLUTE electromagnetic induction linear encoder  
 Max. response speed: Unlimited  
 Battery: SR44 (1 pc.), **938882**  
 Battery life: Approx. 5,000 hours in continuous use  
 Dust/water protection level: IP66\*<sup>3</sup>  
 \*<sup>3</sup> Rustproofing treatment to be applied after use.

### Functions

**ABSOLUTE system measurement:**  
 After power is turned ON, measurement can be started without zero-setting if origin-setting was previously performed. The ABS (absolute) origin position can be changed by the ORIGIN button.

**Zero-setting (INC measurement mode):**  
 Displayed value can be set to zero at any arbitrary position of the slider for comparative measurements.

**Auto ON/OFF:**  
 The reading on the LCD disappears after this instrument is idle for a short time, but the origin point is retained. Moving the slider causes the reading on the LCD to reappear.

**Data output:**  
 Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

**Data hold:**  
 By using the data hold button the displayed value can be held.

**Presetting (ABS INC measurement mode):**  
 Displayed value can be set to any arbitrary value.

**Offsetting:**  
 Automatically adds the thickness of the inside jaws to the measured value so that the result can be read directly, without calculation.

**Inch/mm selection:**  
 Switches the units of measurement (at any time).

**Alerts:**  
 In the unlikely event of a display overflow or calculation error, an error message is displayed and measurement stops. Measurement cannot continue until the error is corrected. If the battery voltage drops below a certain point, the battery indicator will turn on before measurement becomes impossible, warning the user that the battery needs to be replaced. If contamination on the surface of the scale causes a calculation error, an error message is displayed and measurement stops.




Light weight is an advantage when measuring large dimensions.

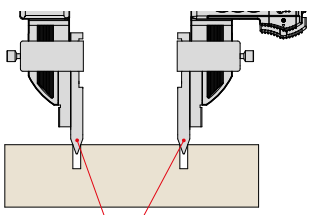
## Optional Accessories

Code No.	Description	Price
914053	Clamp (1 pair) for 552-312-10 and 552-313-10	£140.00
914054	Clamp (1 pair) for 552-314-10, 552-315-10 and 552-316-10	£148.00
914056	Centre-to-centre jaws (1 pair)	£187.00
914058	Point jaws	£213.00
02AZD790A	U-WAVE-T data cable with pushbutton (160 mm)	£62.00
02AZE140A	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	£142.00
05CZA624	SPC data cable with pushbutton (1 m)	£69.40
05CZA625	SPC data cable with pushbutton (2 m)	£83.50
06AFM380A	USB Input Tool Direct USB-ITN-A (2 m)	£126.00

## Optional Accessories

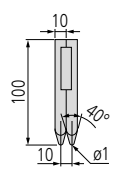
**914056**  
Centre-to-centre jaws  
Accuracy:  $\pm 0.03$  mm






Centre-to-centre jaws

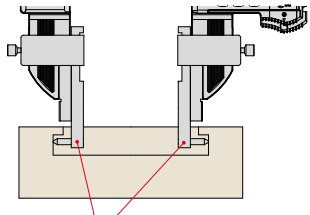
Unit: mm



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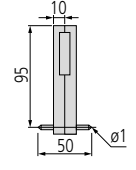
**914058**  
Point jaws  
Accuracy:  $\pm 0.02$  mm






Point jaws

Unit: mm




---

Clamp (1 pair)



914053



914054

D

# Calipers

## SERIES 552 – ABSOLUTE Digimatic Long Jaw Carbon Fibre Caliper

- A lightweight Digimatic caliper that uses CFRP (Carbon Fibre Reinforced Plastics) in the beam and jaws.
- Data output function allows integration into statistical process control and measurement systems.

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**IP66**



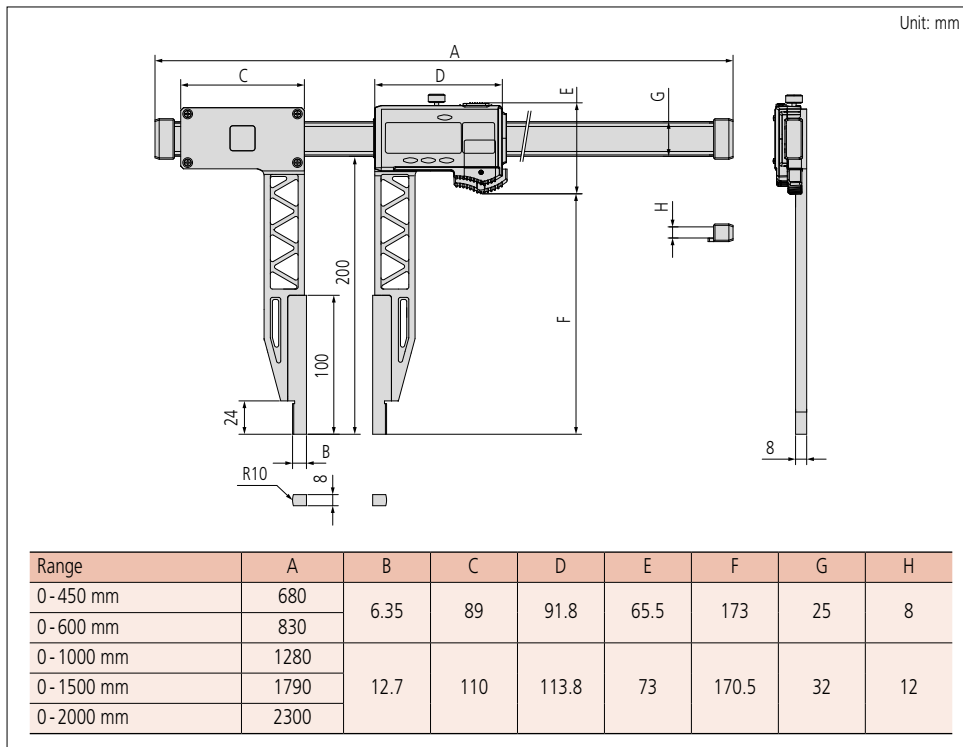
### Specifications

Inch/Metric				
Code No.	Range* <sup>1</sup>	Resolution	Accuracy* <sup>2</sup>	Price
552-160-10	0 (20) - 450 mm / 0 (.5") - 18"	0.01 mm / .0005"	±0.06 mm / ±.0025"	£1190.00
552-161-10	0 (20) - 600 mm / 0 (.5") - 24"			£1270.00
552-162-10	0 (20) - 1000 mm / 0 (1") - 40"			£1820.00
552-163-10	0 (20) - 1500 mm / 0 (1") - 60"			£2090.00
552-164-10	0 (20) - 2000 mm / 0 (1") - 80"			£2650.00

\*<sup>1</sup> ( ): Minimum dimension in inside measurement.

\*<sup>2</sup> Excluding quantizing error.

### Dimensions



### Technical Data

Scale type: ABSOLUTE electromagnetic induction linear encoder  
 Max. response speed: Unlimited  
 Battery: SR44 (1 pc.), **938882**  
 Battery life: Approx. 5,000 hours in continuous use  
 Dust/water protection level: IP66\*<sup>3</sup>  
 \*<sup>3</sup> Rustproofing treatment to be applied after use.

### Functions

**ABSOLUTE system measurement:**  
 After power is turned ON, measurement can be started without zero-setting if origin-setting was previously performed. The ABS (absolute) origin position can be changed by the ORIGIN button.

**Zero-setting (INC measurement mode):**  
 Displayed value can be set to zero at any arbitrary position of the slider for comparative measurements.

**Auto ON/OFF:**  
 The reading on the LCD disappears after this instrument is idle for a short time, but the origin point is retained. Moving the slider causes the reading on the LCD to reappear.

**Data output:**  
 Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

**Data hold:**  
 By using the data hold button the displayed value can be held.

**Presetting (ABS INC measurement mode):**  
 Displayed value can be set to any arbitrary value.

**Offsetting:**  
 Automatically adds the thickness of the inside jaws to the measured value so that the result can be read directly, without calculation.

**Inch/mm selection:**  
 Switches the units of measurement (at any time).

**Alerts:**  
 In the unlikely event of a display overflow or calculation error, an error message is displayed and measurement stops. Measurement cannot continue until the error is corrected. If the battery voltage drops below a certain point, the battery indicator will turn on before measurement becomes impossible, warning the user that the battery needs to be replaced. If contamination on the surface of the scale causes a calculation error, an error message is displayed and measurement stops.

### Optional Accessories

Code No.	Description	Price
02AZD790A	U-WAVE-T data cable with pushbutton (160 mm)	£62.00
02AZE140A	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	£142.00
05CZA624	SPC data cable with pushbutton (1 m)	£69.40
05CZA625	SPC data cable with pushbutton (2 m)	£83.50
06AFM380A	USB Input Tool Direct USB-ITN-A (2 m)	£126.00

## Technical Data

Scale type:	ABSOLUTE electromagnetic induction linear encoder
Max. response speed:	Unlimited
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	Approx. 5,000 hours in continuous use
Dust/water protection level:	IP66*1

\*1 Rustproofing treatment to be applied after use.

## Functions

### ABSOLUTE system measurement:

After power is turned ON, measurement can be started without zero-setting if origin-setting was previously performed. The ABS (absolute) origin position can be changed by the ORIGIN button.

### Zero-setting (INC measurement mode):

Displayed value can be set to zero at any arbitrary position of the slider for comparative measurements.

### Auto ON/OFF:

The reading on the LCD disappears after this instrument is idle for a short time, but the origin point is retained. Moving the slider causes the reading on the LCD to reappear.

### Data output:

Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

### Data hold:

By using the data hold unit (option), the displayed value can be held. This cannot be used with the data output function.

### Presetting (ABS INC measurement mode):

Displayed value can be set to any arbitrary value.

### Offsetting:

Automatically adds the thickness of the inside jaws to the measured value so that the result can be read directly, without calculation.

### Inch/mm selection:

Switches the units of measurement (at any time).

### Alerts:

In the unlikely event of a display overflow or calculation error, an error message is displayed and measurement stops. Measurement cannot continue until the error is corrected. If the battery voltage drops below a certain point, the battery indicator will turn on before measurement becomes impossible, warning the user that the battery needs to be replaced. If contamination on the surface of the scale causes a calculation error, an error message is displayed and measurement stops.

## Optional Accessories

Code No.	Description	Price
<b>914053</b>	Clamp (1 pair)*2	<b>£140.00</b>
<b>914056</b>	Centre-to-centre jaws (1 pair)*2	<b>£187.00</b>
<b>914058</b>	Point jaws*2	<b>£213.00</b>
<b>02AZD790A</b>	U-WAVE-T data cable with pushbutton (160 mm)	<b>£62.00</b>
<b>02AZE140A</b>	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	<b>£142.00</b>
<b>05CZA624</b>	SPC data cable with pushbutton (1 m)	<b>£69.40</b>
<b>05CZA625</b>	SPC data cable with pushbutton (2 m)	<b>£83.50</b>
<b>06AFM380A</b>	USB Input Tool Direct USB-ITN-A (2 m)	<b>£126.00</b>

\*2 Refer to page D-18 for details.

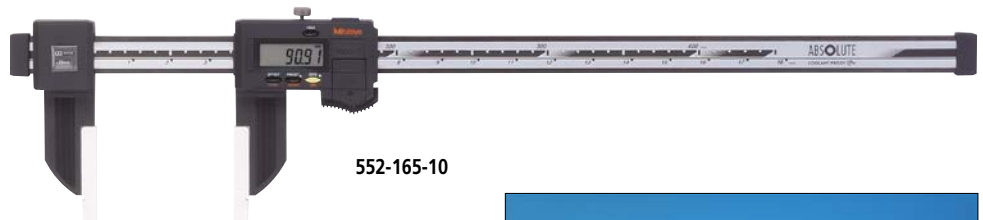
## SERIES 552 – ABSOLUTE Digimatic Coolant Proof Ceramic Jaw Carbon Fibre Caliper

- A lightweight Digimatic caliper that uses CFRP (Carbon Fibre Reinforced Plastics) in the beam and jaws.
- Rustless and nonmagnetic. Suitable for measuring magnetic components.
- Zirconia ceramic contact surfaces for high resistance to wear.
- Data output function allows integration into statistical process control and measurement systems.
- Interchangeable measuring jaws available as optional accessories.

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**ABSOLUTE**

**IP66**



552-165-10



## Specifications

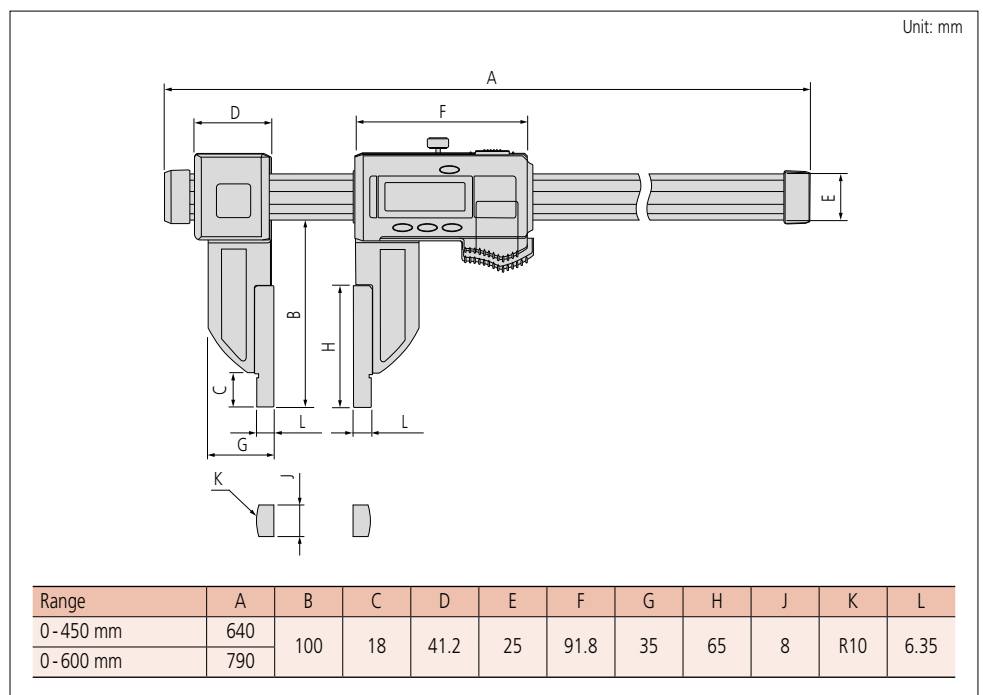
Inch/Metric

Code No.	Range*3	Resolution	Accuracy*4	Price
<b>552-165-10</b>	0 (20) - 450 mm/0 (.5") - 18"	0.01 mm/ .0005"	±0.04 mm/ ±.002"	<b>£1220.00</b>
<b>552-166-10</b>	0 (20) - 600 mm/0 (.5") - 24"			<b>£1260.00</b>

\*3 ( ): Minimum dimension in inside measurement.

\*4 Excluding quantizing error.

## Dimensions



# Calipers

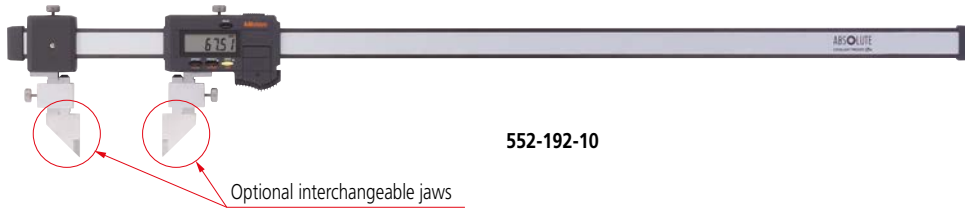
## SERIES 552 – ABSOLUTE Digimatic Coolant Proof Interchangeable Jaw Carbon Fibre Caliper

- A lightweight Digimatic caliper that uses CFRP (Carbon Fibre Reinforced Plastics) in the beam and jaws.
- Provided with preset function for setting a desired starting point, which allows direct readout of offset measurement.
- The range of applications can be expanded by using interchangeable jaws (optional).
- Data output function allows integration into statistical process control and measurement systems.

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**IP66**



552-192-10

Optional interchangeable jaws

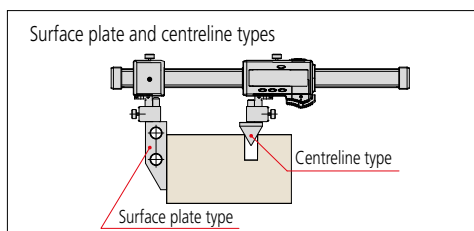
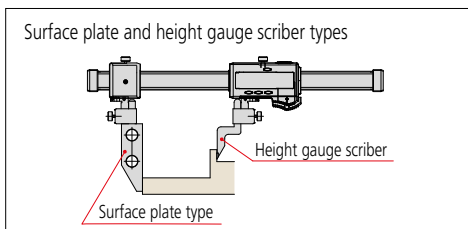
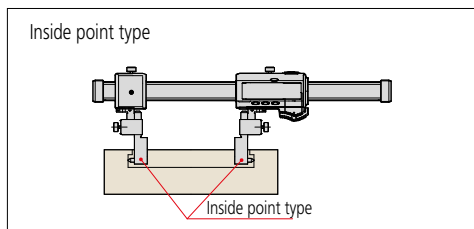
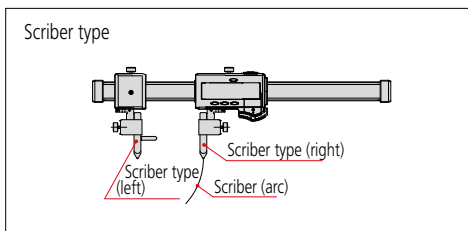
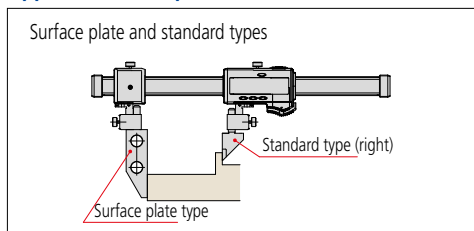
### Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy* <sup>1</sup>	Price
552-191-10	0 - 450 mm / 0 - 18"	0.01 mm / .0005"	±0.04 mm / ±.002"	£889.00
552-192-10	0 - 600 mm / 0 - 24"			£937.00
552-193-10	0 - 1000 mm / 0 - 40"			£1490.00
552-194-10	0 - 1500 mm / 0 - 60"			£1790.00
552-195-10	0 - 2000 mm / 0 - 80"			£2310.00

\*1 Excluding quantizing error.

### Application Examples



### Technical Data

Scale type: ABSOLUTE electromagnetic induction linear encoder  
 Max. response speed: Unlimited  
 Battery: SR44 (1 pc.), **938882**  
 Battery life: Approx. 5,000 hours in continuous use  
 Dust/water protection level: IP66\*<sup>2</sup>  
 Standard accessory: Jaw clamps (2 pcs.), **05GZA033**  
 \*<sup>2</sup> Rustproofing treatment to be applied after use.

### Functions

#### ABSOLUTE system measurement:

After power is turned ON, measurement can be started without zero-setting if origin-setting was previously performed. The ABS (absolute) origin position can be changed by the ORIGIN button.

#### Zero-setting (INC measurement mode):

Displayed value can be set to zero at any arbitrary position of the slider for comparative measurements.

#### Auto ON/OFF:

The reading on the LCD disappears after this instrument is idle for a short time, but the origin point is retained. Moving the slider causes the reading on the LCD to reappear.

#### Data output:

Models equipped with this function have an output port for transferring measurement data to a Statistical Process Control (SPC) system.

#### Data hold:

By using the data button the displayed value can be held.

#### Presetting (ABS INC measurement mode):

Displayed value can be set to any arbitrary value.

#### Offsetting:

Automatically adds the thickness of the inside jaws to the measured value so that the result can be read directly, without calculation.

#### Inch/mm selection:

Switches the units of measurement (at any time).

#### Alerts:

In the unlikely event of a display overflow or calculation error, an error message is displayed and measurement stops. Measurement cannot continue until the error is corrected. If the battery voltage drops below a certain point, the battery indicator will turn on before measurement becomes impossible, warning the user that the battery needs to be replaced. If contamination on the surface of the scale causes a calculation error, an error message is displayed and measurement stops.

### Optional Accessories

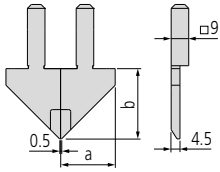
Code No.	Description	Price
02AZD790A	U-WAVE-T data cable with pushbutton (160 mm)	£62.00
02AZE140A	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	£142.00
05CZA624	SPC data cable with pushbutton (1 m)	£69.40
05CZA625	SPC data cable with pushbutton (2 m)	£83.50
06AFM380A	USB Input Tool Direct USB-ITN-A (2 m)	£126.00



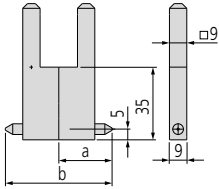
## Interchangeable Jaw Dimensions

Unit: mm

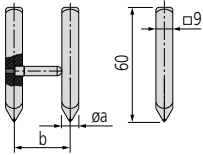
### Standard type



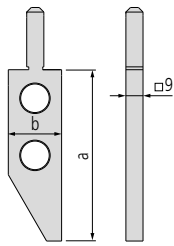
### Inside point type



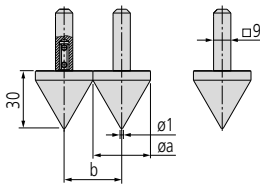
### Scriber type



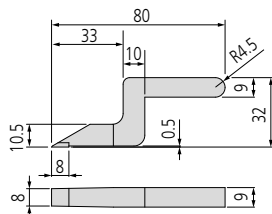
### Surface plate type



### Centreline type



### Height gauge scriber



## Interchangeable Jaw Specifications

Code No.	Components	a	b	Price
<b>Standard type</b>				
<b>07CZA056*</b>	2 pcs.	28 mm	30 mm	<b>£239.00</b>
<b>Inside point type</b>				
<b>07CZA058*</b>	2 pcs.	25 mm	50 mm	<b>£280.00</b>
<b>07CZA059*</b>	2 pcs.	1"	2"	<b>£280.00</b>
<b>Scriber type</b>				
<b>07CZA055*</b>	2 pcs.	8 mm	30 mm	<b>£166.00</b>
<b>07CZA061*</b>	2 pcs.	.031"	1.2"	<b>£199.00</b>

\* Individual components available, price on application.

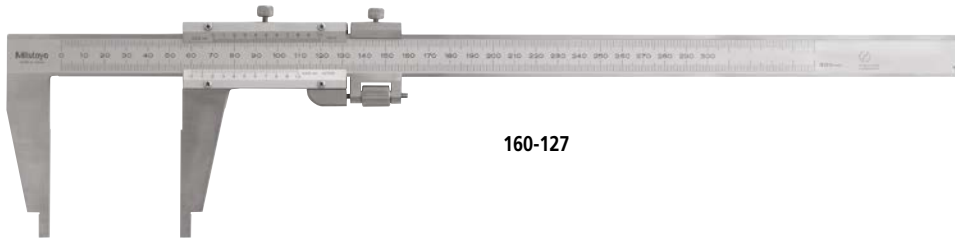
Code No.	Components	a	b	Price
<b>Surface plate type</b>				
<b>07CZA044</b>	1 pc.	90 mm	28 mm	<b>£200.00</b>
<b>Centreline type</b>				
<b>07CZA057*</b>	2 pcs.	30 mm	30 mm	<b>£285.00</b>
<b>07CZA060*</b>	2 pcs.	1.2"	1.2"	<b>£285.00</b>
<b>Height gauge scriber type</b>				
<b>07GZA000</b>	1 pc.	—	—	<b>£41.50</b>

Interchangeable Jaw	Applicable calipers	Range	Accuracy when attached to the caliper	
Standard type	552-191-10	0-450 mm (0-18")	±0.06 mm (±.0025")	
	552-192-10	0-600 mm (0-24")		
	552-193-10	0-1000 mm (0-40")	±0.07 mm (±.0030")	
	552-194-10	0-1500 mm (0-60")	±0.11 mm (±.0045")	
	552-195-10	0-2000 mm (0-80")	±0.14 mm (±.0055")	
Inside point type	552-191-10	Inside: 50-500 mm (2-20")	±0.09 mm (±.0035")	
		Outside: 0-450 mm (0-18")		
	552-192-10	Inside: 50-650 mm (2-26")		
		Outside: 0-600 mm (0-24")		
	552-193-10	Inside: 50-1050 mm (2-42")		±0.10 mm (±.0040")
		Outside: 0-1000 mm (0-40")		
552-194-10	Inside: 50-1550 mm (2-62")	±0.14 mm (±.0055")		
	Outside: 0-1500 mm (0-60")			
552-195-10	Inside: 50-2050 mm (2-82")	±0.17 mm (±.0070")		
	Outside: 0-2000 mm (0-80")			
Centreline type	552-191-10	30-480 mm (1.2-19.2")	±0.08 mm (±.0030")	
	552-192-10	30-630 mm (1.2-25.2")		
	552-193-10	30-1030 mm (1.2-41.2")	±0.09 mm (±.0035")	
	552-194-10	30-1530 mm (1.2-61.2")	±0.13 mm (±.0055")	
	552-195-10	30-2030 mm (1.2-81.2")	±0.16 mm (±.0065")	
Scriber type	552-191-10	30-480 mm (1.2-19.2")	±0.10 mm (±.0040")	
	552-192-10	30-630 mm (1.2-25.2")		
	552-193-10	30-1030 mm (1.2-41.2")	±0.11 mm (±.0045")	
	552-194-10	30-1530 mm (1.2-61.2")	±0.15 mm (±.0060")	
	552-195-10	30-2030 mm (1.2-81.2")	±0.18 mm (±.0070")	
Surface plate and height gauge scriber types	552-191-10	0-450 mm (0-17.7")	±0.10 mm (±.0040")	
	552-192-10	0-600 mm (0-23.7")		
	552-193-10	0-1000 mm (0-39.4")	±0.11 mm (±.0045")	
	552-194-10	0-1500 mm (0-59.4")	±0.15 mm (±.0060")	
	552-195-10	0-2000 mm (0-79.6")	±0.18 mm (±.0070")	
Surface plate and inside point types	552-191-10	Inside: 25-475 mm (1-19")	±0.12 mm (±.0050")	
		Outside: 0-450 mm (1-18")		
	552-192-10	Inside: 25-625 mm (1-25")		
		Outside: 0-600 mm (1-24")		
	552-193-10	Inside: 25-1025 mm (1-41")		±0.13 mm (±.0055")
		Outside: 0-1000 mm (1-40")		
552-194-10	Inside: 25-1525 mm (1-62")	±0.17 mm (±.0070")		
	Outside: 0-1500 mm (1-60")			
552-195-10	Inside: 25-2025 mm (1-81")	±0.20 mm (±.0080")		
	Outside: 0-2000 mm (1-80")			
Surface plate and centreline types	552-191-10	15-465 mm (0.6-18.6")	±0.11 mm (±.0045")	
	552-192-10	15-615 mm (0.6-24.6")		
	552-193-10	15-1015 mm (0.6-40.6")	±0.12 mm (±.0050")	
	552-194-10	15-1515 mm (0.6-60.6")	±0.16 mm (±.0065")	
	552-195-10	15-2015 mm (0.6-80.6")	±0.19 mm (±.0075")	

# Calipers

## SERIES 160 – Vernier Nib Jaw Thumbwheel Caliper

- Inside and outside measurements can be read directly from the upper and lower vernier scales.
- The jaws have radiused measuring faces for accurate inside diameter (ID) measurement.



160-127

### Specifications

#### Metric

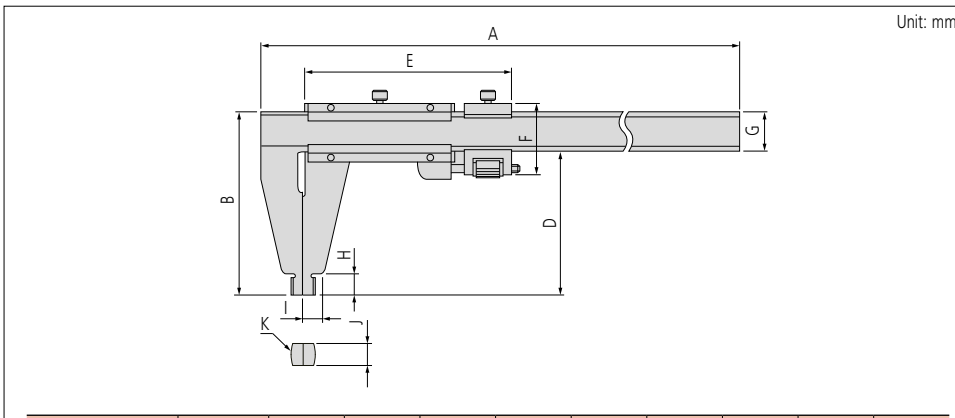
Code No.	Range*	Accuracy	Graduation	Remarks	Price
160-127	0 (10) - 300 mm	±0.04 mm	0.02 mm	—	£295.00
160-128	0 (20) - 450 mm	±0.05 mm			£465.00
160-101	0 (20) - 600 mm				£535.00
160-104	0 (20) - 1000 mm	±0.07 mm			£960.00

#### Inch/Metric

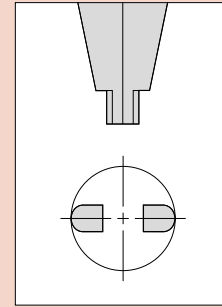
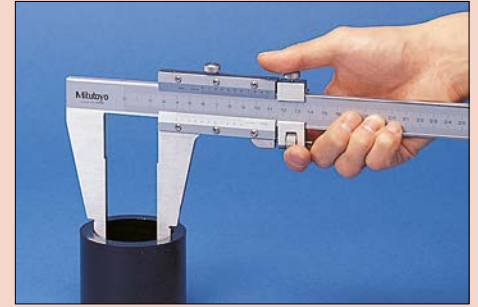
Code No.	Range*	Accuracy	Graduation	Remarks	Price
160-125	0 (10) - 300 mm / 0 (.3) - 12"	±0.04 mm / ±.0015"	0.02 mm / .001"	+ .3" / 7.62 mm to reading in inside measurement	£295.00
160-119	0 (20) - 450 mm / 0 (.5) - 18"	±0.05 mm / ±.002"		+ .5" / 12.7 mm to reading in inside measurement	£465.00
160-103	0 (20) - 600 mm / 0 (.5) - 24"			£535.00	
160-106	0 (20) - 1000 mm / 0 (1) - 40"	±0.07 mm / ±.003"		+ 1" / 25.4 mm to reading in inside measurement	£960.00
160-112	0 (20) - 1500 mm / 0 (1) - 60"	±0.1 mm / ±.004"			£1950.00
160-115	0 (20) - 2000 mm / 0 (1) - 80"	±0.12 mm / ±.005"			£2930.00

\*( ): Minimum measurable inside dimension.

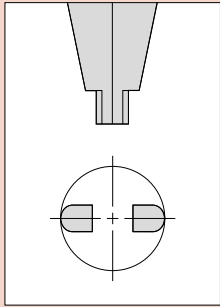
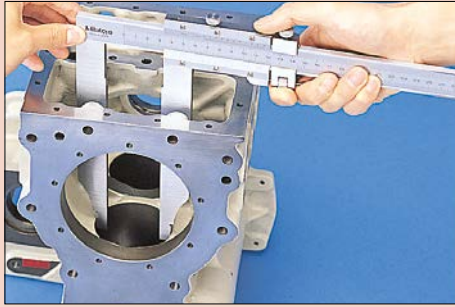
### Dimensions



Range	A	B	D	E	F	G	H	I	J	K
0 - 300 mm	445	95	75	103	38	20	12	10	3.8	R5
0 - 450 mm	630	125	100	112	51	25	18	14.8	6	R10
0 - 600 mm	780		150	62.5	32	24	17	8		
0 - 1000 mm	1240	172	140	150	62.5	32	24	17		
0 - 1500 mm	1800	212	180	170					30	
0 - 2000 mm	2300	220	180	180	78	40	30	23	12	



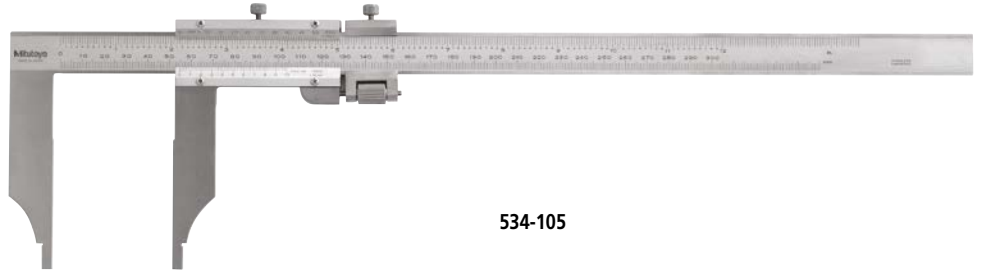
Radiused jaws for accurate ID measurement.



Radiused jaws for accurate ID measurement.

## SERIES 534 – Vernier Long Jaw Thumbwheel Caliper

- Long jaws for measuring hard-to-reach workpiece features.
- Inside and outside measurements can be read directly from the upper and lower vernier scales.
- The jaws have radiused measuring faces for accurate inside diameter (ID) measurement.



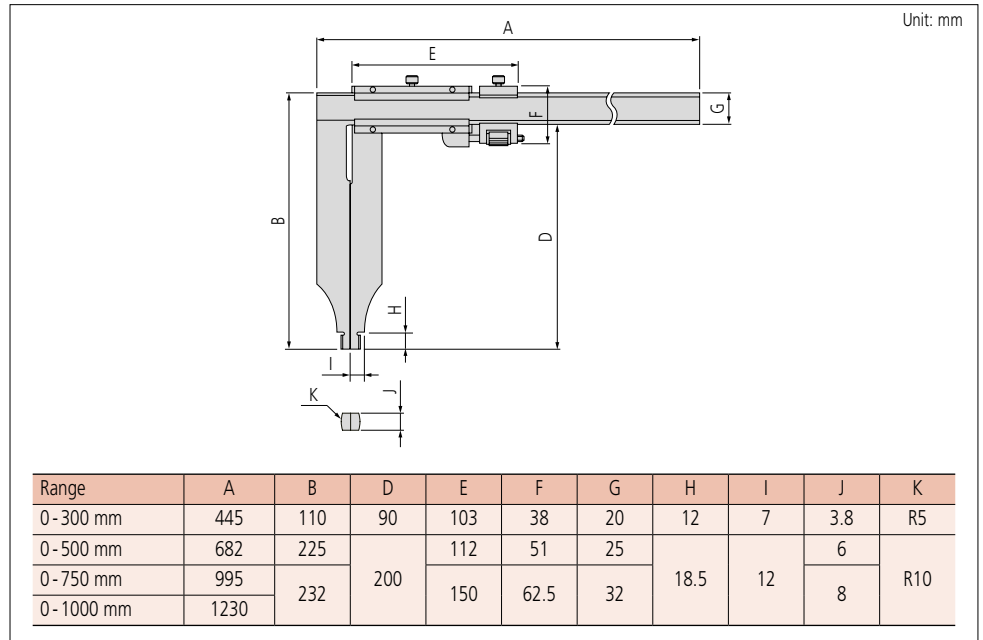
534-105

### Specifications

Inch/Metric					
Code No.	Range*	Accuracy	Graduation	Remarks	Price
534-105	0 (10)-300 mm / 0 (.3)-12"	±0.04 mm / ±.0015"	0.02 mm / .001"	+10 mm / .394" to reading in inside measurement	£263.00
534-106	0 (20)-500 mm / 0 (.8)-20"	±0.06 mm / ±.0025"		+20 mm / .787" to reading in inside measurement	£618.00
534-107	0 (20)-750 mm / 0 (.8)-30"	±0.08 mm / ±.003"			£874.00
534-108	0 (20)-1000 mm / 0 (1)-40"	±0.1 mm / ±.004"		£1180.00	

\*( ): Minimum measurable inside dimension.

### Dimensions



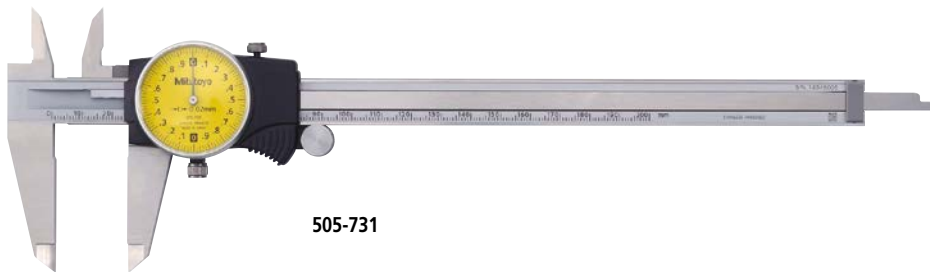
# Calipers

## SERIES 505 – Dial Caliper

- Newly designed dial movement for ultra-smooth sliding and high shock protection.
- Titanium coating is applied to the sliding surfaces to enhance durability (except for 0 - 300 mm and 0 - 12" models).
- Easy-to-read yellow dial.
- Large finger rest aids ease of use.
- Jaw tips are relieved for easy measurement of thin parts.
- Can measure outside and inside dimensions, depth, and steps.



505-730



505-731

### Specifications

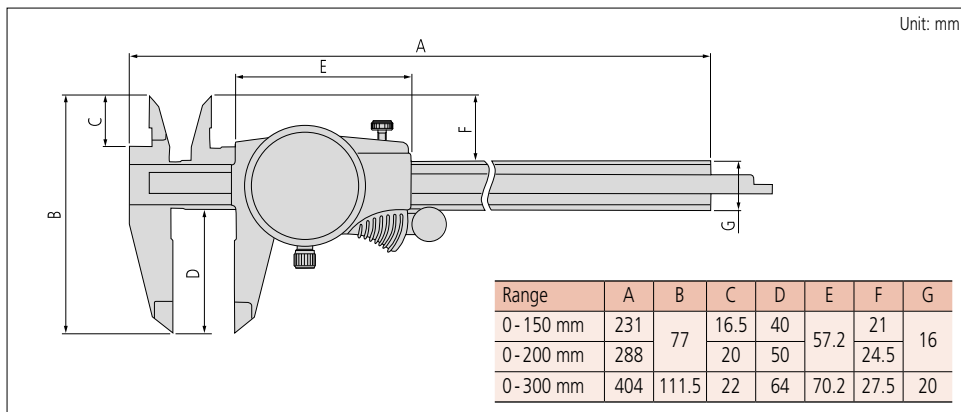
#### Metric

Code No.	Range	Accuracy	Graduation	Remarks	Price
505-730	0 - 150 mm	±0.03 mm	0.02 mm, 2 mm/rev	—	£112.00
505-732		±0.02 mm	0.01 mm, 1 mm/rev	Silver body	£117.00
505-731	0 - 200 mm	±0.03 mm	0.02 mm, 2 mm/rev	—	£148.00
505-733			0.01 mm, 1 mm/rev	Silver body	£148.00
505-745	0 - 300 mm	±0.04 mm	0.02 mm, 2 mm/rev	—	£250.00

#### Inch

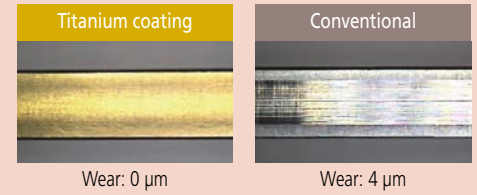
Code No.	Range	Accuracy	Graduation	Remarks	Price
505-742	0 - 6"	±.001"	.001", .1"/rev	Silver body	£112.00
505-743	0 - 8"	±.002"			£148.00
505-746	0 - 12"		±.002"	.001", .2"/rev	—
505-749		£217.00			

### Dimensions



### Wear comparison of main scale slider face

The photographs below show the condition of the main beam sliding surfaces after a sliding test comprising 100,000 movements. Smooth movement over the entire measuring range is assured even when you use a particular part of the sliding surface repeatedly.



Wear: 0 µm

Wear: 4 µm

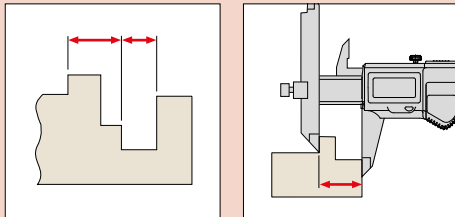
## Technical Data for 573 series

Dust/water protection level:	IP67*1
Scale type:	ABSOLUTE electromagnetic induction linear encoder
Max. response speed:	Unlimited
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	Approx. 5 years under normal use (1 year for models over 300 mm)

\*1 Rustproofing treatment to be applied after use.

## Optional Accessories for 573 series

Code No.	Description	Price
<b>264-620</b>	U-WAVE-TC transmission unit	<b>£193.00</b>
<b>02AZF310</b>	U-WAVE-TC connection unit	<b>£62.00</b>
<b>05CZA624</b>	SPC data cable with pushbutton (1 m)	<b>£69.40</b>
<b>05CZA625</b>	SPC data cable with pushbutton (2 m)	<b>£83.50</b>
<b>06AFM380A</b>	USB input tool direct USB-ITN-C (2 m)	<b>£126.00</b>



Application example.

## SERIES 573, 536 – Offset Jaw Caliper

- The beam-mounted jaw can be adjusted to facilitate measurement of stepped sections and hard-to-get-at workpiece features.
- Digimatic models feature Mitutoyo's ABSOLUTE system with IP67 ingress protection. No need to reset the origin after switching on.
- Digimatic models enable integration into statistical process control and measurement systems.

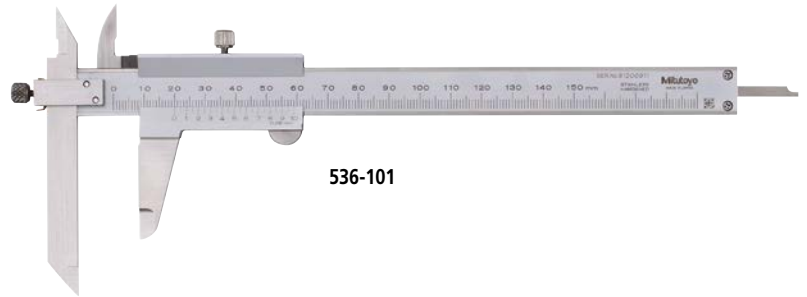
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Data Management Software by Mitutoyo

**ABSOLUTE**

**IP67**



573-701-20



536-101

## Specifications

### Inch/Metric

Code No.	Range	Resolution	Accuracy*2	Price
<b>ABSOLUTE Digimatic type</b>				
<b>573-701-20</b>	0 - 150 mm (0 - 6")	0.01 mm (.0005")	±0.02 mm (±.001")	<b>£390.00</b>
<b>573-702-20</b>	0 - 200 mm (0 - 8")			<b>£468.00</b>
<b>573-704</b>	0 - 300 mm (0 - 12")		±0.03 mm (±.0015")	<b>£558.00</b>

### Metric

Code No.	Range	Graduation	Accuracy	Price
<b>Vernier type</b>				
<b>536-101</b>	0 - 150 mm	0.05 mm	±0.05 mm	<b>£214.00</b>
<b>536-102</b>	0 - 200 mm			<b>£252.00</b>
<b>536-103</b>	0 - 300 mm		±0.08 mm	<b>£368.00</b>

\*2 Excluding quantizing error.

## Dimensions

		Unit: mm							
		Left View				Right View			
Range	t	A	B	C	D	E	F	G	t
0 - 150 mm	3.5	95	10	40	16	16.5	21	14.6	3
0 - 200 mm	3	95	10	50	16	20	24.5	18.1	3
0 - 300 mm	3.8	135	15	64	20	22	27.5	19.8	3.8

# Calipers

## SERIES 573, 536 – Offset Centreline Caliper

- Specially designed for hole centre-to-centre measurements on the same, or offset, planes.
- Digimatic models feature Mitutoyo's ABSOLUTE system with IP67 ingress protection. No need to reset the origin after switching on.
- Direct reading of pitch measurements is available due to the offset-value setting function.
- Digimatic models enable integration into statistical process control and measurement systems.

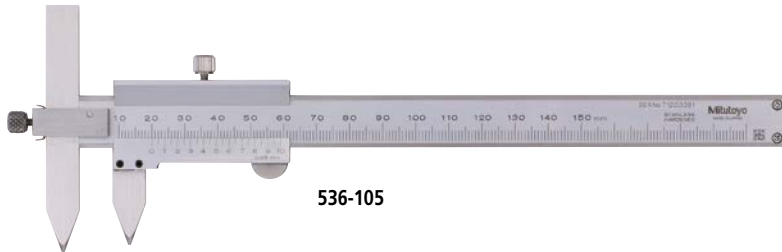
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IP67



573-705-20



536-105

### Specifications

#### Inch/Metric

Code No.	Range	Resolution	Accuracy* <sup>1</sup>	Price
ABSOLUTE Digimatic type				
573-705-20	10 - 160 mm (.4 - 6.4")	0.01 mm (.0005")	±0.03 mm (±.0015")	£367.00
573-706	10 - 210 mm (.4 - 8.4")			£468.00
573-708	10 - 310 mm (.4 - 12.4")		±0.04 mm (±.0015")	£577.00

#### Metric

Code No.	Range	Graduation	Accuracy	Price
Vernier type				
536-105	10 - 150 mm	0.05 mm	±0.05 mm	£290.00
536-106	10 - 200 mm			£332.00
536-107	10 - 300 mm		±0.08 mm	£375.00

\*<sup>1</sup> Excluding quantizing error.

### Dimensions

Unit: mm

Range	A	B	t	Applicable hole
10 - 160 mm	75	16	3.5	ø1.5 - ø9.5 mm
10 - 210 mm				
10 - 310 mm	100	20	3.8	

Range	A	B	t	Applicable hole
10 - 150 mm	75	16	3	ø1.5 - ø9.5 mm
10 - 200 mm				
10 - 300 mm	100	20	3.8	

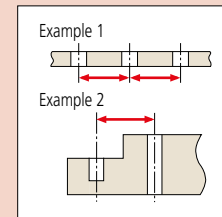
### Technical Data for 573 series

Dust/water protection level: IP67\*<sup>2</sup>  
 Scale type: ABSOLUTE electromagnetic induction linear encoder  
 Max. response speed: Unlimited  
 Battery: SR44 (1 pc.), 938882  
 Battery life: Approx. 5 years under normal use (1 year for models over 300 mm)

\*<sup>2</sup> Rustproofing treatment to be applied after use.

### Optional Accessories for 573 series

Code No.	Description	Price
264-620	U-WAVE-TC transmission unit	£193.00
02AZF310	U-WAVE-TC connection unit	£62.00
05CZA624	SPC data cable with pushbutton (1 m)	£69.40
05CZA625	SPC data cable with pushbutton (2 m)	£83.50
06AFM380A	USB input tool direct USB-ITN-C (2 m)	£126.00



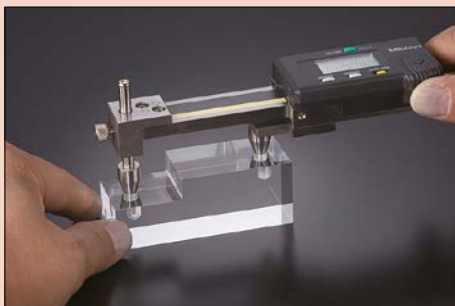
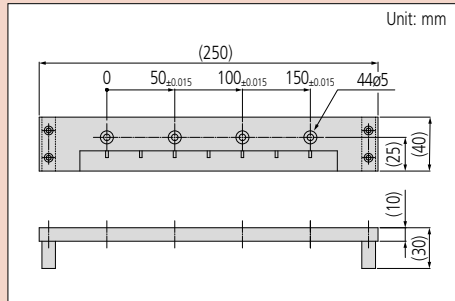
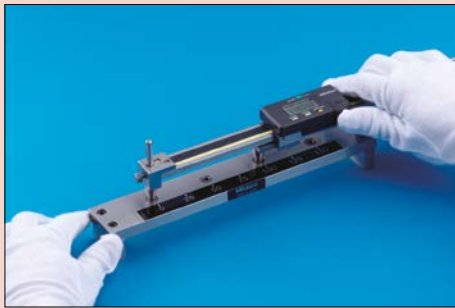
Application example.

## Technical Data

Scale type:	ABSOLUTE electrostatic linear encoder
Max. response speed:	Unlimited
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	Approx. 3.5 years under normal use

## Optional Accessories

Code No.	Description	Price
<b>959143</b>	Data hold unit	<b>£20.20</b>
<b>959149</b>	SPC data cable with pushbutton (1 m)	<b>£35.70</b>
<b>959150</b>	SPC data cable with pushbutton (2 m)	<b>£40.60</b>
<b>02AZD790C</b>	U-WAVE-T data cable with pushbutton (160 mm)	<b>£62.00</b>
<b>02AZE140C</b>	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	<b>£127.00</b>
<b>05FAJ735</b>	Centreline caliper inspection gauge	<b>£1110.00</b>
<b>06AFM380C</b>	USB Input Tool Direct USB-ITN-C (2 m)	<b>£109.00</b>

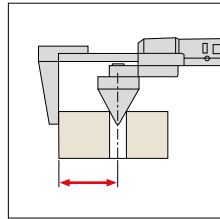


## SERIES 573 – ABSOLUTE Digimatic Back Jaw Centreline Caliper

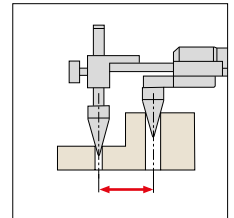
- Specially designed to measure hole centre-to-centre and edge-to-centre distances.
- Provided with jaws on the back of the slider, measurements can be read easily from above.
- Direct reading of pitch measurements is possible due to the offset-value setting function.
- Data output function allows integration into statistical process control and measurement systems.
- Dedicated calibration inspection tools are available.

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Application example.



Application example.

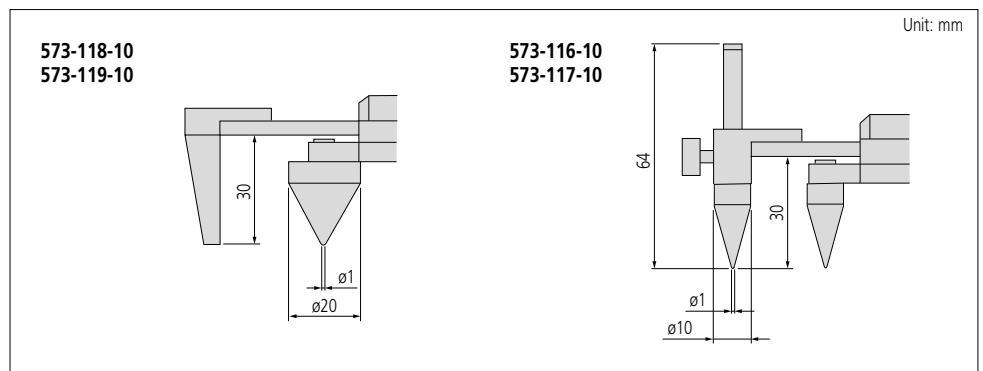
## Specifications

### Metric

Code No.	Range	Resolution	Accuracy*	Price
<b>Edge-to-centre type</b>				
<b>573-118-10</b>	10-200 mm	0.01 mm	±0.1 mm	<b>£940.00</b>
<b>573-119-10</b>	10-300 mm		±0.15 mm	<b>£995.00</b>
<b>Centre-to-centre type</b>				
<b>573-116-10</b>	10-200 mm	0.01 mm	±0.1 mm	<b>£990.00</b>
<b>573-117-10</b>	10-300 mm		±0.15 mm	<b>£1040.00</b>

\* Excluding quantizing error.

## Dimensions



# Calipers

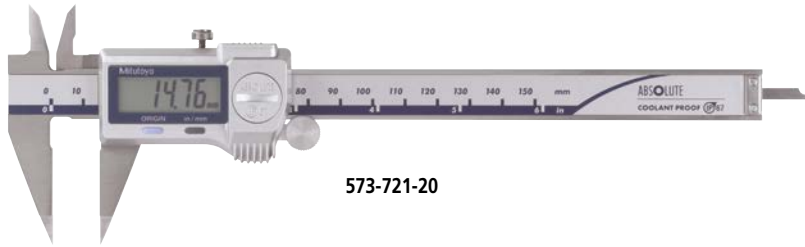
## SERIES 573, 536 – Point Caliper

- Narrow-tip jaws fit into very small grooves and tracks, making many previously difficult outside measurements far easier to obtain.
- Can measure outside and inside dimensions, depth, and steps.
- Digimatic models feature Mitutoyo's ABSOLUTE system with IP67 ingress protection. No need to reset the origin after switching on.
- Digimatic models enable integration into statistical process control and measurement systems.

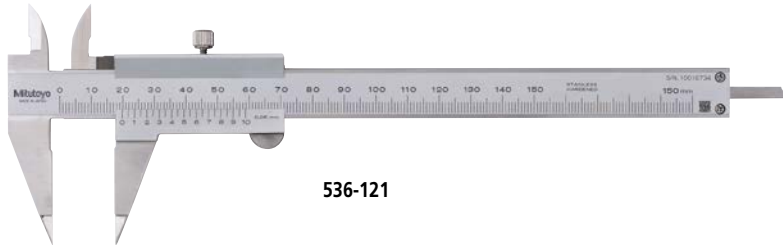
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**IP67**



573-721-20



536-121

### Specifications

#### Inch/Metric

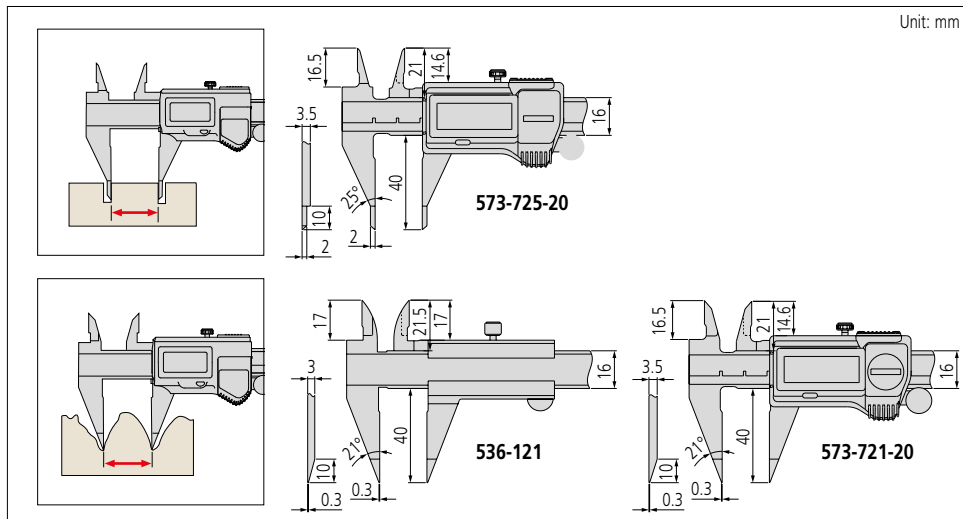
Code No.	Range	Resolution	Accuracy*1	Price
ABSOLUTE Digimatic type				
573-721-20	0 - 150 mm (0-6")	0.01 mm (.0005")	±0.02 mm (±.001")	£295.00
573-725-20				£370.00

#### Metric

Code No.	Range	Graduation	Accuracy	Price
Vernier type				
536-121	0 - 150 mm	0.05 mm	±0.05 mm	£163.00

\*1 Excluding quantizing error.

### Dimensions



### Technical Data for 573 series

Dust/water protection level: IP67\*2  
Scale type: ABSOLUTE electromagnetic induction linear encoder  
Max. response speed: Unlimited  
Battery: SR44 (1 pc.), **938882**  
Battery life: Approx. 5 years under normal use (1 year for models over 300 mm)

\*2 Rustproofing treatment to be applied after use.

### Optional Accessories for 573 series

Code No.	Description	Price
264-620	U-WAVE-TC transmission unit	£193.00
02AZF310	U-WAVE-TC connection unit	£62.00
05CZA624	SPC data cable with pushbutton (1 m)	£69.40
05CZA625	SPC data cable with pushbutton (2 m)	£83.50
06AFM380A	USB input tool direct USB-ITN-C (2 m)	£126.00





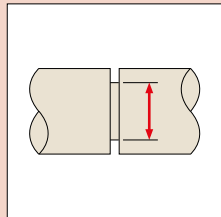
### Technical Data for 573 series

Dust/water protection level:	IP67*1
Scale type:	ABSOLUTE electromagnetic induction linear encoder
Max. response speed:	Unlimited
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	Approx. 5 years under normal use (1 year for models over 300 mm)

\*1 Rustproofing treatment to be applied after use.

### Optional Accessories for 573 series

Code No.	Description	Price
<b>264-620</b>	U-WAVE-TC transmission unit	<b>£193.00</b>
<b>02AZF310</b>	U-WAVE-TC connection unit	<b>£62.00</b>
<b>05CZA624</b>	SPC data cable with pushbutton (1 m)	<b>£69.40</b>
<b>05CZA625</b>	SPC data cable with pushbutton (2 m)	<b>£83.50</b>
<b>06AFM380A</b>	USB input tool direct USB-ITN-C (2 m)	<b>£126.00</b>



Application example.

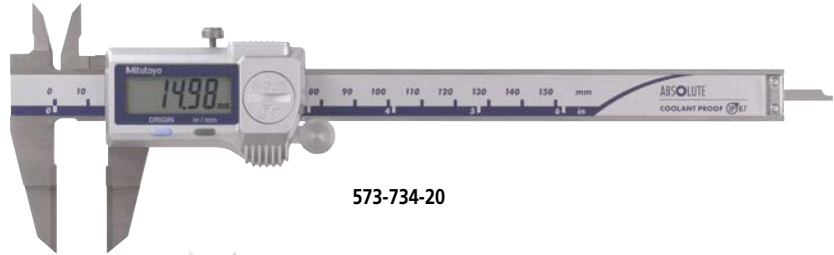
### SERIES 573, 536 – Blade Caliper

- The thin blade-type jaws fit into very small grooves and make previously difficult outside measurements far easier to obtain.
- The outside measuring faces are carbide tipped.
- Can measure outside and inside dimensions, depth, and steps.
- Digimatic models feature Mitutoyo's ABSOLUTE system with IP67 ingress protection. No need to reset the origin after switching on.
- Digimatic models enable integration into statistical process control and measurement systems.

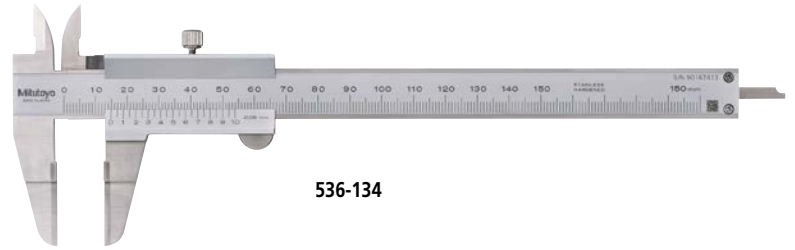
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Data Management Software by Mitutoyo

**ABSOLUTE**

**IP67**



573-734-20



536-134

### Specifications

#### Inch/Metric

Code No.	Range	Resolution	Accuracy*2	Price
<b>ABSOLUTE Digimatic type</b>				
<b>573-734-20</b>	0 - 150 mm (0 - 6")	0.01 mm (.0005")	±0.02 mm (±.001")	<b>£445.00</b>

#### Metric

Code No.	Range	Graduation	Accuracy	Price
<b>Vernier type</b>				
<b>536-134</b>	0 - 150 mm	0.05 mm	±0.05 mm	<b>£332.00</b>
<b>536-135</b>	0 - 200 mm			<b>£387.00</b>
<b>536-136</b>	0 - 300 mm		±0.08 mm	<b>£423.00</b>

\*2 Excluding quantizing error.

### Dimensions

**573-734-20**

Unit: mm

Range	A	B	C	D	E	F	G	t
0 - 150 mm	40	20	0.75	17	21.5	17	16	3
0 - 200 mm	50	25		20.5	25	20.5		
0 - 300 mm	64	30	1	22	27.5	22	20	3.8

# Calipers

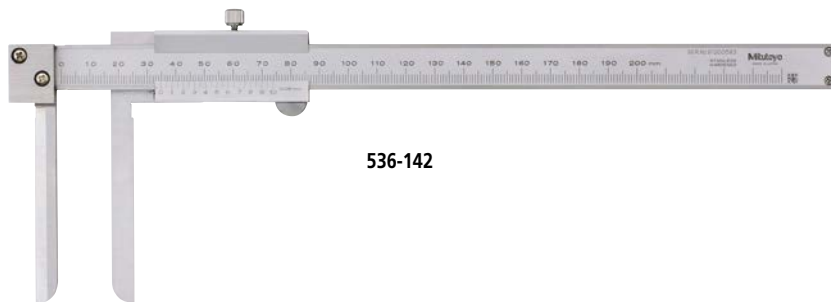
## SERIES 573, 536 – Knife Edge Inside Caliper

- Specially designed for inside measurements in hard-to-reach places.
- Digimatic models feature Mitutoyo's ABSOLUTE system with IP67 ingress protection. No need to reset the origin after switching on.
- Digimatic models enable integration into statistical process control and measurement systems.

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**IP67**



### Specifications

#### Inch/Metric

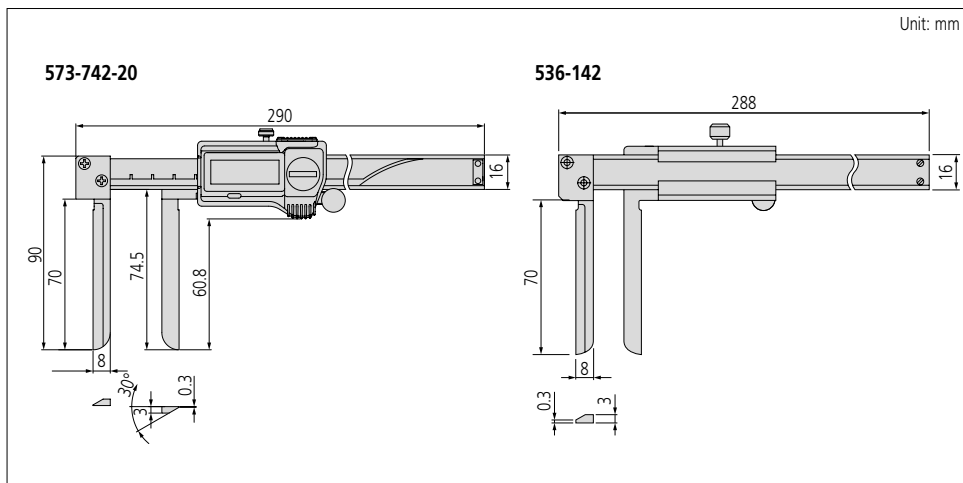
Code No.	Range	Resolution	Accuracy* <sup>1</sup>	Min. measurable hole	Price
<b>ABSOLUTE Digimatic type</b>					
<b>573-742-20</b>	10-200 mm (.4-8")	0.01 mm (.0005")	±0.05 mm (±.002")	ø10 mm (ø.4")	<b>£569.00</b>

#### Metric

Code No.	Range	Graduation	Accuracy	Min. measurable hole	Price
<b>Vernier type</b>					
<b>536-142</b>	10-200 mm	0.05 mm	±0.12 mm	ø10 mm	<b>£487.00</b>

\*1 Excluding quantizing error.

### Dimensions



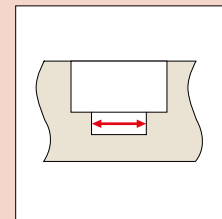
### Technical Data for 573 series

Dust/water protection level: IP67\*<sup>2</sup>  
Scale type: ABSOLUTE electromagnetic induction linear encoder  
Max. response speed: Unlimited  
Battery: SR44 (1 pc.), **938882**  
Battery life: Approx. 5 years under normal use (1 year for models over 300 mm)

\*<sup>2</sup> Rustproofing treatment to be applied after use.

### Optional Accessories for 573 series

Code No.	Description	Price
<b>264-620</b>	U-WAVE-TC transmission unit	<b>£193.00</b>
<b>02AZF310</b>	U-WAVE-TC connection unit	<b>£62.00</b>
<b>05CZA624</b>	SPC data cable with pushbutton (1 m)	<b>£69.40</b>
<b>05CZA625</b>	SPC data cable with pushbutton (2 m)	<b>£83.50</b>
<b>06AFM380A</b>	USB input tool direct USB-ITN-C (2 m)	<b>£126.00</b>



Application example.

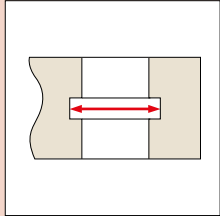
## Technical Data for 573 series

Dust/water protection level:	IP67*1
Scale type:	ABSOLUTE electromagnetic induction linear encoder
Max. response speed:	Unlimited
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	Approx. 5 years under normal use (1 year for models over 300 mm)

\*1 Rustproofing treatment to be applied after use.

## Optional Accessories for 573 series

Code No.	Description	Price
<b>264-620</b>	U-WAVE-TC transmission unit	<b>£193.00</b>
<b>02AZF310</b>	U-WAVE-TC connection unit	<b>£62.00</b>
<b>05CZA624</b>	SPC data cable with pushbutton (1 m)	<b>£69.40</b>
<b>05CZA625</b>	SPC data cable with pushbutton (2 m)	<b>£83.50</b>
<b>06AFM380A</b>	USB input tool direct USB-ITN-C (2 m)	<b>£126.00</b>



Application example.

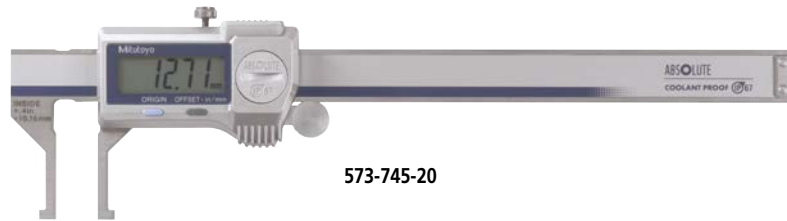
## SERIES 573, 536 – Inside Groove Caliper

- Specially designed for inside measurements in hard-to-reach places.
- Digimatic models feature Mitutoyo's ABSOLUTE system with IP67 ingress protection. No need to reset the origin after switching on.
- Digimatic models enable integration into statistical process control and measurement systems.

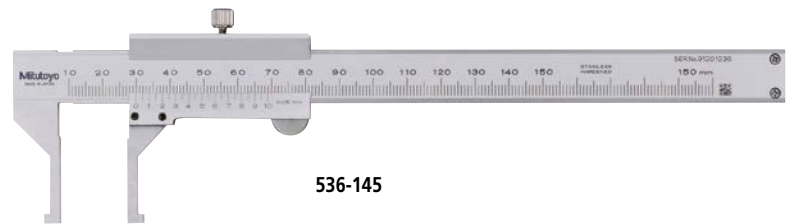
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**ABSOLUTE**

**IP67**



573-745-20



536-145

## Specifications

### Inch/Metric

Code No.	Range	Resolution	Accuracy*2	Min. measurable hole	Price
<b>ABSOLUTE Digimatic type</b>					
<b>573-745-20</b> *3	10 - 160 mm (.4 - 6")	0.01 mm (.0005")	±0.05 mm (±.002")	ø10 mm (ø.4")	<b>£445.00</b>

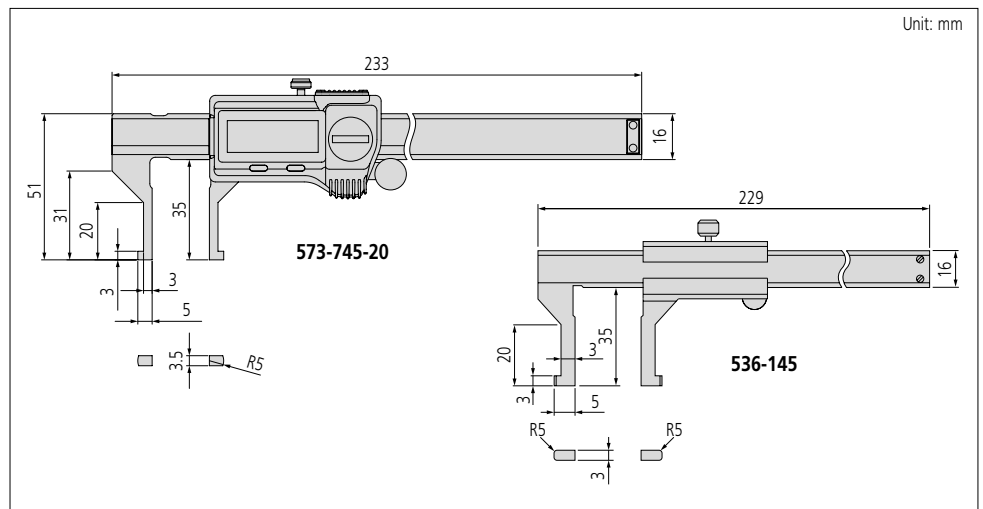
### Metric

Code No.	Range	Graduation	Accuracy	Min. measurable hole	Price
<b>Vernier type</b>					
<b>536-145</b>	10 - 150 mm	0.05 mm	±0.05 mm	ø10 mm	<b>£375.00</b>

\*2 Excluding quantizing error.

\*3 Equipped with the offsetting function, which indicates the actual measurement value.

## Dimensions



# Calipers

## SERIES 573, 536 – Point Jaw Inside Caliper

- Specially designed for inside measurements in hard-to-reach places.
- Digimatic models feature Mitutoyo's ABSOLUTE system with IP67 ingress protection. No need to reset the origin after switching on.
- Digimatic models enable integration into statistical process control and measurement systems.

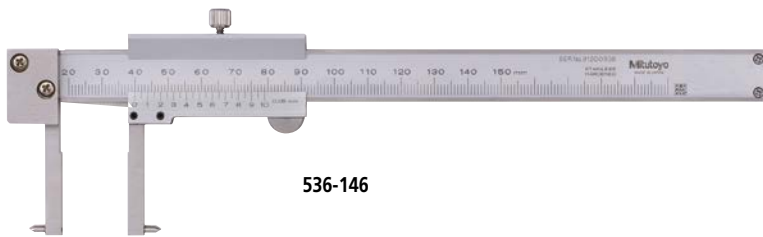
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**IP67**



573-746-20



536-146

### Specifications

#### Inch/Metric

Code No.	Range	Resolution	Accuracy* <sup>1</sup>	Min. measurable hole	Price
<b>ABSOLUTE Digimatic type</b>					
573-746-20* <sup>2</sup>	20 - 170 mm (.8 - 6")	0.01 mm (.0005")	±0.03 mm (±.0015")	ø20 mm (ø.8")	£560.00

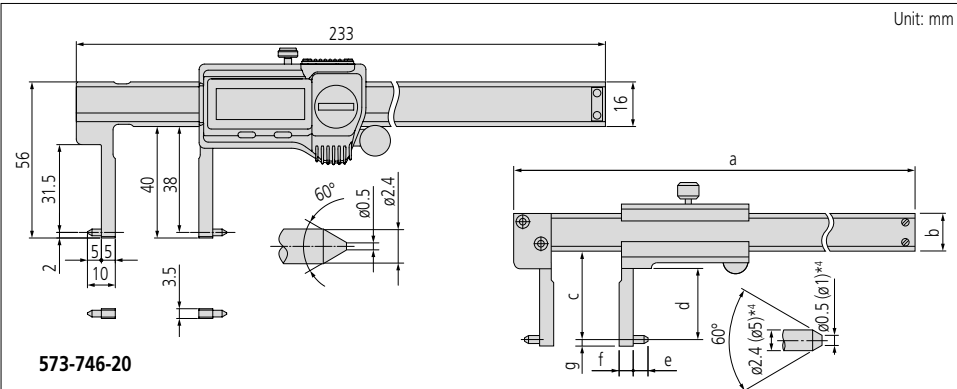
#### Metric

Code No.	Range	Graduation	Accuracy	Min. measurable hole	Price
<b>Vernier type</b>					
536-146	20 - 150 mm	0.05 mm	±0.05 mm	ø20 mm	£497.00
536-147	30 - 300 mm		±0.08 mm	ø30 mm	£650.00
536-148	70 - 450 mm		±0.10 mm	ø70 mm	£1260.00
536-149	70 - 600 mm		±0.12 mm		£1310.00

\*<sup>1</sup> Excluding quantizing error.

\*<sup>2</sup> Equipped with the offsetting function, which indicates the actual measurement value.

### Dimensions



573-746-20

\*<sup>4</sup> 450 and 600 mm range models

Range	a	b	c	d	e	f	g
20 - 150 mm	229	16	38	31	5	5	2
30 - 300 mm	403	20	98	89	10		
70 - 450 mm	610	25	145	136	10	25	5
70 - 600 mm	750						

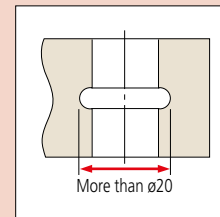
### Technical Data for 573 series

Dust/water protection level:	IP67* <sup>3</sup>
Scale type:	ABSOLUTE electromagnetic induction linear encoder
Max. response speed:	Unlimited
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	Approx. 3 years under normal use (1 year for models over 300 mm)

\*<sup>3</sup> Rustproofing treatment to be applied after use.

### Optional Accessories for 573 series

Code No.	Description	Price
264-620	U-WAVE-TC transmission unit	£193.00
02AZF310	U-WAVE-TC connection unit	£62.00
05CZA624	SPC data cable with pushbutton (1 m)	£69.40
05CZA625	SPC data cable with pushbutton (2 m)	£83.50
06AFM380A	USB input tool direct USB-ITN-C (2 m)	£126.00



Application example.

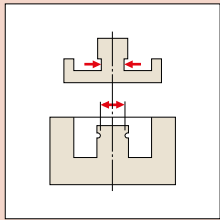
## Technical Data for 573 series

Dust/water protection level:	IP67*1
Scale type:	ABSOLUTE electromagnetic induction linear encoder
Max. response speed:	Unlimited
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	Approx. 3 years under normal use (1 year for models over 300 mm)

\*1 Rustproofing treatment to be applied after use.

## Optional Accessories for 573 series

Code No.	Description	Price
<b>264-620</b>	U-WAVE-TC transmission unit	<b>£193.00</b>
<b>02AZF310</b>	U-WAVE-TC connection unit	<b>£62.00</b>
<b>05CZA624</b>	SPC data cable with pushbutton (1 m)	<b>£69.40</b>
<b>05CZA625</b>	SPC data cable with pushbutton (2 m)	<b>£83.50</b>
<b>06AFM380A</b>	USB input tool direct USB-ITN-C (2 m)	<b>£126.00</b>



Application example.

## SERIES 573, 536 – Neck Jaw Caliper

- Can measure wall thickness inside bores and recesses.
- Digimatic models feature Mitutoyo's ABSOLUTE system with IP67 ingress protection. No need to reset the origin after switching on.
- Digimatic models enable integration into statistical process control and measurement systems.

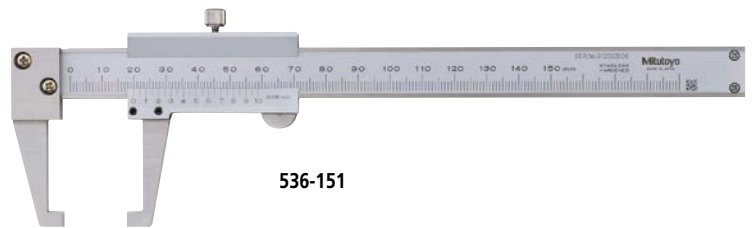
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**ABSOLUTE**

**IP67**



573-752-20



536-151

## Specifications

### Inch/Metric

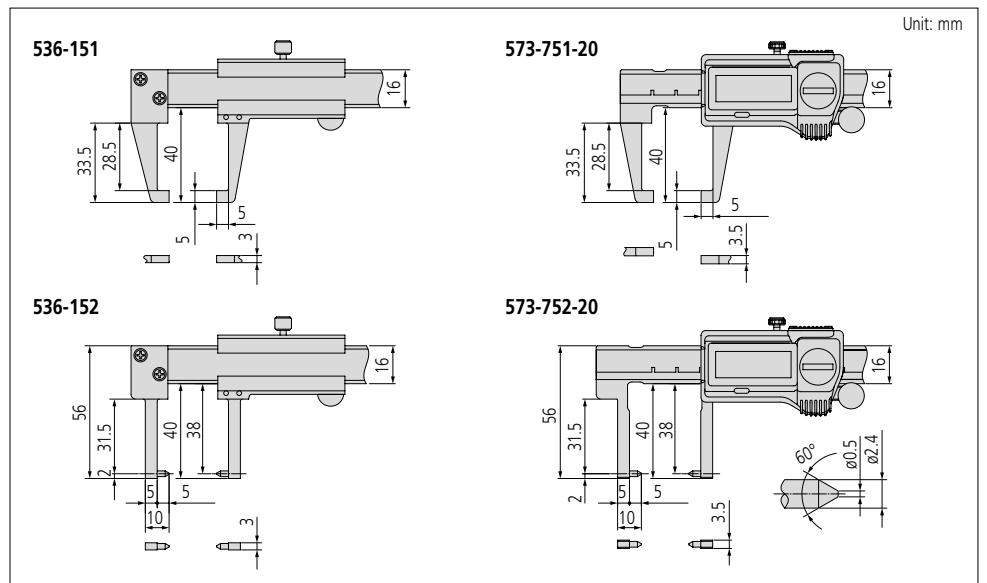
Code No.	Range	Resolution	Accuracy*2	Remarks	Price
ABSOLUTE Digimatic type					
<b>573-751-20</b>	0 - 150 mm (0 - 6")	0.01 mm (.0005")	±0.03 mm (±.0015")	—	<b>£448.00</b>
<b>573-752-20</b>				Point type	<b>£551.00</b>

### Metric

Code No.	Range	Graduation	Accuracy	Remarks	Price
Vernier type					
<b>536-151</b>	0 - 150 mm	0.05 mm	±0.05 mm	—	<b>£321.00</b>
<b>536-152</b>				Point type	<b>£385.00</b>

\*2 Excluding quantizing error.

## Dimensions



# Calipers

## SERIES 573, 536 – Tube Thickness Caliper

- The beam-mounted jaw is a round bar that facilitates measurements of tube wall thickness.
- Digimatic models feature Mitutoyo's ABSOLUTE system with IP67 ingress protection. No need to reset the origin after switching on.
- Digimatic models enable integration into statistical process control and measurement systems.

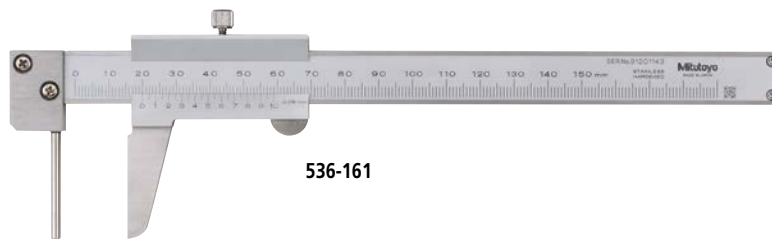
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**IP67**



573-761-20



536-161

### Specifications

#### Inch/Metric

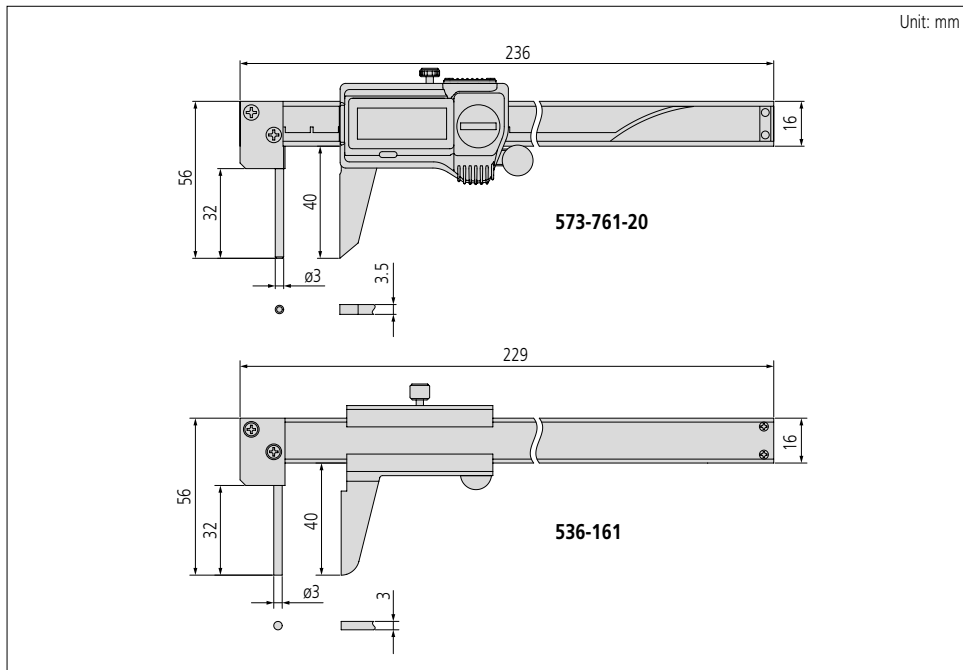
Code No.	Range	Resolution	Accuracy* <sup>1</sup>	Price
ABSOLUTE Digimatic type				
573-761-20	0 - 150 mm (0 - 6")	0.01 mm (.0005")	±0.05 mm (±.002")	£370.00

#### Metric

Code No.	Range	Graduation	Accuracy	Price
Vernier type				
536-161	0 - 150 mm	0.05 mm	±0.05 mm	£293.00

\*1 Excluding quantizing error.

### Dimensions



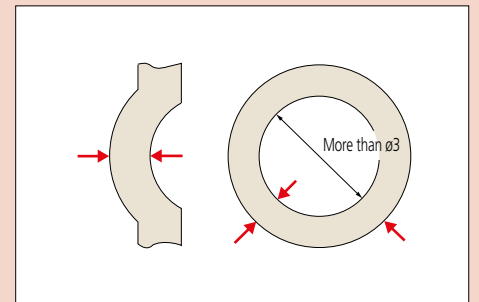
### Technical Data for 573 series

Dust/water protection level: IP67\*<sup>2</sup>  
Scale type: ABSOLUTE electromagnetic induction linear encoder  
Max. response speed: Unlimited  
Battery: SR44 (1 pc.), **938882**  
Battery life: Approx. 3 years under normal use (1 year for models over 300 mm)

\*<sup>2</sup> Rustproofing treatment to be applied after use.

### Optional Accessories for 573 series

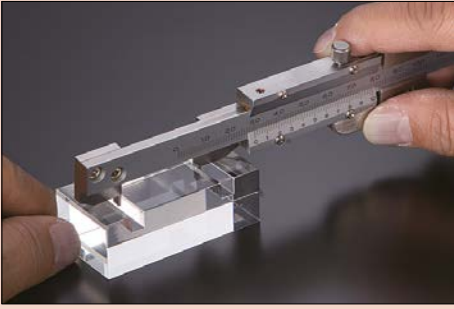
Code No.	Description	Price
264-620	U-WAVE-TC transmission unit	£193.00
02AZF310	U-WAVE-TC connection unit	£62.00
05CZA624	SPC data cable with pushbutton (1 m)	£69.40
05CZA625	SPC data cable with pushbutton (2 m)	£83.50
06AFM380A	USB input tool direct USB-ITN-C (2 m)	£126.00



Application example.

## SERIES 536 – Vernier Hook Jaw Caliper

- Can measure width of grooves and lands inside bores and recesses.



536-171



536-172  
Inside-groove type

### Specifications

Metric					
Code No.	Range	Graduation	Accuracy	Remarks	Price
536-171	0(10)-200 mm	0.02 mm	±0.03 mm	—	£454.00
536-172	0(20)-200 mm			With fine adjustment	£469.00

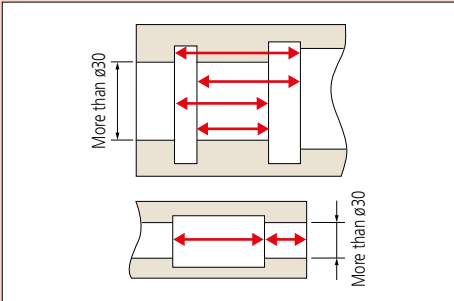
\* ( ) : Minimum dimension in inside measurement.

### Dimensions

Unit: mm

R5: 536-171  
Flat: 536-172

Code No.	L	a	b	c	d	e	f	g
536-171	320	28	—	—	12	4	5	3.5
536-172			28.5	20			1	

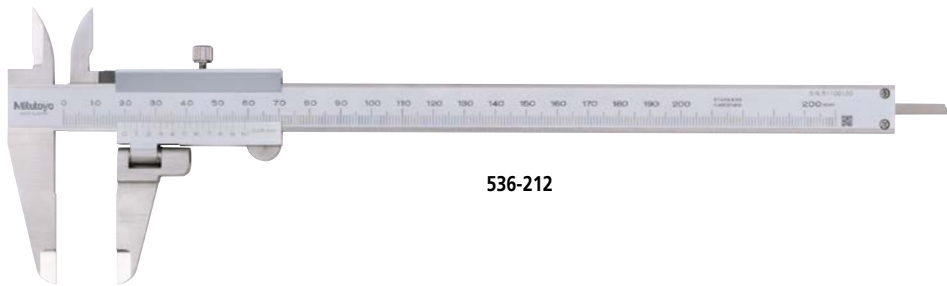


Application example.

# Calipers

## SERIES 536 – Vernier Moving Jaw Caliper

- The moving jaw can be rotated to measure sectioned shafts.
- Can measure outside and inside dimensions, depth, and steps.



536-212



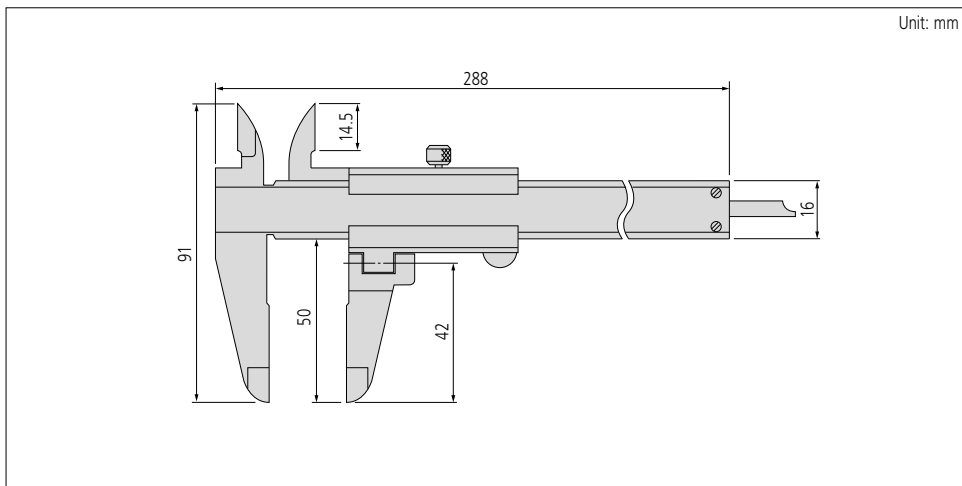
Measuring the distance from a shoulder to the end of a shaft.

### Specifications

Metric

Code No.	Range	Graduation	Accuracy	Price
536-212	0-200 mm	0.05 mm	±0.05 mm	£407.00

### Dimensions





## Technical Data

Scale type:	ABSOLUTE electrostatic linear encoder
Jaw retraction:	0.3 mm
Max. response speed:	Unlimited
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	Approx. 3.5 years under normal use

## Optional Accessories

Code No.	Description	Price
<b>264-621</b>	U-WAVE-TC transmission unit	<b>£193.00</b>
<b>959143</b>	Data hold unit	<b>£20.20</b>
<b>959149</b>	SPC data cable with pushbutton (1 m)	<b>£35.70</b>
<b>959150</b>	SPC data cable with pushbutton (2 m)	<b>£40.60</b>
<b>02AZF300</b>	U-WAVE-TC connection unit	<b>£62.00</b>
<b>06AFM380C</b>	USB input tool direct USB-ITN-C (2 m)	<b>£109.00</b>

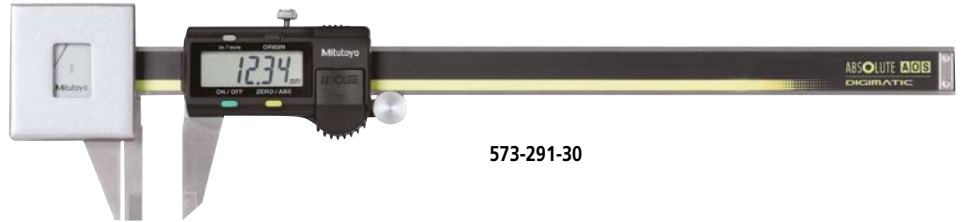


**Measurement procedure**  
A consistently low measuring force can be guaranteed by only taking measurements when the pointer is between the two fiducial lines.

## SERIES 573 – ABSOLUTE Digimatic Low Force Caliper

- Due to the low measuring force, this caliper is ideal for measuring elastic workpieces such as plastic parts and rubber parts that standard calipers cannot measure accurately.
- The thumb roller allows smooth and easy fine adjustment.
- Movement of main scale jaw is 0.3 mm.
- Measuring force: 0.49 to 0.98 N (50 to 100 gf).
- Features Mitutoyo's ABSOLUTE system. No need to reset the origin after switching on.
- Slider operation is smooth and comfortable.
- Data output function allows integration into statistical process control and measurement systems.

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573-291-30

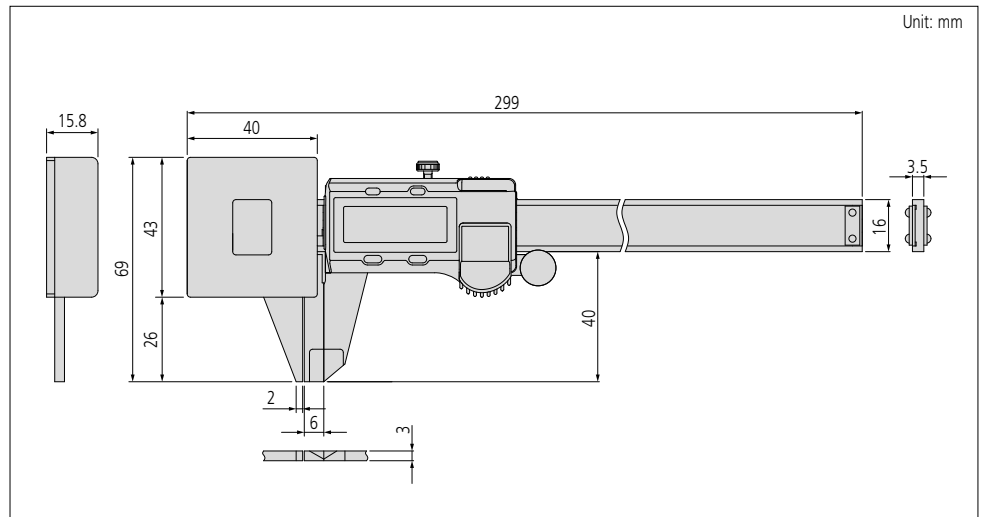
## Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy*	Price
<b>573-291-30</b>	0 - 180 mm (0 - 7")	0.01 mm (.0005")	±0.05 mm (±.002")	<b>£837.00</b>

\* Excluding quantizing error.

## Dimensions



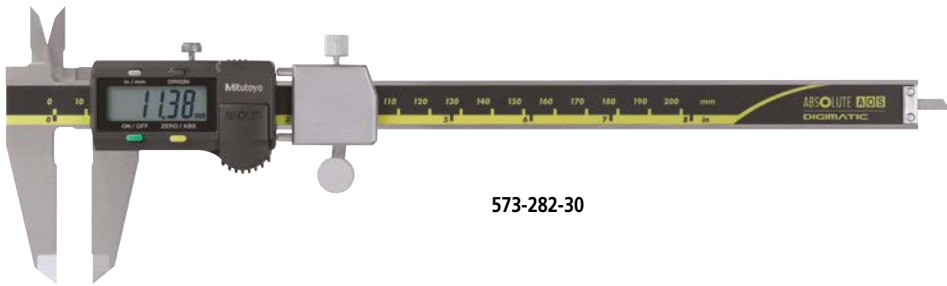
Unit: mm

# Calipers

## SERIES 573 – ABSOLUTE Digimatic Snap Caliper

- Features a 'snap action' movement control of the slider via a spring-loaded mechanism attached to a movable clamp on the beam.
- Enables quick and efficient repetitive GO/NO-GO inspection of a specific dimension on mass produced parts by just moving a lever.
- Can measure outside and inside dimensions, depth, and steps.
- Measuring force: 7 - 14 N (700 - 1400 gf).
- The slider can be retracted by up to 2 mm from the measuring position.
- Features Mitutoyo's ABSOLUTE system. No need to reset the origin after switching on.
- Slider operation is smooth and comfortable.
- Data output function allows integration into statistical process control and measurement systems.

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573-282-30

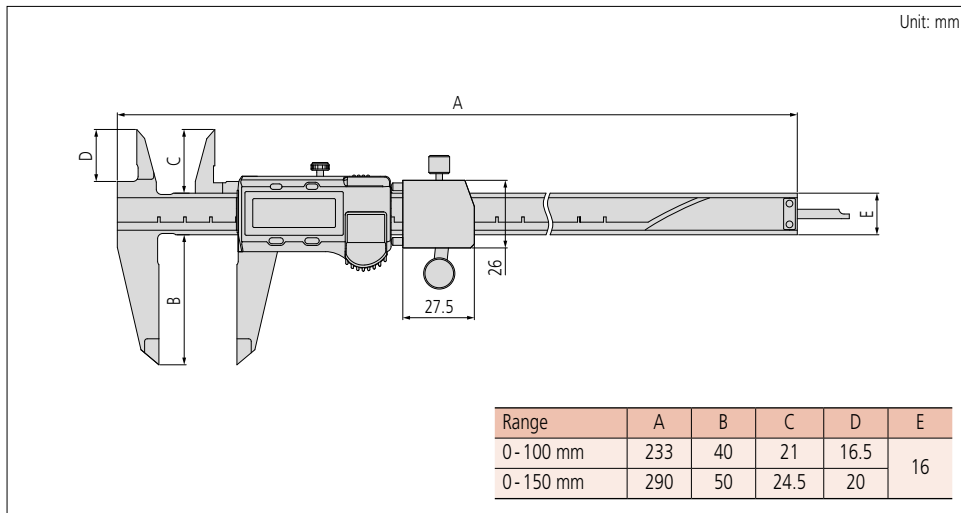
### Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy*	Price
573-281-30	0 - 100 mm (0 - 4")	0.01 mm (.0005")	±0.02 mm (±.001")	£345.00
573-282-30	0 - 150 mm (0 - 6")			£385.00

\* Excluding quantizing error.

### Dimensions

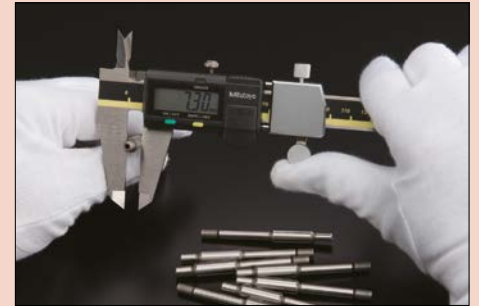


### Technical Data

Repeatability:	0.01 mm
Scale type:	ABSOLUTE electrostatic linear encoder
Jaw retraction:	2 mm
Max. response speed:	Unlimited
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	Approx. 3.5 years under normal use

### Optional Accessories

Code No.	Description	Price
959143	Data hold unit	£20.20
959149	SPC data cable with pushbutton (1 m)	£35.70
959150	SPC data cable with pushbutton (2 m)	£40.60
02AZD790C	U-WAVE-T data cable with pushbutton (160 mm)	£62.00
02AZE140C	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	£127.00
06AFM380C	USB input tool direct USB-ITN-C (2 m)	£109.00



Spring-loaded action enables rapid repetitive measurement.

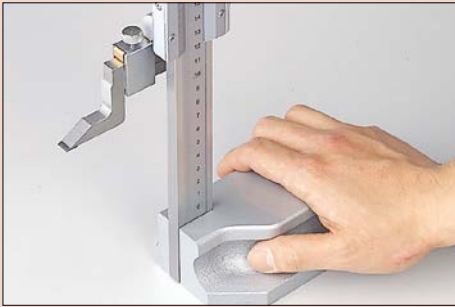
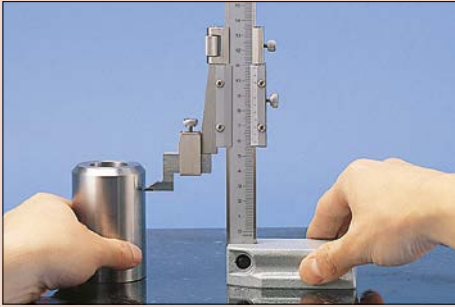
# Height Gauges

## SERIES 506, 514 – Vernier Adjustable Scale Height Gauge

- Fits comfortably in the hand and moves easily on the surface plate.
- The main scale slides and clamps within the column for quick and convenient zero-setting.
- Large locking screws are used both for the slider and fine adjustment clamps to make clamping easy and secure.
- Operability of slider has been improved.
- Large mainscale engraving for fatigue-free working.
- Carbide-tipped scriber (900173 for 506-208, 07GZA000 for 514-103/5/7, 905200 for 514-109) is provided as a standard accessory. (Scriber clamp 07GZA004 for 506-208, 05GZA033 for 514-103/5/7/9.)

### Technical Data

Graduation: 0.02 mm (.001")



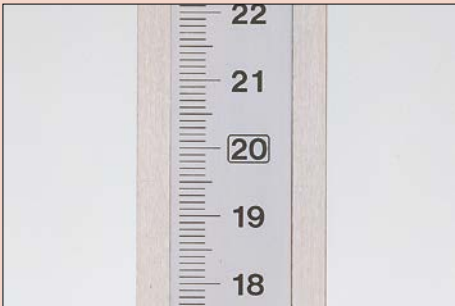
Base fits the hand comfortably.



Fine-adjustment knob.



Locking screws.



Large main-scale engraving.



### Specifications

#### Inch/Metric

Code No.	Range	Accuracy	Scale adjustment	Fine feed	Height	Mass	Price
506-208	0-200 mm (0-8")	±0.03 mm (±.001")	—		341 mm	1.4 kg	£291.00
514-103	0-300 mm (0-12")	±0.04 mm (±.002")	15 mm (.6")	4 mm (.16")	525 mm	3.1 kg	£366.00
514-105	0-450 mm (0-18")	±0.05 mm (±.002")			675 mm	3.4 kg	£701.00
514-107	0-600 mm (0-24")		25 mm (1")	7 mm (.27")	870 mm	7.4 kg	£917.00
514-109	0-1000 mm (0-40")	±0.07 mm (±.004")			6 mm (.24")	1340 mm	20 kg

### Dimensions

Unit: mm

Range	L	a	b	c	d	e
0-200 mm	341	25	20	57	20	35
0-300 mm	525	32		70	28	45
0-450 mm	675		24	85	35	54
0-600 mm	870	42	30	110	45	65
0-1000 mm	1340					

# Height Gauges

## SERIES 570 – ABSOLUTE Digimatic Ergonomic Height Gauge

- Allows smooth elevation by the slider adjustment wheel, which is the same type used on the well-established double-column height gauge.
- Large slider-clamp lever ensures positive and accurate clamping action.
- Character height of the LCD display is 10 mm.
- Due to the built-in ABSOLUTE scale function, origin setting is not required each time power is turned ON.
- Ergonomic and stylish base fits comfortably in the hand.
- Allows integration into statistical process control and measurement systems.
- High durability and high accuracy are ensured by an improved column design (35 x 15 mm).

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**ABSOLUTE**

570-312



Slider height adjustment wheel.



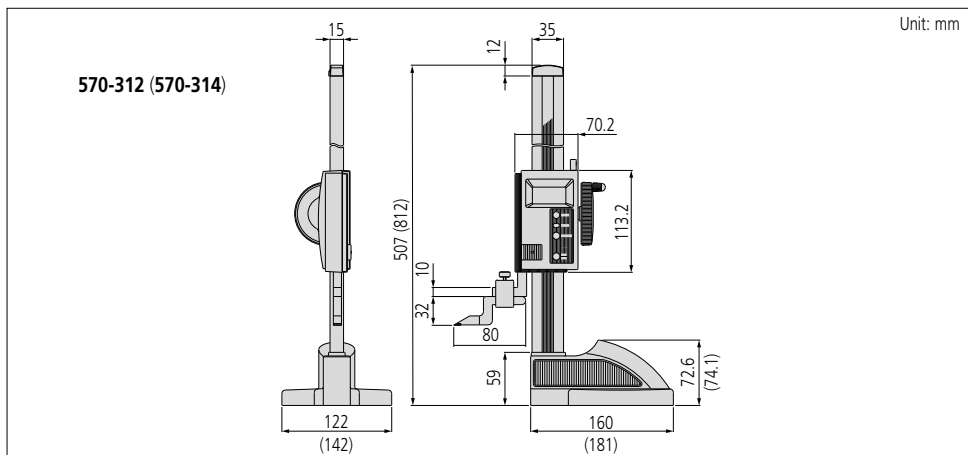
Large clamp lever.

### Specifications

Inch/Metric						
Code No.	Range	Accuracy*	Resolution	Height	Mass	Price
570-312	0 - 300 mm (0 - 12")	±0.03 mm (±.0015")	0.01 mm (.0005")	507 mm	4.6 kg	£497.00
570-313	0 - 450 mm (0 - 18")	±0.05 mm (±.002")		662 mm	5.9 kg	£690.00
570-314	0 - 600 mm (0 - 24")			812 mm	6.4 kg	£835.00

\* Excluding quantizing error.

### Dimensions



### Technical Data

Repeatability: 0.01 mm  
Max. response speed: Unlimited  
Battery: SR44 (1 pc.), **938882**  
Battery life: 20,000 hours under normal use

### Functions

#### Origin-setting:

Any convenient reference surface, such as a surface plate, etc., can be stored as the absolute origin point.

#### ABSOLUTE system measurement:

After power is turned ON, measurement can be started without zero-setting if origin-setting was previously performed. The ABS (absolute) origin position can be changed by the ORIGIN button.

#### Incremental measurement:

Allows origin setting at any arbitrary position. In this case, the origin point is not stored after turning off the power.

#### Data hold:

Display value can be held.

#### Data output:

Allows integration into statistical process control and measurement systems.

#### Low-voltage alert:

If the battery voltage becomes low, a "B" appears in the display to alert the user before measurement is no longer possible so that the battery can be changed in good time.

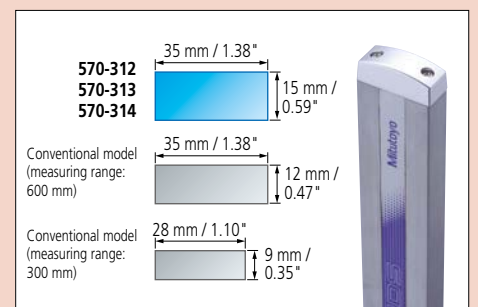
### Standard Accessories

- 900258: Scriber
- 900322: Clamp (with dovetail groove)
- 901385: Scriber clamp
- 953639: Holding bar C (test indicator mount)



### Optional Accessories

Code No.	Description	Price
905338	SPC data cable (1 m)	£33.90
905409	SPC data cable (2 m)	£38.00
02AZD790F	U-WAVE-T data cable (160 mm)	£62.00
02AZE140F	U-WAVE-T data cable with footswitch (160/500 mm)	£127.00
06AFM380F	USB input tool direct USB-ITN-C (2 m)	£109.00



Dimensions of column cross section.

## Technical Data

Repeatability:	0.01 mm
Fine feed:	6 mm (.24")
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	20,000 hours under normal use

## Functions

Zero-setting  
 +/- directional measurement  
 Data hold  
 Data output  
 Presetting  
 inch/mm reading (inch/mm models)  
 Preset value memory  
 Origin restoration  
 Low battery voltage alert  
 Counting value composition error alert

## Optional Accessories

Code No.	Description	Price
<b>905338</b>	SPC data cable (1 m)	<b>£33.90</b>
<b>905409</b>	SPC data cable (2 m)	<b>£38.00</b>
<b>02AZD790F</b>	U-WAVE-T data cable (160 mm)	<b>£62.00</b>
<b>02AZE140F</b>	U-WAVE-T data cable with footswitch (160/500 mm)	<b>£127.00</b>
<b>06AFM380F</b>	USB input tool direct USB-ITN-C (2 m)	<b>£109.00</b>

## SERIES 570 – ABSOLUTE Digimatic Height Gauge

- ABS and INC measurement modes allow efficient operation.
- Rigid structure makes instrument suitable for use in severe work environments.
- The +/- measurement function widens the application range.
- Allows integration into statistical process control and measurement systems.
- Carbide-tipped scriber (05GZA033) is provided as a standard accessory.

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**ABSOLUTE**



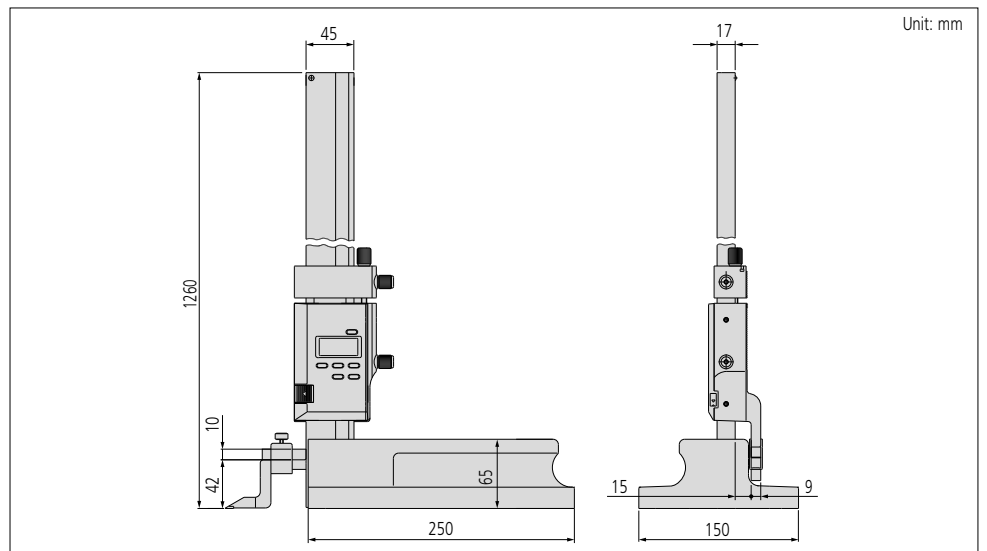
## Specifications

Inch/Metric

Code No.	Range	Accuracy*	Resolution	Height	Mass	Price
<b>570-248</b>	0 - 1000 mm (0 - 40")	±0.07 mm (±.003")	0.01 mm (.0005")	1260 mm	16.8 kg	<b>£2350.00</b>

\* Excluding quantizing error.

## Dimensions

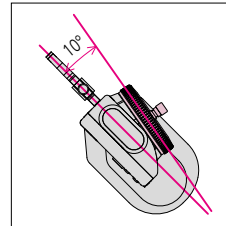


# Height Gauges

## SERIES 192 – Digimatic Double Column Height Gauge

- Double-column structure ensures high measuring accuracy.
- Available in Standard and Multifunctional types.
- Ergonomic base fits comfortably in the hand.
- Bidirectional touch-trigger probe is available as an optional accessory.
- Character height of the display has been increased (10 to 11 mm) and the high-contrast LCD display provides improved readability.
- Inclined handle improves slider ergonomics.
- Allows integration into statistical process control and measurement systems.
- Carbide-tipped long scribe is provided as a standard accessory.

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Offset height adjustment wheel improves ergonomics.



- ① Height adjustment wheel
- ② Power ON/OFF button
- ③ Zero set/ABS button
- ④ Preset/probe-tip-diameter compensation mode button
- ⑤ Hold/data button
- ⑥ Inch/metric button
- ⑦ Button used when presetting measuring direction (and compensating for probe-tip diameter on Multifunctional type)

### Specifications

Inch/Metric

Order No.	Range	Accuracy*1	Resolution (switchable)	Height	Mass	Price
<b>Standard type</b>						
192-630-10	0-300 mm (0-12")	±0.02 mm (±.001")	0.01/0.005 mm (.0005/.0002")	475 mm	4.7 kg	£835.00
192-631-10	0-450 mm (0-18")	±0.05 mm (±.002")		649 mm	7.5 kg	£1170.00
192-632-10	0-600 mm (0-24")			802 mm	8.3 kg	£1220.00
192-633-10	0-1000 mm (0-40")			±0.07 mm (±.003")	1228 mm	15.7 kg
<b>Multifunctional type</b>						
192-670-10	0-300 mm (0-12")	±0.02 mm (±.001")	0.01/0.005 mm (.0005/.0002")	510 mm	5.7 kg	£1130.00
192-671-10	0-450 mm (0-18")	±0.04 mm (±.0015")		649 mm	7.5 kg	£1300.00
192-672-10	0-600 mm (0-24")			802 mm	8.3 kg	£1510.00
192-673-10	0-1000 mm (0-40")			±0.06 mm (±.0025")	1228 mm	15.7 kg

\*1 Excluding quantizing error.

### Technical Data

Repeatability: 0.01 mm  
Max. response speed: 500 mm/s  
Battery: SR44 (1 pc.), 938882  
Battery life: Approx. 3500 hours in continuous use

### Functions

#### Origin-setting (ABS measurement mode):

Any arbitrary value can be stored as the origin point.

#### Zero-setting (INC measurement mode):

Displayed value can be set to zero at any arbitrary position of the slider.

#### Origin restoration:

Previously set origin is restored when switching back to ABS mode.

#### Presetting (ABS INC measurement mode):

Displayed value can be set to any arbitrary value, including negative values.

#### Measuring direction:

Measuring direction can be switched at the press of a button.

#### Data hold:

Display value can be held. Reverts to ABS or INC mode when cancelled.

#### Alarm:

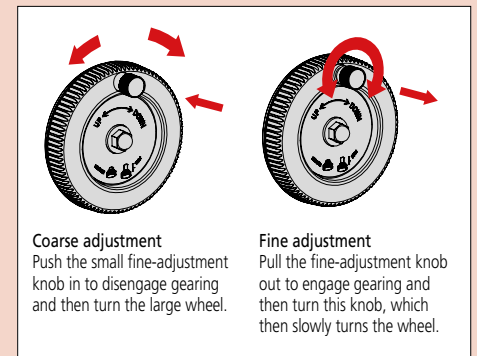
Error message is displayed when overflow or overspeed of displayed value arises and measurement is stopped.

#### Data output:

Allows integration into statistical process control and measurement systems.

#### Fine and coarse height adjustment:

Through knob and wheel combination. Slider height adjustment wheel allows fine and coarse height adjustment.



#### Low-voltage alert:

When battery voltage becomes low, a warning appears in the display.

#### Probe-tip diameter compensation\*2:

An adjustment is applied to the raw measurement data to compensate for the effect of the size of the spherical contact point used by the bidirectional touch-trigger probe.

\*2 Multifunctional type only.

### Standard Accessories

900258: Scribe (for Standard type)  
905201: Scribe (for Multifunctional type)  
901385: Scribe clamp

## Optional Accessories

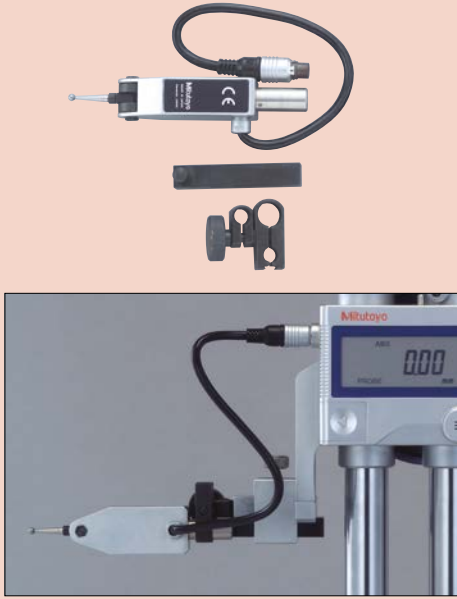
Code No.	Description	Price
905338	SPC data cable (1 m)	£33.90
905409	SPC data cable (2 m)	£38.00
02AZD790F	U-WAVE-T data cable (160 mm)	£62.00
02AZE140F	U-WAVE-T data cable with footswitch (160/500 mm)	£127.00
06AFM380F	USB input tool direct USB-ITN-C (2 m)	£109.00
For Multifunctional type only		
192-008	Bidirectional touch-trigger probe*	£449.00

\* See below for details.

## Bidirectional Touch-Trigger Probe

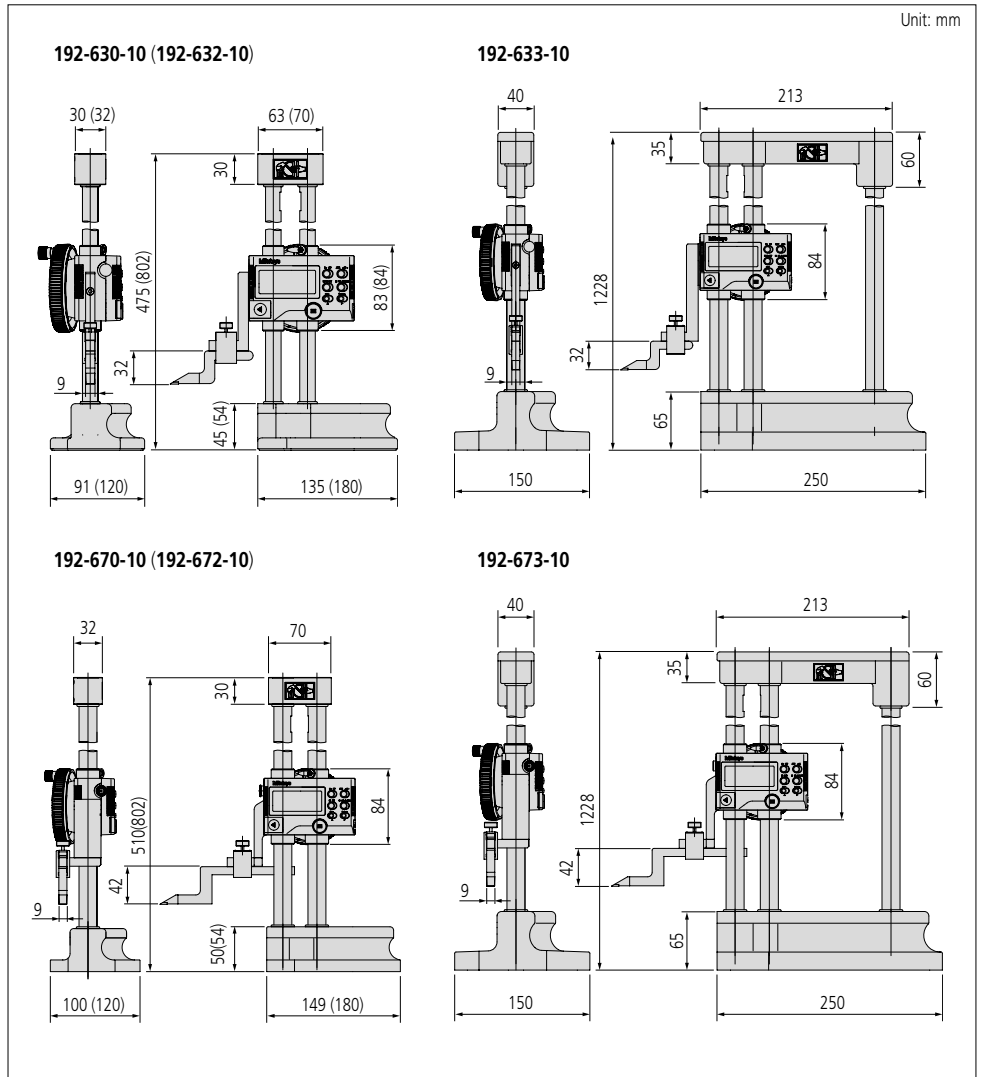
(optional accessory for Multifunctional type only)

Improves accuracy in step, internal thickness, and outside width measurement by minimizing reproducibility error.

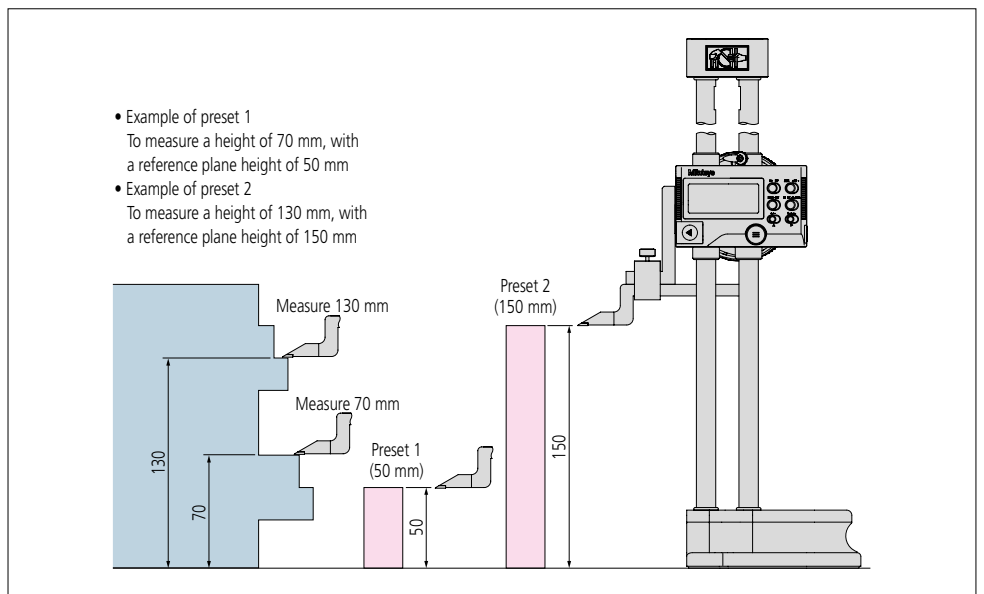


Code No.	192-008
Measuring direction	Bidirectional
Relay contact type	Normally open
Probe overtravel	1.5 mm
Probe tip size	ø3 mm
Repeatability	σ: 2 μm
Measuring force	0.4 N
Standard accessories	Holder arm, clamp

## Dimensions



## Presetting (2 positions)



With two preset functions, two reference heights created by gauge blocks can be used to make repetitive measurements with high accuracy relative to a datum plane (surface plate). This is an example of gaining accuracy from an instrument by taking advantage of its narrow range accuracy.

# Optional Accessories

## SERIES 515 – CERA Caliper Checker

- Enables efficient setting and inspection of calipers and height gauges.



515-555

### Specifications

#### Metric

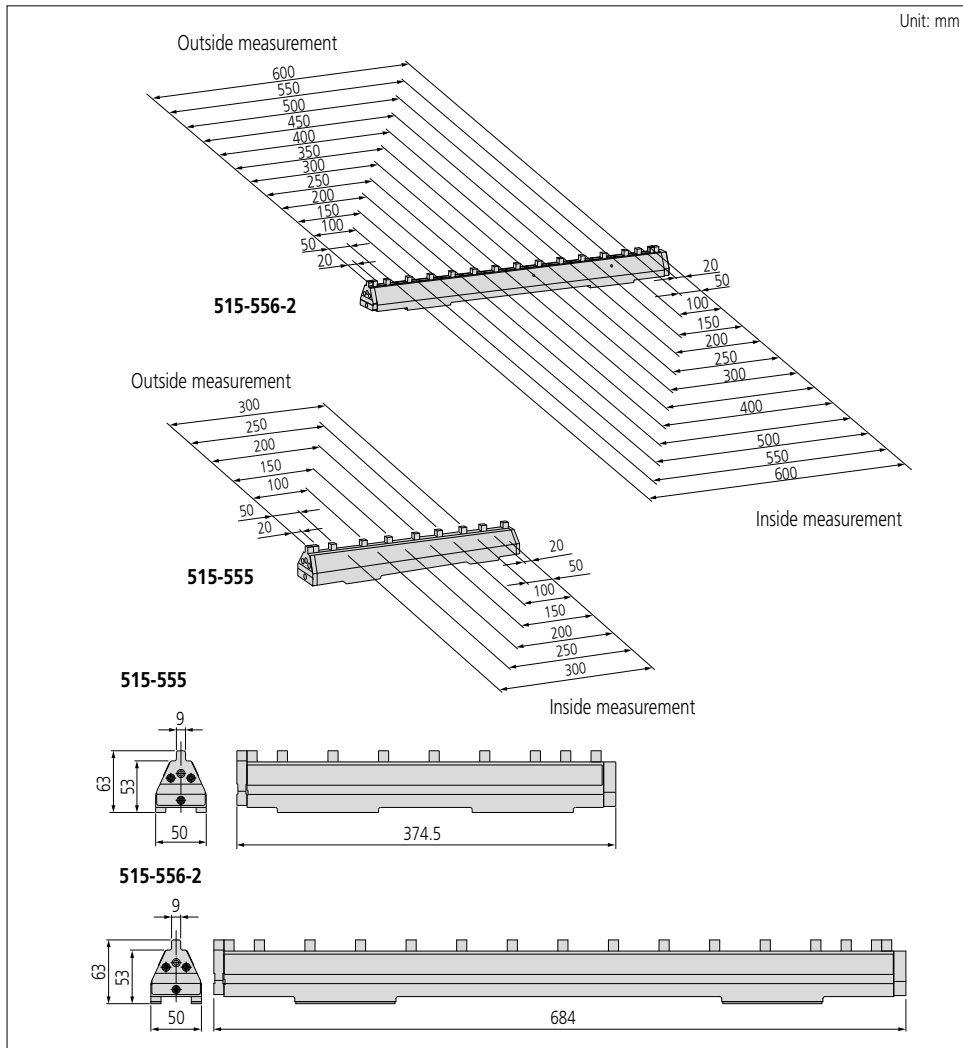
Code No.	Range	Block pitch accuracy*		Parallelism of blocks*		Mass	Price
		20-300 mm	350-600 mm	20-300 mm	350-600 mm		
515-555	0-300 mm	±5.0 µm	—	2.0 µm	—	4 kg	£2320.00
515-556-2	0-600 mm		±7.0 µm		4.0 µm		

#### Inch

Code No.	Range	Block pitch accuracy* 1-12"	Parallelism of blocks* 1-12"	Mass	Price
515-565	0-12"	±.0002"	.00008"	4 kg	£2320.00

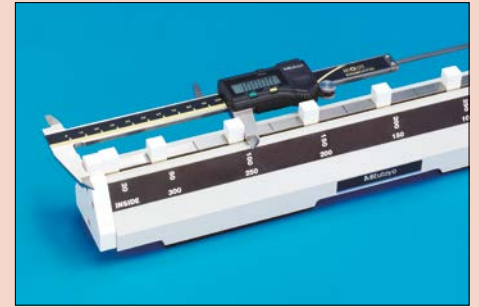
\* The block accuracy and parallelism are based on the following:  
 Outside caliper and height gauge: lower end reference plane  
 Inside caliper: inside reference plane

### Dimensions

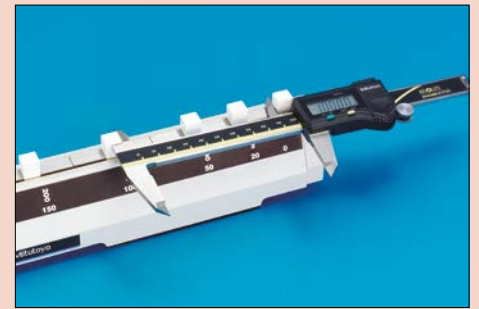


### Optional Accessories

Code No.	Description	Price
602162	Wooden case for 300 mm / 12" model	£244.00
602164	Wooden case for 600 mm model	£274.00



Checking the accuracy of a caliper (outside measurement).



Checking the accuracy of a caliper (inside measurement).



Setting a height gauge.



## Contact Sensor

The contact sensor eliminates errors caused by non-contact of the scriber with a workpiece while making measurements. When the scriber of a height gauge touches a conductive workpiece, an indicator lights up to indicate that a measurement can be taken, which results in consistent results.

- Magnet is incorporated.
- Battery (PR44, 2 pcs required) is not included.

Code No.	Description	Price
900872	Contact sensor	£77.00



## Centre Probe

Allows quick measurement of Centre-to-Centre distance between holes.

- Measurable hole diameters: 1 - 38 mm / .04 - 1.5".
- Mounting position dimension: 99 mm.

Code No.	Description	Price
951144	Metric centre probe	£115.00
900581	Inch centre probe	£115.00



## Depth Gauge Attachment

Attaches to a height gauge for measuring groove and hole depth.

- Minimum hole diameter: 5.5 mm / .22".
- Maximum distance from the bottom of the holding bar to the contact point: 80 mm (metric type), 2.95" (inch type).
- Dial indicator contact points are usable.
- Mounting position dimension: 99 mm.
- Holding bar length: 100 mm.

Code No.	Description	Price
900764	Metric depth gauge attachment	£31.50
900878	Inch depth gauge attachment	£31.50



## For Height Gauges

### Scriber



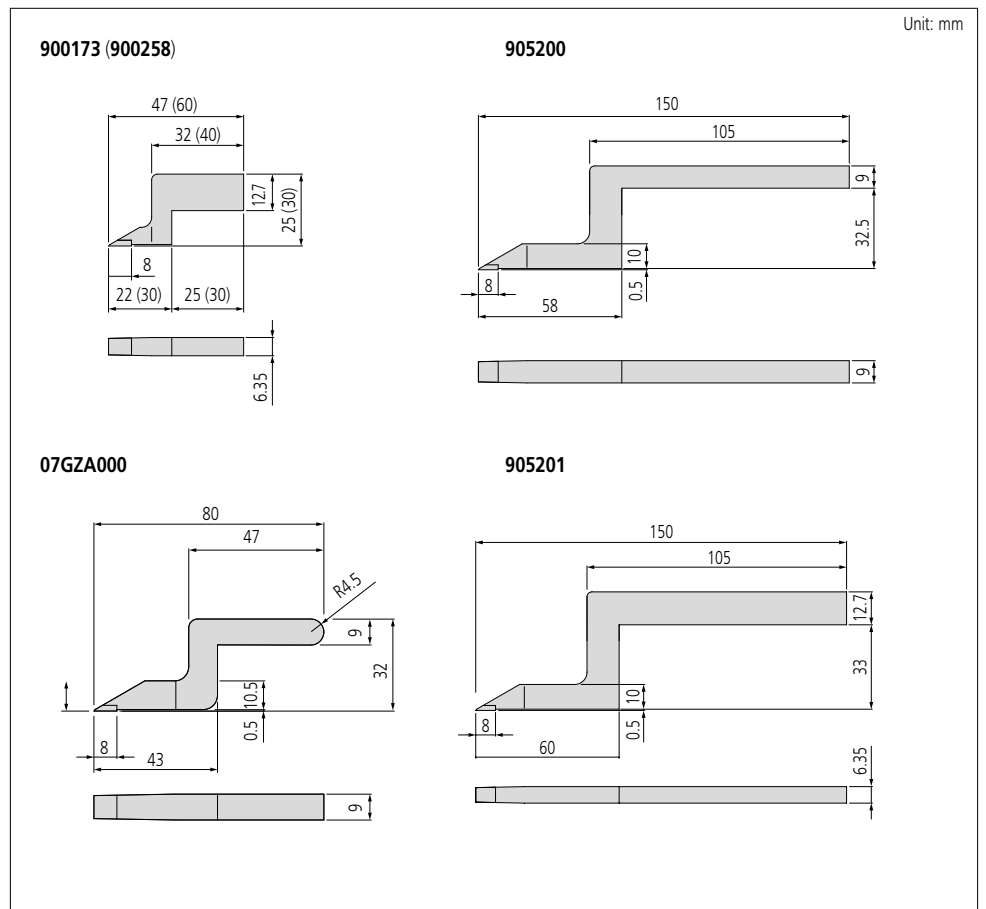
#### Metric

Code No.	Applicable Height Gauges	Price
07GZA000	192 Series Dial Height Gauges (192-130, 192-131, 192-132, 192-133) 514 Series Vernier Height Gauges (514-103, 514-105, 514-107)	£41.50
905200	514 Series Vernier Height Gauges (514-109)	£96.30

#### Inch

Code No.	Applicable Height Gauges	Price
900173	570 Series Digimatic Height Gauges (570-227, 570-244) 506 Series Vernier Height Gauges (506-208)	£44.50
900258	192 Series Digimatic Height Gauges (192-630-10, 192-631-10, 192-632-10, 192-633-10) 570 Series Digimatic Height Gauges (570-312, 570-313, 570-314) 192 Series Dial Height Gauges (192-150, 192-151, 192-152, 192-153) 574 Series Heightmatic (574-212-1, 574-211-1, 574-210-1)	£44.50
905201	192 Series Digimatic Height Gauges (192-670-10, 192-671-10, 192-672-10, 192-673-10) 570 Series Digimatic Height Gauges (570-248)	£93.20

### Scriber Dimensions



# Height Gauges

## SERIES 518 – Linear Height Digimatic 2D Measurement System

- Excellent accuracy of  $(1.1+0.6L/600)$   $\mu\text{m}$  with  $0.1 \mu\text{m}/0.4 \mu\text{m}$  resolution/repeatability.
- High-accuracy Height Gauge incorporating a wide range of measurement functions.
- To achieve best-in-class accuracy, a high-accuracy reflective-type linear encoder and an exceptionally straight guide are used.
- Measurement can be implemented by icon-based commands that also support easy one-key operation. Perpendicularity (frontal) of  $5 \mu\text{m}$  and straightness of  $4 \mu\text{m}$  are guaranteed.
- A best-in-class large colour LCD with excellent visibility is used.
- Pneumatic full/semi-floating suspension system allows adjustment of air-cushion height.
- Basic statistical functions are provided and, additionally, RS-232C data output provides the option of evaluating measurement data externally with SPC software on a PC.

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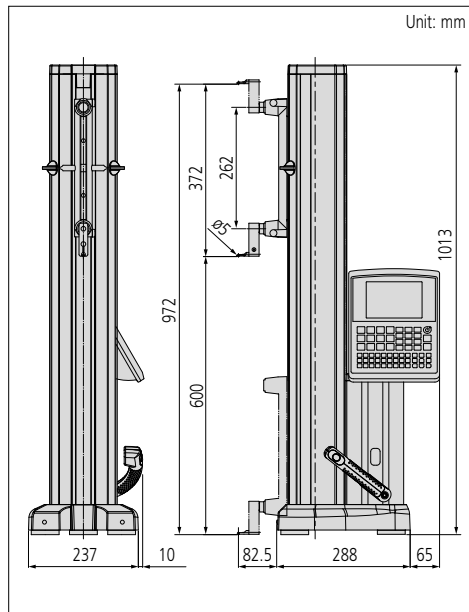
Running the pneumatic suspension allows frictionless movement on a surface plate.



The power grip makes it easy to approach the workpiece.



### Dimensions



### Specifications

Inch/Metric		
Code No.	Remarks	Price
518-351E-21	—	£4940.00
518-352E-21	Power grip pre-installed	£5200.00

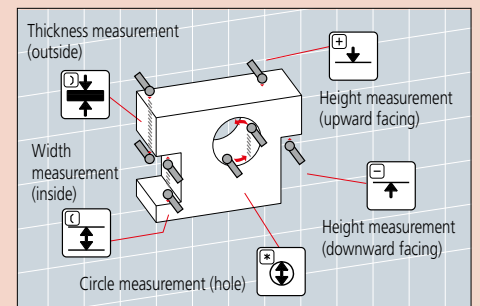
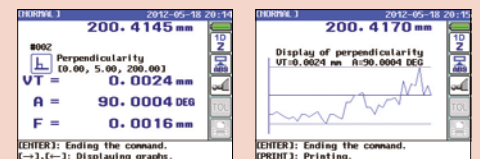
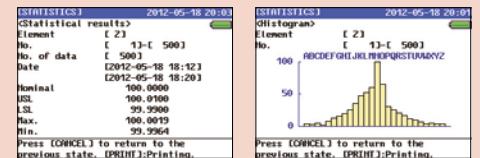
### Technical Data

- Measuring range: 0-972 mm  
 Slider stroke: 600 mm  
 Resolution (switchable): 0.0001/0.001/0.01/0.1 mm or .000001/.00001/.0001/.001"  
 Accuracy at 20°C\*1:  $(1.1+0.6L/600) \mu\text{m}$ ,  
 L = measuring length in mm  
 Repeatability (2 $\sigma$ )\*1  
 Plane: 0.4  $\mu\text{m}$   
 Bore: 0.9  $\mu\text{m}$   
 Perpendicularity\*2: 5  $\mu\text{m}$  (after compensation)  
 Straightness\*2: 4  $\mu\text{m}$  (mechanical straightness)  
 Drive method: Manual/motor (5-40 mm/s, 7 steps)  
 Measuring force: 1 N  
 Balancing method: Counter balance  
 Suspension method: Full/semi-floating with built-in air compressor  
 Display: Colour TFT LCD (320 x 240 dot, with LED backlight)  
 Language for display: Japanese, English, German, French, Italian, Spanish, Dutch, Portuguese, Swedish, Czech, Hungarian, Slovene, Polish, Traditional Chinese, Korean, and Simplified Chinese  
 No. of stored programs: 50 (max.)  
 No. of stored data: 60,000 (max.)  
 Power supply: AC adapter/battery (Ni-MH)  
 Battery operation time: Approx. 5 hours (air suspension and slider elevation: 25% duty cycle)

\*1 Guaranteed when using the standard eccentric  $\phi 5$  probe  
 \*2 Guaranteed when using the Lever Head (MLH-321) or Mu-checker (M-411)

### Standard Accessories

- 12AAF634:** 5-stepped probe  
**12AAA715:** Ball-diameter correction block  
 Note: When the correction is performed by using the taper type contact point, the ball-diameter correction block 12AAA787 (for taper type contact point) is required.  
**12AAF674:** Auxiliary weight (2 pcs.)

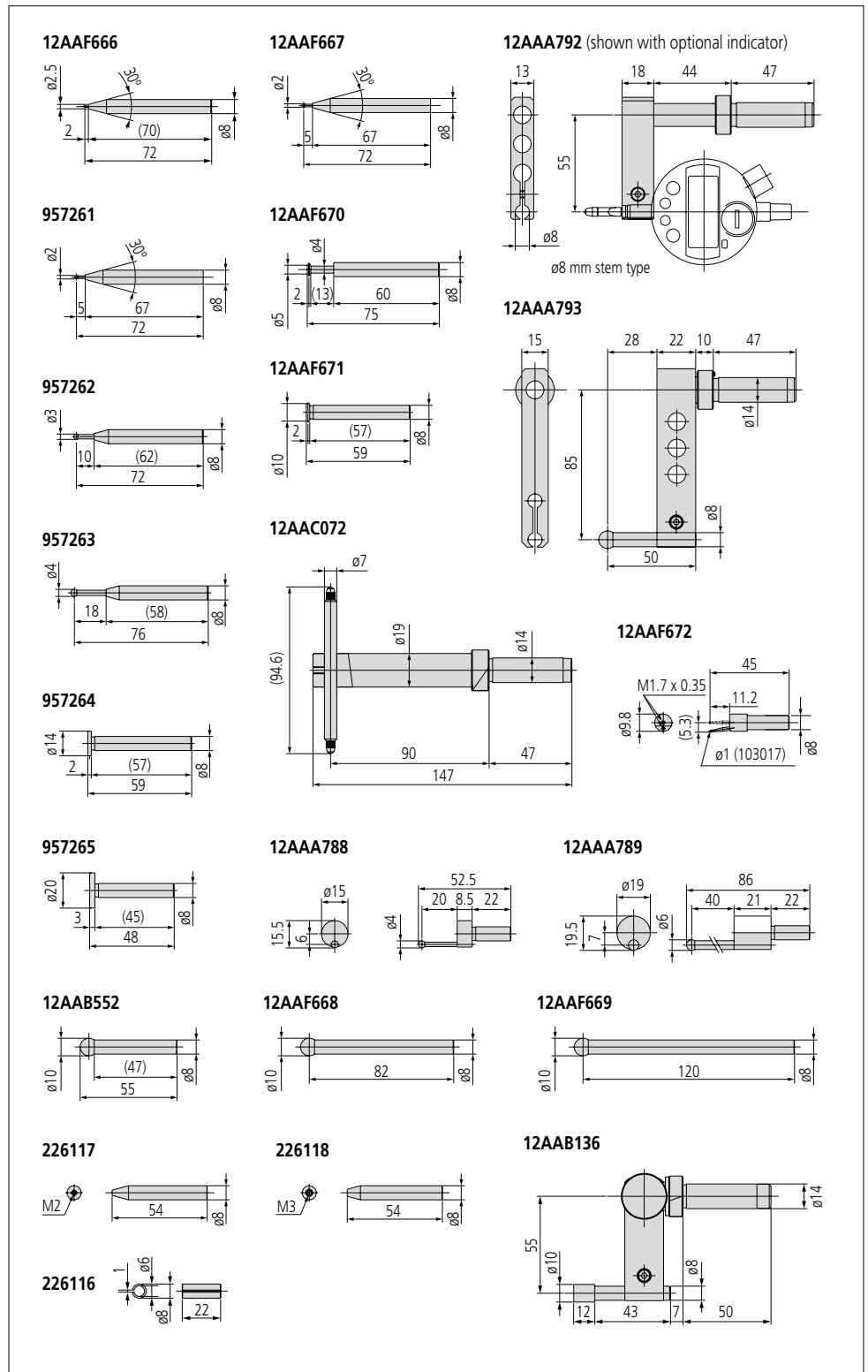


Example of measurements.

## Optional Accessories

Code No.	Description	Price
226116	Test indicator (ø6 mm stem) adapter	£15.30
226117	M2 CMM stylus adapter* <sup>3</sup>	£60.50
226118	M3 CMM stylus adapter* <sup>3</sup>	£60.50
532328	ø10 CMM ball probe	£220.00
532345	ø20 disc probe	£260.00
930803	ø30 disc probe	£390.00
932361	Mu-checker lever head holder - additional auxiliary weights are required (total 4 pcs).	£470.00
932377A	ø2 CMM ball probe	£640.00
932378A	ø3 CMM ball probe	£610.00
932379A	ø5 CMM ball probe	£620.00
932380A	ø6 CMM ball probe	£640.00
957261	ø2 mm ball probe (coaxial type)	£112.00
957262	ø3 mm ball probe (coaxial type)	£117.00
957263	ø4 mm ball probe (coaxial type)	£125.00
957264	ø14 mm disc probe	£166.00
957265	ø20 mm disc probe	£200.00
05HAA394	ø5 mm ball offset probe	£129.00
12AAA787	Block for calibrating probe diameter (applicable to taper probe)	£177.00
12AAA788	ø4 mm ball offset probe	£121.00
12AAA789	ø6 mm ball offset probe	£129.00
12AAA792	Dial indicator (ø8 mm stem) holder	£73.70
12AAA793	Probe extension holder (85 mm / 3.3")	£73.70
12AAA879	Sample workpiece	£200.00
12AAB136	ø10 mm cylindrical probe	£256.00
12AAB552	ø10 mm ball probe, L = 55 mm (coaxial type)	£149.00
12AAC072	Depth probe	£363.00
12AAC073	ø20 mm taper probe	£79.50
12AAF666	ø1 mm ball probe (coaxial type)	£118.00
12AAF667	ø2 mm ruby ball probe (coaxial type)	£155.00
12AAF668	ø10 mm ball probe, L = 82 mm (coaxial type)	£113.00
12AAF669	ø10 mm ball probe, L = 120 mm (coaxial type)	£202.00
12AAF670	ø5 mm disc probe	£130.00
12AAF671	ø10 mm disc probe	£98.40
12AAF672	ø1 mm ball offset probe	£106.00
12AAF675	Set with cover for large capacity battery	£630.00
12AAF712	Battery pack	£92.50
12AAG245	Large-capacity battery	£260.00

## Optional Accessories



### Various peripheral devices

12AAA802-1	Thermal printer paper	£6.20
12AAA804	Cable for page printer (2 m)	£45.00
12AAA807D	RS-232C cable (2 m / 80")	£36.20
12AAG920	RS-232C cable (3 m / 118")	£87.60
12AAH035	FDD unit (USB)	£145.00
12AAN050	Thermal printer	£960.00
63AAA042	Digimatic interface DMX-3-2	£1260.00

\*<sup>3</sup> Stylus for CMMs can be provided.

# Height Gauges

## SERIES 518 – QM-Height ABSOLUTE Digimatic High Precision Height Gauge

- High-performance height gauge with best-in-class accuracy and perpendicularity plus GO/±NG judgement functionality.
- Redesigned control panel features a dual-numeric display that shows the difference between the previous measurement value and the current value as well as the current value.
- Newly developed high accuracy and high resolution ABSOLUTE linear encoder for position detection. Once origin is set, origin setting is not required each time you turn the power ON (except in the case of a large environmental temperature change).
- GO/NO-GO judgement is performed by setting upper and lower tolerances. If a judgement result is out of tolerance the 3-colour LED above the display changes from green to red or orange, so tolerance judgement can be made at a glance.
- Frequent-use measurement such as inside/outside diameter and pitch calculation can be implemented by icon-based commands that also support easy one-key operation.
- Inside/outside diameters can be measured via a unique method (detect circle apex by tracing measurement\*<sup>1</sup>).
- Slider elevation knob (for travel) and wheel (for measurement) enable coarse and fine height adjustment.
- An angled grip is conveniently placed for moving the QM-Height on the surface plate and the pneumatic suspension system enables easy, friction-free positioning.
- SPC (Digimatic) and RS-232C data output enables incorporation into statistical process control and measurement systems.

\*<sup>1</sup> Tracing measurement stroke is approx. 1 mm upwards and downwards from the measurement start point.



518-247

### Specifications

Inch/Metric		
<b>Code No.</b>	<b>518-245</b>	<b>518-247</b>
Range	0-350 mm (0-14")	0-600 mm (0-24")
Perpendicularity	7 μm	12 μm
Mass	26 kg	30 kg
<b>Price</b>	<b>£2890.00</b>	<b>£3280.00</b>

### Technical Data

Resolution:	0.001 / 0.0005 mm (.00005" / .00001")
Accuracy at 20°C* <sup>2</sup> :	±(2.4+2.1L/600) μm, L = measuring length in mm
Repeatability (2σ)* <sup>2</sup> :	≤1.8 μm
Guiding method:	Roller bearing
Drive method:	Manual
Scale type:	ABSOLUTE electromagnetic linear encoder
Measuring force:	1.5 ± 0.5 N
Display:	LCD
Power supply:	AC adapter (optional)/battery (LR6 x 4)
Battery operation time:	Approx. 1200 hours not using pneumatic suspension system, (approx. 90 hours using pneumatic suspension system regularly)

\*<sup>2</sup> Guaranteed when using the standard ø5 mm offset probe.

### Standard Accessories

<b>05HZA148:</b>	ø5 mm offset probe
<b>12AAA715:</b>	Ball-diameter correction block



The power grip provides easy handling.

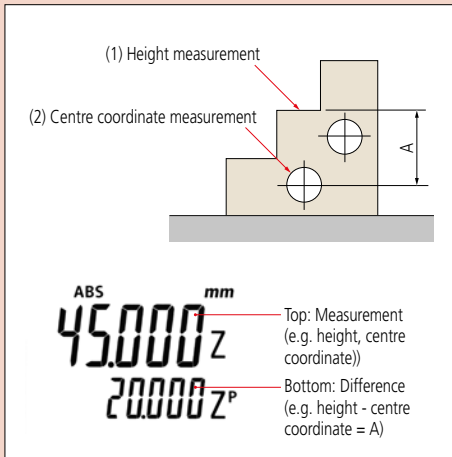


GO shown on the display and the panel LED showing GREEN means the measurement is within the tolerance limits.

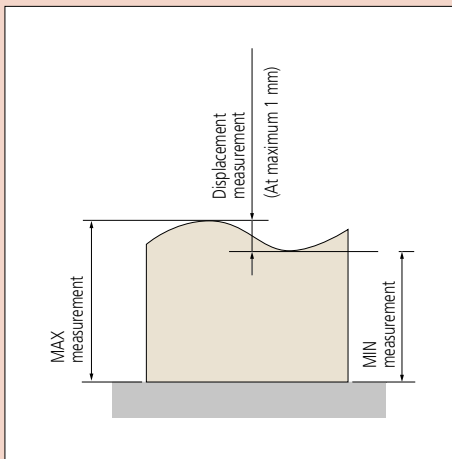


±NG shown on the display and the panel LED showing ORANGE (-NG) or RED (+NG) means the measurement is outside the tolerance limits.

## Application Examples



Dimension difference measurement.



Maximum/minimum and displacement measurement.

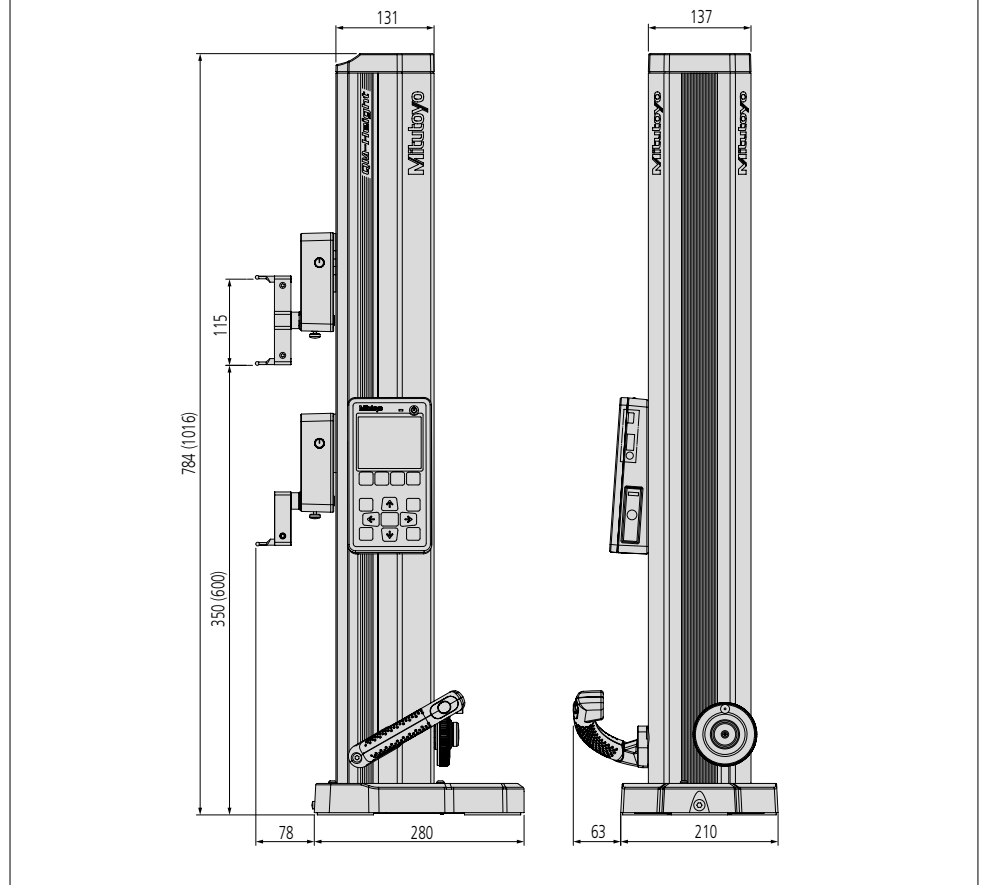
## Optional Accessories

Code No.	Description	Price
936937	Digimatic cable (1 m)	£33.90
957261	ø2 mm ball probe (coaxial type)	£112.00
957262	ø3 mm ball probe (coaxial type)	£117.00
957263	ø4 mm ball probe (coaxial type)	£125.00
957264	ø14 mm disc probe	£166.00
957265	ø20 mm disc probe	£200.00
965014	Digimatic cable (2 m)	£49.80
12AAA788	ø4 mm ball offset probe	£121.00
12AAA789	ø6 mm ball offset probe	£129.00
12AAA792	Dial indicator (ø8 mm stem) holder	£73.70
12AAA793	Probe extension holder (85 mm / 3.3")	£73.70
12AAC072	Depth probe	£363.00

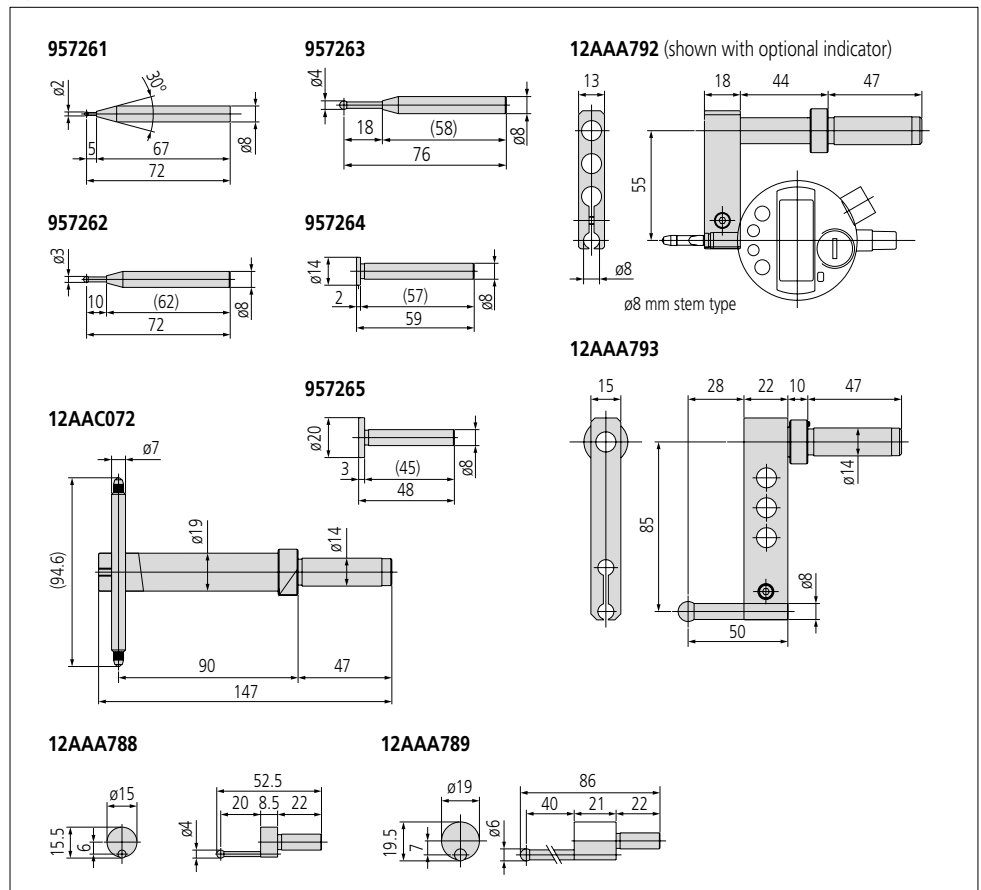
## Dimensions

( ): Range 0 - 600 mm / 0 - 24"

Unit: mm



## Optional Accessories



# Depth Gauges

## SERIES 329 – Digimatic Interchangeable Rod Depth Micrometer

- This type uses interchangeable rods to enable wide-range measurement.
- Data output function allows integration into statistical process control and measurement systems.
- Measuring rod diameter:  $\varnothing 4$  mm.
- Measuring rod lock.
- Ratchet stop provides constant measuring force.

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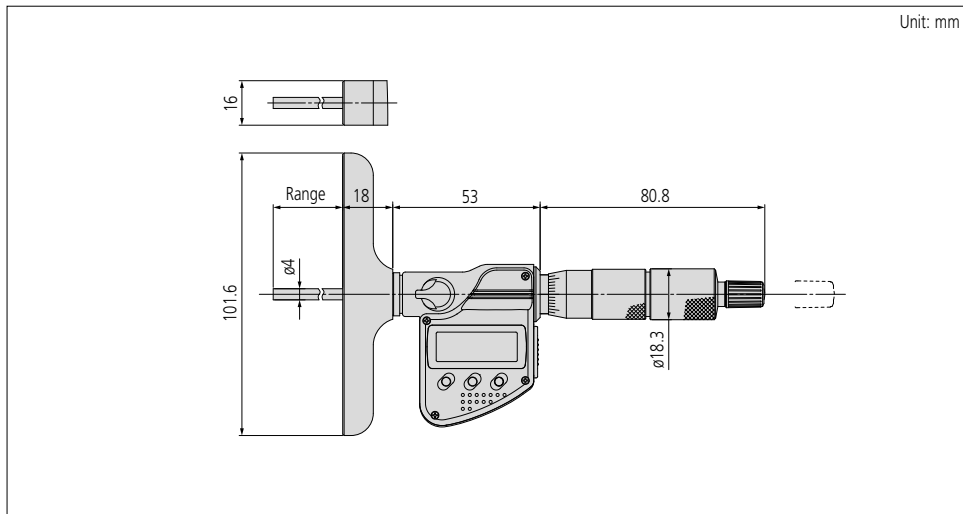
329-350-30

### Specifications

Inch/Metric

Code No.	Range	Resolution	Base	No. of rods	Price
329-350-30	0 - 150 mm (0 - 6")	0.001 mm (.00005")	4 x .63"	6	£581.00
329-351-30	0 - 300 mm (0 - 12")	0.001 mm (.0001")		12	£818.00

### Dimensions



Unit: mm

### Technical Data

Accuracy\*

Micrometer head:  $\pm 3 \mu\text{m} / \pm .00015''$  (excluding quantizing error)

Interchangeable rod:  $\pm (2 + R/75) \mu\text{m} / \pm [.0001 + .00005 (R/3)]''$

Flatness of reference face

63.5 mm (2.5") base:  $1.3 \mu\text{m} (.00005'')$

101.6 mm (4") base:  $2 \mu\text{m} (.00008'')$

Flatness of measuring

rod face:  $0.3 \mu\text{m}$

Parallelism between

reference face and

measuring rod face\*:  $(4 + R/50) \mu\text{m} /$

$[.00016 + .00004 (R/2)]''$

Battery:

SR44 (2 pcs) **938882**

Battery life:

Approx. 2.4 years under normal use

\* R = max. range (mm/inch)

Note: Fractions rounded up

### Optional Accessories

Code No.	Description	Price
264-623	U-WAVE-TM transmission unit	£193.00
02AZF310	U-WAVE-TM connection unit	£62.00
05CZA662	SPC data cable with pushbutton (1 m)	£69.40
05CZA663	SPC data cable with pushbutton (2 m)	£83.50
06AFM380B	USB input tool direct USB-ITN-B (2 m)	£126.00



Ratchet stop provides consistent reproducibility.

## Technical Data

### Accuracy\*

Micrometer head:  $\pm 3 \mu\text{m} / \pm .00015''$   
 Interchangeable rod:  $\pm (2+R/75) \mu\text{m} /$   
 $\pm [.0001 + .00005 (R/3)]''$

### Flatness of reference face

63.5 mm (2.5") base:  $1.3 \mu\text{m} (.00005'')$   
 101.6 mm (4") base:  $2 \mu\text{m} (.00008'')$

### Flatness of measuring rod face:

0.3  $\mu\text{m}$

### Parallelism between

#### reference face and

measuring rod face\*:  $(4+R/50) \mu\text{m} /$   
 $[\ .00016 + .00004 (R/2)]''$

\* R = max. range (mm/inch)

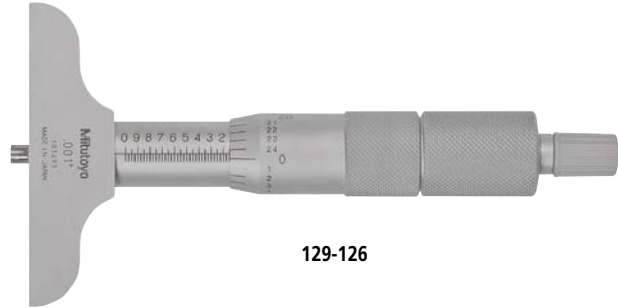
Note: Fractions rounded up



Dedicated fixtures enable rapid checking of depth micrometer setting accuracy after a rod change.

## SERIES 129 – Interchangeable Rod Depth Micrometer

- This type uses interchangeable rods to enable wide-range measurement.
- Measuring rod diameter:  $\varnothing 4 \text{ mm}$ .
- Measuring rod lock.
- Ratchet stop provides constant measuring force.



129-126



## Specifications

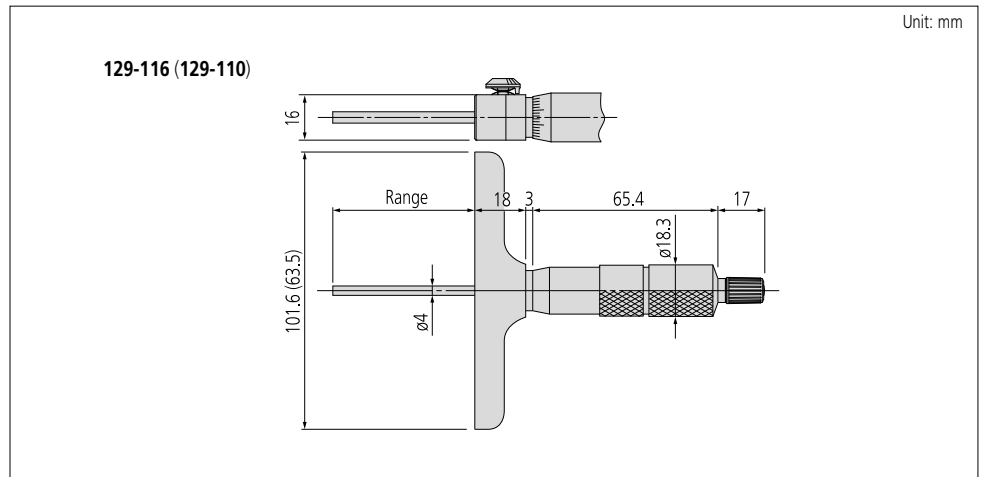
### Metric

Code No.	Range	Graduation	Base	No. of rods	Price
129-110	0 - 75 mm	0.01 mm	63.5 x 16 mm	3	£155.00
129-111	0 - 100 mm			4	£160.00
129-112	0 - 150 mm		6	£220.00	
129-116			101.6 x 16 mm	£232.00	
129-153	0 - 300 mm			12	£360.00

### Inch

Code No.	Range	Graduation	Base	No. of rods	Price
129-126	0 - 3"	.001"	2.5 x .63"	3	£155.00
129-128	0 - 6"			6	£220.00
129-132			4 x .63"	£232.00	
129-150	0 - 12"				12

## Dimensions

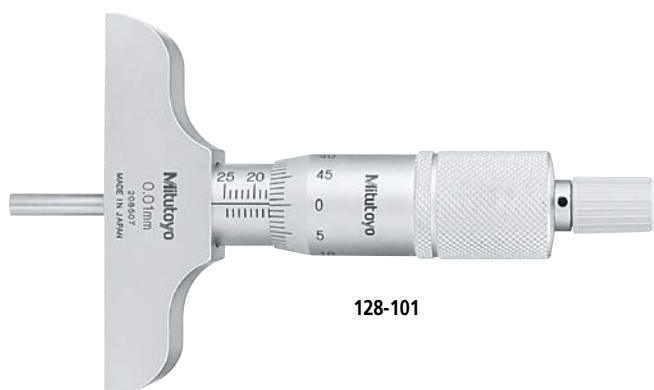


Unit: mm

# Depth Gauges

## SERIES 128 – Depth Micrometer

- Measuring rod diameter:  $\varnothing 4$  mm.
- Ratchet stop provides constant measuring force.



128-101

### Specifications

#### Metric

Code No.	Range	Accuracy	Graduation	Base	Price
128-101	0-25 mm	$\pm 3 \mu\text{m}$	0.01 mm	63.5 x 16 mm	<b>£98.00</b>
128-102				101.6 x 16 mm	<b>£140.00</b>

#### Inch

Code No.	Range	Accuracy	Graduation	Base	Price
128-105	0-1"	$\pm .00015"$	.001"	2.5 x .63"	<b>£98.00</b>
128-106				4 x .63"	<b>£140.00</b>

### Technical Data

Flatness of reference face: 1.3  $\mu\text{m}$  (.00005") for 63.5 mm (2.5") length base, 2  $\mu\text{m}$  (.00008") for 101.6 mm (4") length base

Flatness of measuring spindle face: 0.3  $\mu\text{m}$





### Technical Data

Repeatability:	0.01 mm (.0005")
Scale type:	ABSOLUTE electrostatic linear encoder
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	Approx. 3 years under normal use (1 year for 300 mm / 12" model)

### Optional Accessories

Code No.	Description	Price
<b>264-620</b>	U-WAVE-TC transmission unit	<b>£193.00</b>
<b>02AZF310</b>	U-WAVE-TC connection unit	<b>£62.00</b>
<b>05CZA624</b>	SPC data cable with pushbutton (1 m)	<b>£69.40</b>
<b>05CZA625</b>	SPC data cable with pushbutton (2 m)	<b>£83.50</b>
<b>06AFM380A</b>	USB input tool direct USB-ITN-C (2 m)	<b>£126.00</b>

## SERIES 571 – ABSOLUTE Digimatic Coolant Proof Depth Gauge

- Enables stable depth measurement with a resolution of 0.01 mm.
- Features Mitutoyo's ABSOLUTE system with IP67 ingress protection. No need to reset the origin after switching on.
- Optional longer extension bases are available.
- Sliding operation is smooth and comfortable.
- Data output function allows integration into statistical process control and measurement systems.

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**IP67**



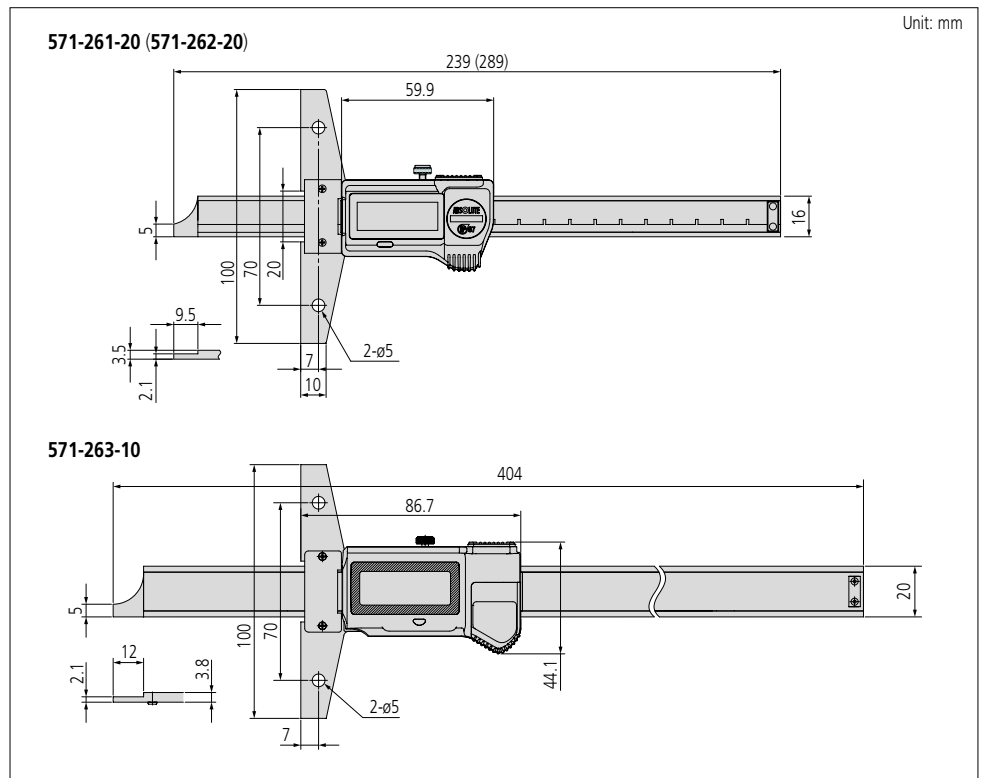
### Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy*	Base	Price
<b>571-261-20</b>	0 - 150 mm (0 - 6")	0.01 mm (.0005")	±0.02 mm (±.001")	100 x 6 mm	<b>£398.00</b>
<b>571-262-20</b>	0 - 200 mm (0 - 8")				<b>£454.00</b>
<b>571-263-10</b>	0 - 300 mm (0 - 12")		±0.03 mm (±.0015")	100 x 6.3mm	<b>£482.00</b>

\* Excluding quantizing error.

### Dimensions



# Depth Gauges

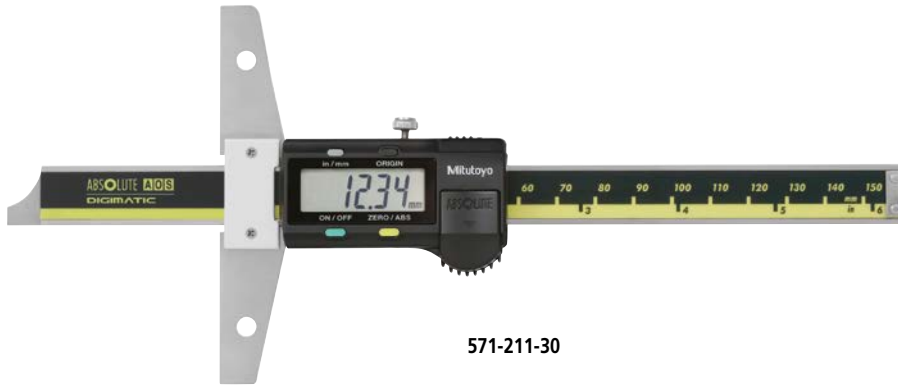
## SERIES 571 – ABSOLUTE Digimatic Depth Gauge

- Enables stable depth measurement with a resolution of 0.01 mm.
- Features Mitutoyo's ABSOLUTE system. No need to reset the origin after switching on.
- Optional longer extension bases are available\*<sup>1</sup>.
- Data output function allows integration into statistical process control and measurement systems.

\*<sup>1</sup> Except for models with measuring ranges of 450, 600, 750, 1000 mm.



Data Management Software by Mitutoyo



571-211-30

### Specifications

Inch/Metric				
Code No.	Range	Resolution	Accuracy* <sup>2</sup>	Price
571-211-30	0 - 150 mm (0 - 6")	0.01 mm (.0005")	±0.02 mm (±.001")	£350.00
571-212-30	0 - 200 mm (0 - 8")			£375.00
571-213-10	0 - 300 mm (0 - 12")		±0.03 mm (±.0015")	£467.00
571-214-10	0 - 450 mm (0 - 18")		±0.05 mm (±.002")	£750.00
571-215-10	0 - 600 mm (0 - 24")			£790.00
571-216-10	0 - 750 mm (0 - 30")		±0.06 mm (±.0025")	£830.00
571-217-10	0 - 1000 mm (0 - 40")		±0.07 mm (±.0025")	£920.00

\*<sup>2</sup> Excluding quantizing error.

### Dimensions

Unit: mm

Models up to 300 mm measuring range

Models with measuring range 450 mm and over

Range	L	Base (W x T)
0 - 150 mm	237	100 x 6
0 - 200 mm	287	
0 - 300 mm	403	
0 - 450 mm	635	250 x 10
0 - 600 mm	785	
0 - 750 mm	935	
0 - 1000 mm	1200	

### Technical Data

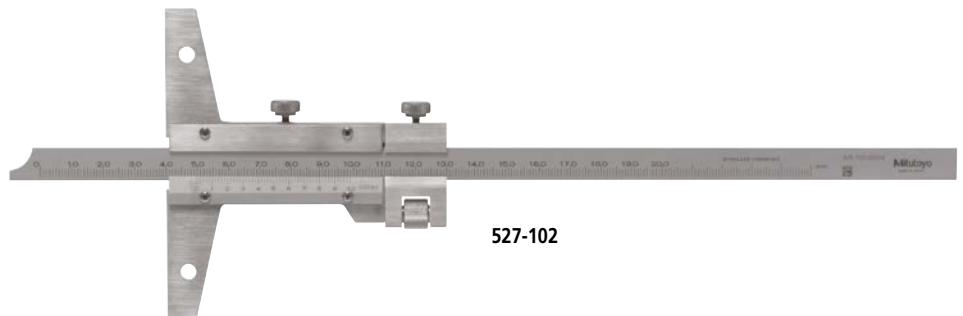
Repeatability:	0.01 mm (.0005")
Scale type:	ABSOLUTE electrostatic linear encoder
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	Approx. 3 years under normal use (1 year for 300 mm / 12" model)

### Optional Accessories

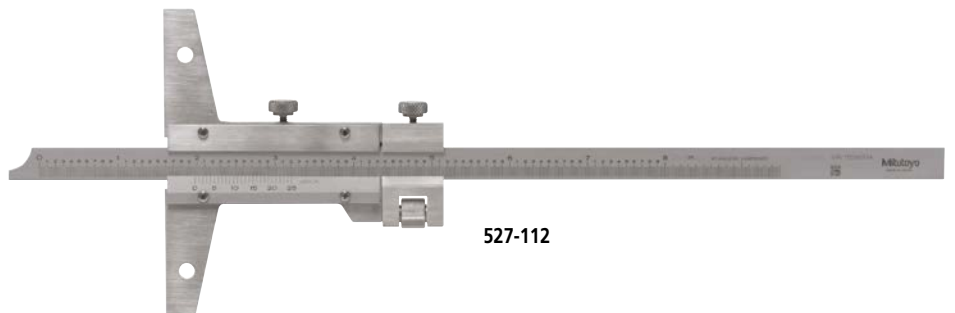
Code No.	Description	Price
For 571-211-30, 571-212-30 and 571-213-10		
264-621	U-WAVE-TC transmission unit	£193.00
959143	Data hold unit	£20.20
959149	SPC data cable with pushbutton (1 m)	£35.70
959150	SPC data cable with pushbutton (2 m)	£40.60
02AZF300	U-WAVE-TC connection unit	£62.00
06AFM380C	USB input tool direct USB-ITN-C (2 m)	£109.00
For 571-214-10, 571-215-10, 571-216-10 and 571-217-10		
959143	Data hold unit	£20.20
959149	SPC data cable with pushbutton (1 m)	£35.70
959150	SPC data cable with pushbutton (2 m)	£40.60
02AZD790C	U-WAVE-T data cable with pushbutton (160 mm)	£62.00
02AZE140C	U-WAVE-T data cable with pushbutton and footswitch connection (160/500 mm)	£127.00
06AFM380C	USB input tool direct USB-ITN-C (2 m)	£109.00

## SERIES 527 – Vernier Depth Gauge

- Standard gauge for depth measurement.
- Optional longer extension bases are available (except for models with measuring ranges of 600 and 1000 mm).



527-102



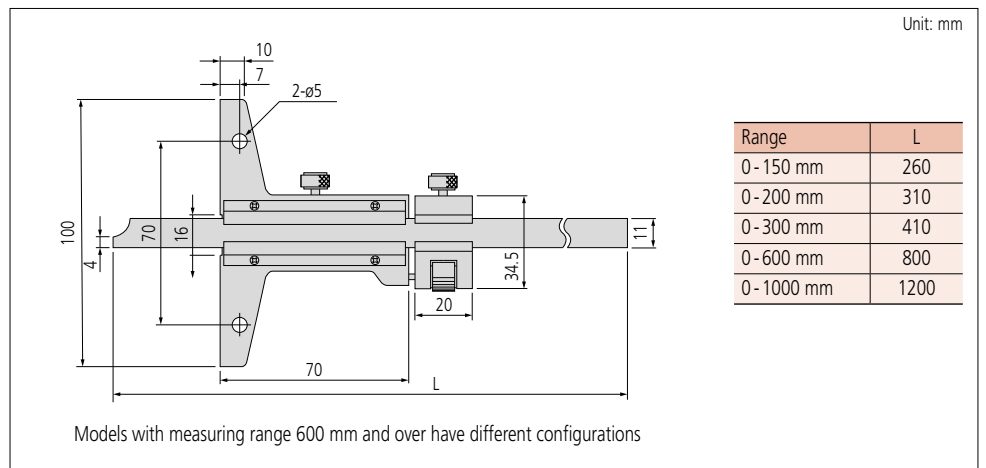
527-112

### Specifications

Metric						
Code No.	Range	Graduation	Accuracy	Base (W x T)	Remarks	Price
527-101	0 - 150 mm	0.02 mm	±0.05 mm	100 x 6.5 mm	With fine adjustment	£110.00
527-102	0 - 200 mm		±0.08 mm			£120.00
527-103	0 - 300 mm		±0.10 mm			£165.00
527-104	0 - 600 mm		±0.15 mm	£664.00		
527-105	0 - 1000 mm		250 x 10 mm	£714.00		

Inch						
Code No.	Range	Graduation	Accuracy	Base (W x T)	Remarks	Price
527-111	0 - 6"	.001"	±.001"	3.93 x .25"	With fine adjustment	£110.00
527-112	0 - 8"		±.0015"			£120.00
527-113	0 - 12"		±.002"			£165.00
527-114	0 - 24"		±.003"	£664.00		
527-115	0 - 40"		9.8 x .39"	£714.00		

### Dimensions



# Depth Gauges

## SERIES 571 – ABSOLUTE Digimatic Coolant Proof Hook End Depth Gauge

- The end of the main beam is hook-shaped to allow depth and thickness measurements of a projected portion or lip in a hole, in addition to standard depth measurement.
- Enables stable depth measurement with a resolution of 0.01 mm.
- Features Mitutoyo's ABSOLUTE system with IP67 ingress protection. No need to reset the origin after switching on.
- Optional longer extension bases are available.
- The OFF button is used to switch between direct display of hook and depth readings.
- Slider operation is smooth and comfortable.
- Models with measurement data output connector may be integrated into statistical process control and measurement systems.

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**IP67**



571-264-20

### Specifications

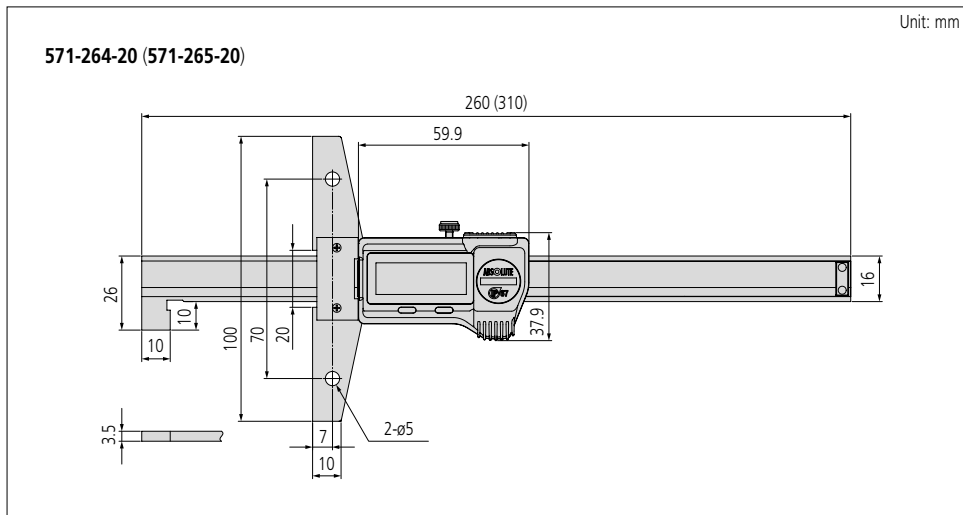
Inch/Metric

Code No.	Range: L1 (L2)* <sup>2</sup>	Resolution	Accuracy* <sup>1</sup>	Base	Price
571-264-20	10 - 160 mm (0 - 150 mm) / .4 - 6.4" (0 - 6")	0.01 mm / .0005"	±0.03 mm / ±.0015"	100 x 6 mm	£410.00
571-265-20	10 - 210 mm (0 - 200 mm) / .4 - 8.4" (0 - 8")				£482.00

\*1 Excluding quantizing error.

\*2 The range of L3 extends from the minimum range value of L1 to the maximum range value of L2, and is therefore less than that of L2 by at least the length of the hook.

### Dimensions

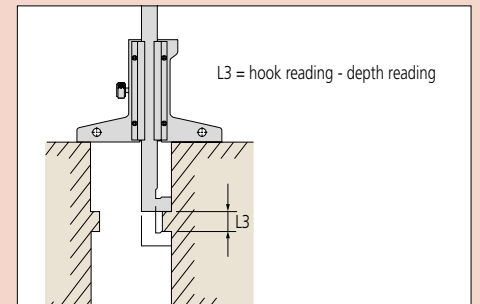
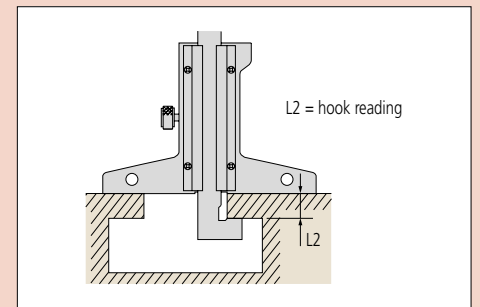
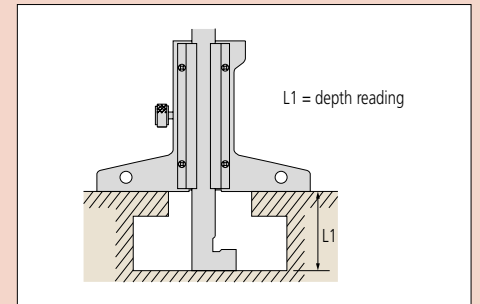


### Technical Data

Scale type: ABSOLUTE electrostatic linear encoder  
Battery: SR44 (1 pc.), **938882**  
Battery life: Approx. 3 years under normal use

### Optional Accessories

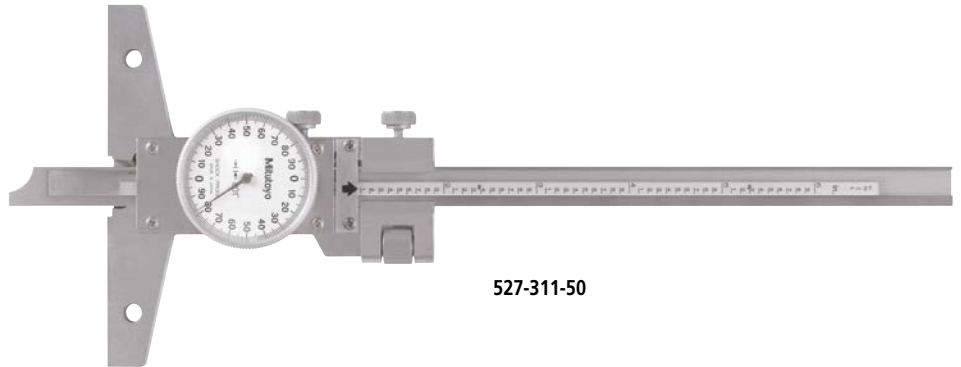
Code No.	Description	Price
264-620	U-WAVE-TC transmission unit	£193.00
02AZF310	U-WAVE-TC connection unit	£62.00
05CZA624	SPC data cable with pushbutton (1 m)	£69.40
05CZA625	SPC data cable with pushbutton (2 m)	£83.50
06AFM380A	USB input tool direct USB-ITN-C (2 m)	£126.00





## SERIES 527 – Dial Fine Adjustment Depth Gauge

- Easy-to-read dial caliper with rack and pinion magnification mechanism.
- Optional longer extension bases are available.

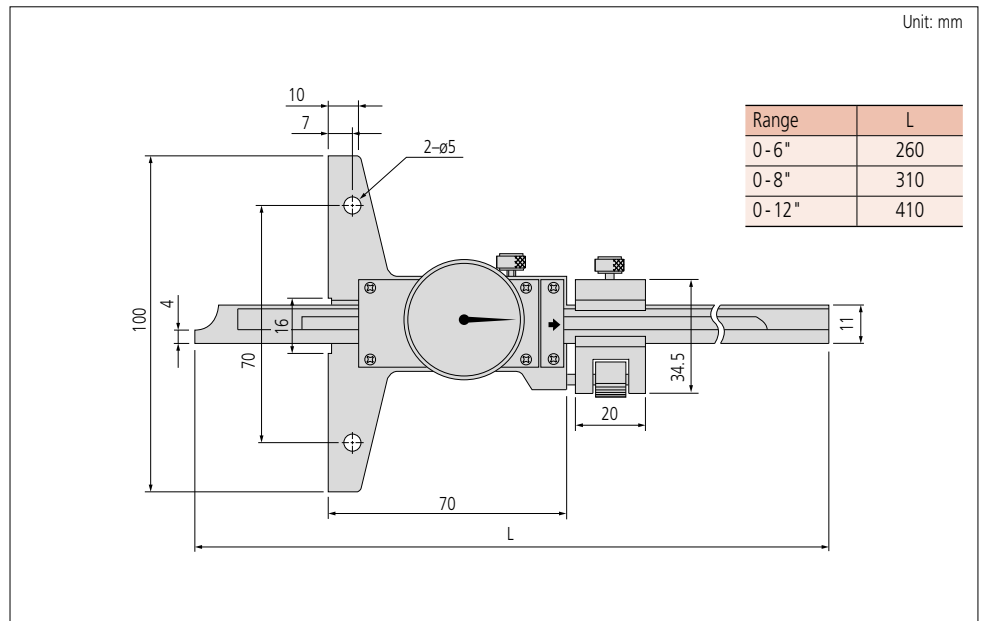


527-311-50

### Specifications

Metric					
Code No.	Range	Dial graduation	Accuracy	Base	Price
527-301-50	0 - 150 mm	0.05 mm	±0.05 mm	100 x 6.5 mm	£230.00
Inch					
Code No.	Range	Dial graduation	Accuracy	Base	Price
527-311-50	0 - 6"	.001"	±.001"	100 x 6.5 mm	£230.00
527-312-50	0 - 8"		£250.00		
527-313-50	0 - 12"		±.0015"		£285.00

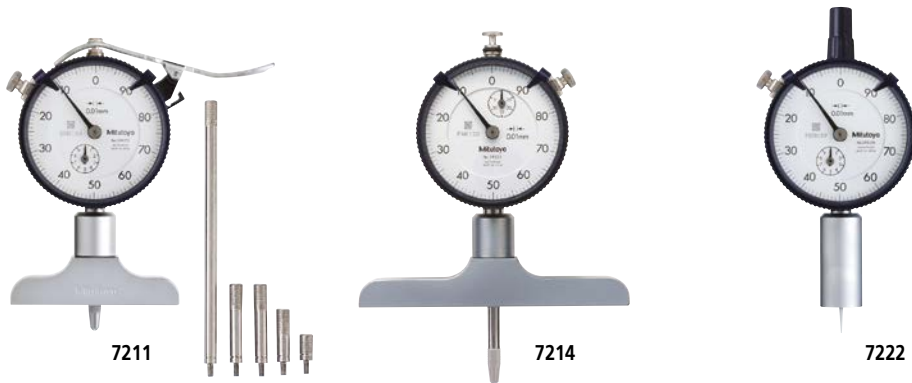
### Dimensions



# Depth Gauges

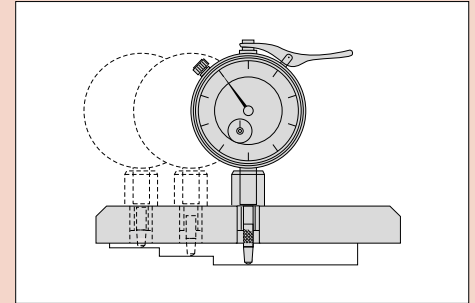
## SERIES 7 – Dial Depth Gauges

- Optimal for hole, narrow groove and step measurement.



### Technical Data

Graduation:	0.01 mm / .0005"
Base flatness:	5 µm / .0002"
Base thickness:	16 mm (18 mm: <b>7221</b> )
Mounting positions for the dial indicator:	1 (3: <b>7221</b> )
Contact point:	Carbide-tipped ball point (needle point: <b>7222</b> )



**7221** allows the mounting position of the dial indicator to be varied.

### Specifications

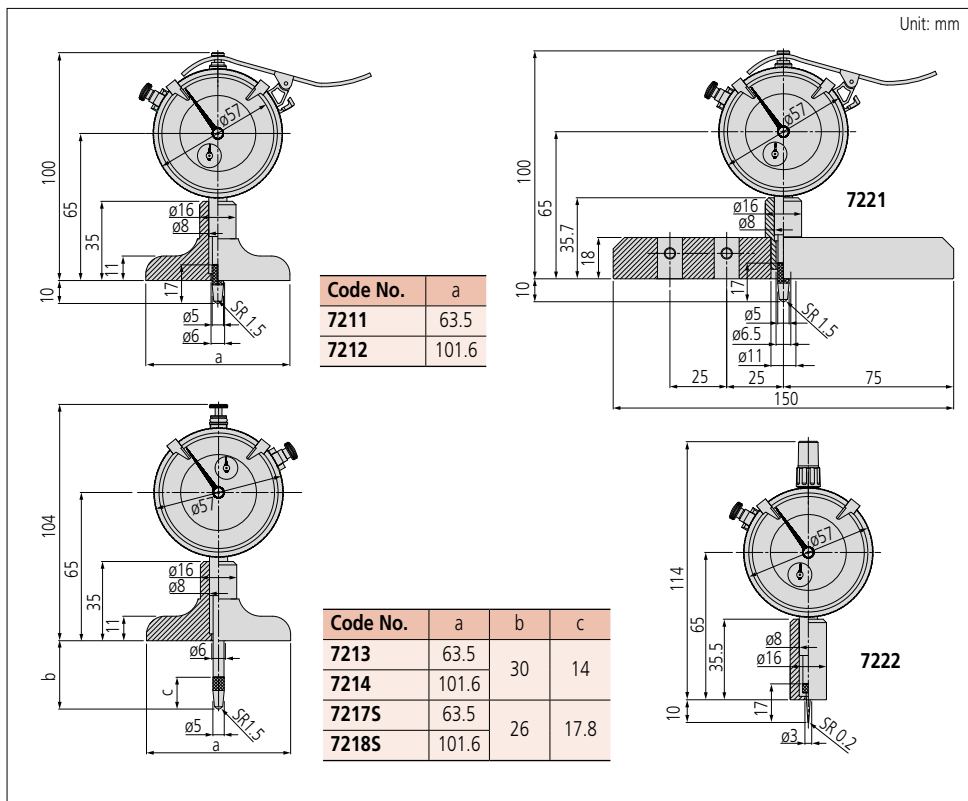
#### Metric

Code No.	Range	Accuracy	Stroke	Measuring force	Extension rod	Dial indicator	Price
<b>7211</b>	0 - 200 mm	±15 µm	10 mm	1.4 N	5 pcs. (10, 20, 30, 30, 100 mm)	<b>2902SB</b>	£169.00
<b>7212</b>							£179.00
<b>7213</b>	0 - 210 mm	±30 µm	30 mm	2.5 N	3 pcs. (30, 60, 90 mm)	<b>2952SB</b>	£250.00
<b>7214</b>							£313.00
<b>7221</b>	0 - 200 mm	±15 µm	10 mm	1.4 N	5 pcs. (10, 20, 30, 30, 100 mm)	<b>2902SB</b>	£225.00
<b>7222</b>							0 - 10 mm

#### Inch

Code No.	Range	Accuracy	Stroke	Measuring force	Extension rod	Dial indicator	Price
<b>7217S</b>	0 - 8"	±.002"	1"	2.5 N	3 pcs. (1", 2", 4")	<b>2904SB</b>	£185.00
<b>7218S</b>							£195.00

### Dimensions



### Caution should be used when exchanging the contact point of a depth gauge

The measurement range may not be maintained when mounting a differently sized contact point than the standard accessory. Zero-setting will not be possible if the contact-point diameter is too large for the plunger hole in the bottom face of the base. Parallelism adjustment with the bottom face of the base is required when mounting a flat contact point such as the flat/needle or carbide-tipped contact point.

## Technical Data

Stroke:	12.7 mm / .5"
Measuring force:	1.5N
Base flatness:	5 $\mu\text{m}$ / .0002" (2 $\mu\text{m}$ / .00008" : <b>543-392B</b> )
Base thickness:	16 mm / .63"
Contact point:	Carbide-tipped ball point
Max. response speed:	Unlimited
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	Approx. 7000 hours under normal use

## Optional Accessories

Code No.	Description	Price
<b>905338</b>	SPC data cable (1 m)	<b>£33.90</b>
<b>905409</b>	SPC data cable (2 m)	<b>£38.00</b>
<b>02AZD790F</b>	U-WAVE-T data cable (160 mm)	<b>£62.00</b>
<b>02AZE140F</b>	U-WAVE-T data cable with footswitch (160/500 mm)	<b>£127.00</b>

## SERIES 547 – ABSOLUTE Digimatic Depth Gauge

- Easy-to-read dial effectively prevents misreading.
- Allows integration into statistical process control and measurement systems for models with a measurement data output connector.

**MeasurLink** ENABLED  
Data Management Software by Mitutoyo

**ABSOLUTE**



## Specifications

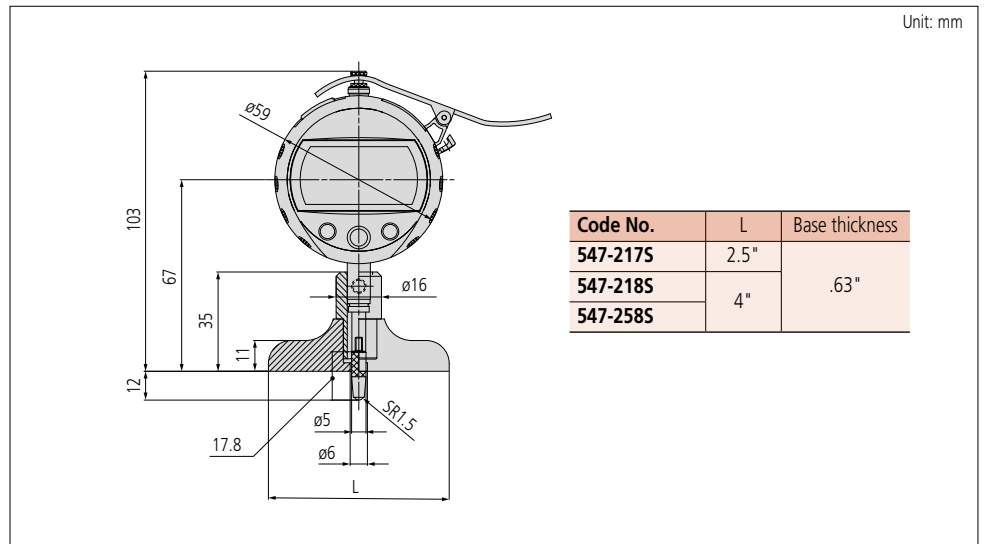
Inch/Metric

Code No.	Range	Resolution	Accuracy* <sup>1</sup>	Extension rod	Indicator	Price
<b>547-217S</b>	0-200 mm/ 0-8"	0.01 mm / .0005"	$\pm 20 \mu\text{m} / \pm .001"$	4 pcs. (.5", 1", 2", 4")	<b>543-402B</b> * <sup>2</sup>	<b>£350.00</b>
<b>547-218S</b>		0.001 mm / .00005"	$\pm 5 \mu\text{m} / \pm .0002"$		<b>543-392B</b>	<b>£360.00</b>
<b>547-258S</b>						<b>£417.00</b>

\*<sup>1</sup> Excluding quantizing error.

\*<sup>2</sup> The measuring force of this indicator is different from that of the standard 543-402B.

## Dimensions



Caution should be used when exchanging the contact point of a depth gauge

The measurement range may not be maintained when mounting a differently sized contact point than the standard accessory. Zero-setting will not be possible if the contact-point diameter is too large for the plunger hole in the bottom face of the base. Parallelism adjustment with the bottom face of the base is required when mounting a flat contact point such as the flat/needle or carbide-tipped contact point.

# Optional Accessories

## SERIES 515 – Depth Micro Checker

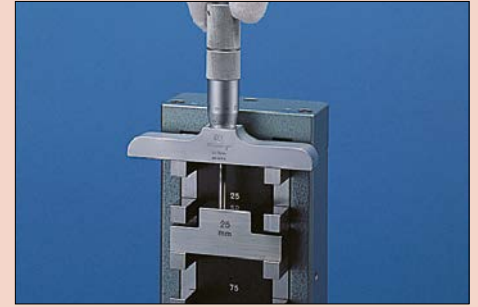
- The Depth Micro Checker is designed to check and help set the range-end points of a depth micrometer.



515-570



515-571

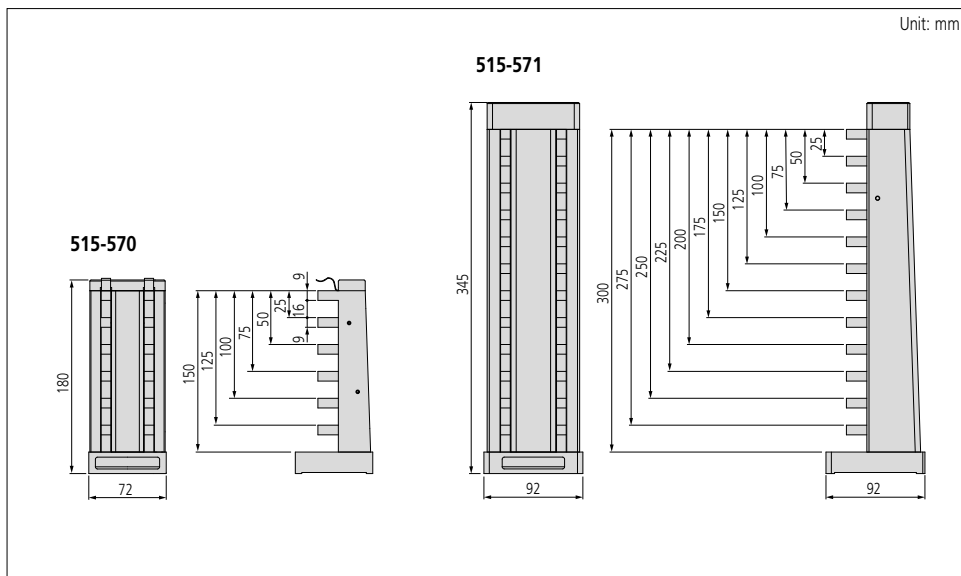


A 25 mm anvil block provides the reference surface for the depth micrometer rod.

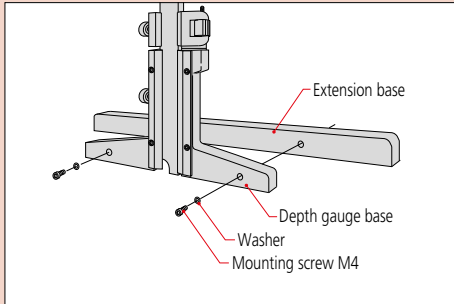
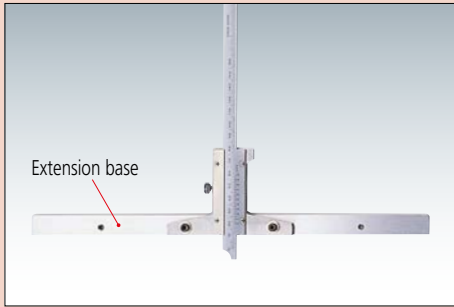
### Specifications

Metric				
Code No.	Range	Block pitch accuracy	Anvil block accuracy	Price
515-570	0-150 mm	$\pm(1+L/150) \mu\text{m}$ , L = length to check (mm)	$\pm 0.5 \mu\text{m}$	£1250.00
515-571	0-300 mm			£3350.00
Inch				
Code No.	Range	Block pitch accuracy	Anvil block accuracy	Price
515-575	0-6"	$\pm(40+L/0.15) \mu\text{inch}$ , L = length to check (inch)	$\pm 20 \mu\text{inch}$	£1250.00

### Dimensions







## Extension Bases for Depth Gauges

- Attaches to the base (reference face) plate of a depth gauge to extend its span.
- Refer to the illustrations at left for attachment details.
- These extension bases cannot be attached to Digimatic models of 18" / 450 mm and over or vernier models of 24" / 600 mm and over.

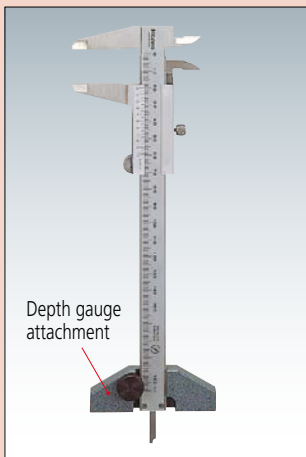
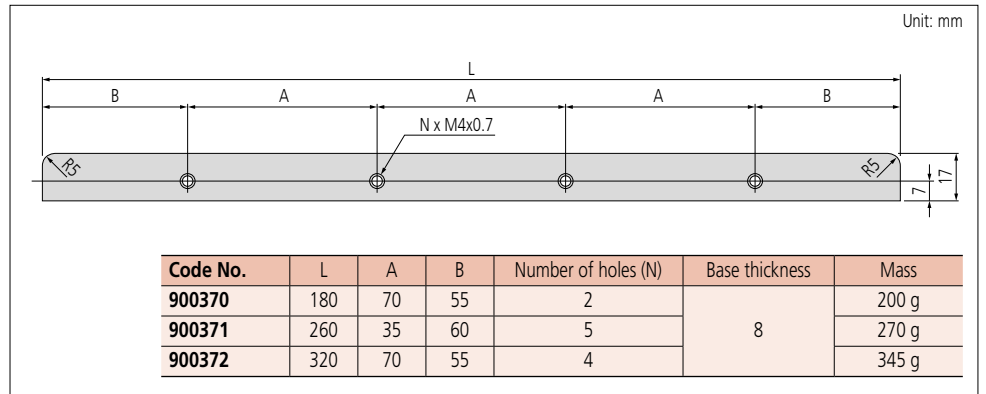


900372

### Specifications

Metric			Inch		
Code No.	Size L	Price	Code No.	Size L	Price
900370	180 mm	£35.60	900367	7"	£35.60
900371	260 mm	£52.00	900368	10"	£52.00
900372	320 mm	£62.50	900369	12"	£62.50

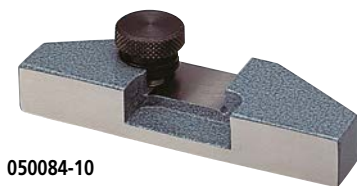
### Dimensions



The attachment is fixed flush with the end of the caliper's main beam before use.

## Depth Gauge Attachment for Calipers

- Fixing this attachment to the end of a caliper's main beam so that its reference face is flush with that of the caliper makes depth measurement accurate and secure.

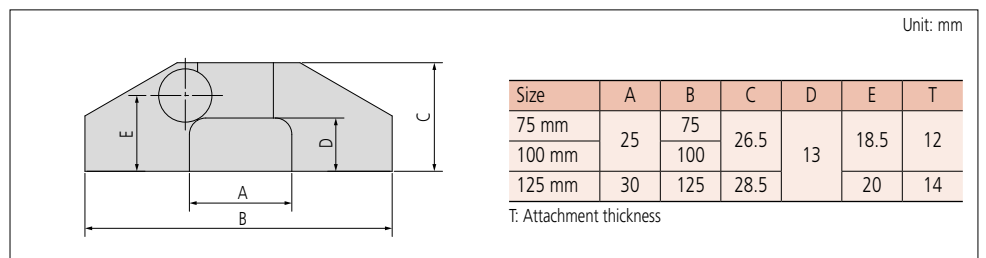


050084-10

### Specifications

Metric			
Code No.	Size	Applicable measuring range of caliper	Price
050083-10	75 mm	100 mm, 150 mm, 200 mm, 4", 6" and 8"	£41.60
050084-10	100 mm		£47.40
050085-10	125 mm	300 mm and 12"	£53.40

### Dimensions

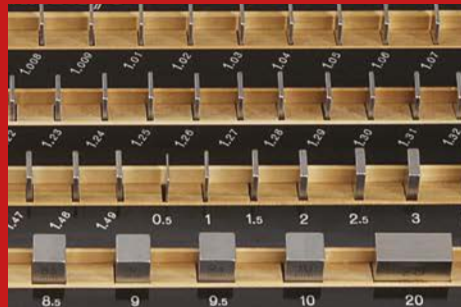


# GAUGE BLOCKS REFERENCE GAUGES

E



### Gauge Blocks



### Reference Gauges



### Contents

#### Gauge Blocks

Features and Accuracies	E-03
Gauge Block Sets	E-05
Micrometer Inspection Gauge Block Set	E-06
Caliper Inspection Gauge Block Set	E-06
Individual Metric Steel Gauge Blocks	E-07
Individual Inch Steel Gauge Blocks	E-09
Wear Block Sets	E-10
Gauge Block Accessory Sets	E-11
Maintenance Kit for Gauge Blocks	E-13
Ceraston	E-14

#### Reference Gauges

Height Master	E-15
Height Master Accessories	E-16
Check Master	E-17
High Accuracy Check Master	E-17
Straight Edge	E-18
Combination Square Set	E-18
Steel Rules	E-19
Thickness Gauges	E-20
Radius Gauges	E-21
Thread Pitch Gauges	E-21
Digimatic Universal Protractor	E-22
Universal Bevel Protractor	E-22
Digital Protractor	E-23
Precision Level	E-24
Precision Frame Level	E-24
Bench Centres	E-25
Black Granite Surface Plates	E-26



# Gauge Blocks

## Features and Accuracies

### Features of Mitutoyo Gauge Blocks

Mitutoyo offers rectangular steel and ceramic (CERA Blocks) gauge blocks for use as length standards in variously sized sets and as individual blocks. Accessories include wear blocks in tungsten carbide and ceramic in the standard thicknesses. Mitutoyo gauge blocks are recognized to be of the highest quality and are available in various grades to meet every need in respect of working conditions, environment and application.

### Accuracy

As a world-leading precision measuring equipment manufacturer, Mitutoyo is certified by the Japanese government as an accredited calibration laboratory, which means that the accuracy of its gauge blocks is guaranteed through traceability to the Metrology Management Centre of the National Institute of Advanced Industrial Science and Technology (AIST).

### Wringing

Lapping measuring surfaces is one of Mitutoyo's specialties. Our advanced technique, developed over more than half a century, enables us to achieve the optimum flatness and surface finish needed for gauge blocks and thus maximize the wringing force.

### Abrasion Resistance and Dimensional Stability of Steel Blocks

High-carbon high-chrome steel is employed to satisfy a variety of the material characteristics required for gauge blocks. Our advanced heat treatment technology for steel blocks, which involves repeated temperature cycling, simultaneously achieves excellent abrasion resistance and minimizes any change in length over time.

### CERA Blocks

CERA blocks are made of a ceramic material with a superior surface finish, created by Mitutoyo's ultra-precision machining techniques, that provides a premium quality block with significant advantages:

#### 1. Corrosion Resistant

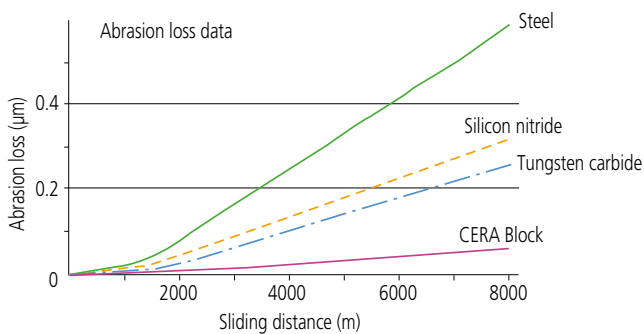
Anti-corrosion treatment is not required when handled normally (i.e. with fingers), resulting in simple maintenance and storage.

#### 2. No Burrs Caused by Accidental Mishandling

Since the CERA Block is very hard, it will not scratch easily and is highly resistant to burrs. If a burr is formed, it can easily be removed with a ceramic deburring stone (Ceraston).

#### 3. Abrasion Resistant

CERA Blocks have 10 times the abrasion resistance of steel gauge blocks.



#### 4. Dimensionally Stable

CERA Blocks are free from dimensional change over time.

#### 5. Clearly Marked Sizes

Black characters, indicating the nominal length, are inscribed by laser and are clearly visible against the white surface of the block.

#### 6. Non-Magnetic Nature Prevents Steel Swarf Contamination

#### 7. High Wringing Force

Superior flatness and surface finish provides maximum wringing force.



## Grade and Application

### Grade 2:

These gauge blocks are intended for shop floor use to set and calibrate fixtures as well as precision instruments.

### Grade 1:

This grade is used within an inspection area to verify the accuracy of plug and snap gauges as well as for setting electronic measuring devices.

### Grade 0:

These higher accuracy gauges are intended for use within a controlled environment by skilled inspection staff. Mainly used as reference standards for setting high precision measuring equipment and for the calibration of lower grade gauge blocks.

The following table can be used to select the gauge block grade according to usage (specified by DIN861, BS4311, and JIS B 7506).

Usage	Applications	Grade
Workshop use	• Mounting tools and cutters	2
	• Manufacturing gauges • Calibrating instruments	1 or 2
Inspection use	• Inspecting mechanical parts, tools, etc.	1 or 2
	• Checking the accuracy of gauges • Calibrating instruments	0 or 1
Calibration use	• Checking the accuracy of gauge blocks for workshop • Checking the accuracy of gauge blocks for inspection • Checking the accuracy of instruments	0

## Constructing a Gauge Block Stack

The following points should be noted when constructing a gauge block stack:

1. Use as few gauge blocks as possible to obtain the required length by selecting thick blocks wherever possible.
2. Select the block for the least significant digit first, then work back through the more significant digits until the required length is attained.
3. There are multiple combinations for the integer part of a length. To reduce wear as much as possible, do not always use the same gauge blocks.

Example: Required length = 30.6785 mm

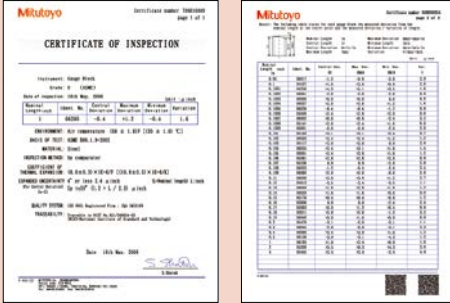
- Using an 88-block metric set
- |            |
|------------|
| 1.0005     |
| 1.008      |
| 1.17       |
| 7.5        |
| 20         |
| 30.6785 mm |

Example: Required length = 1.8761 "

- Using an 81-block inch set
- |          |
|----------|
| 0.1001   |
| 0.126    |
| 0.65     |
| 1        |
| 1.8761 " |

## Mitutoyo Gauge Blocks and Inspection Certificates

A Certificate of Inspection is furnished with all Mitutoyo gauge blocks with a serial number on the box (in the case of sets) and an identification number on each block. The deviation of each block from nominal length, at the time of inspection, is stated. For this inspection, each gauge block is measured relative to the upper level master using a gauge block comparator.



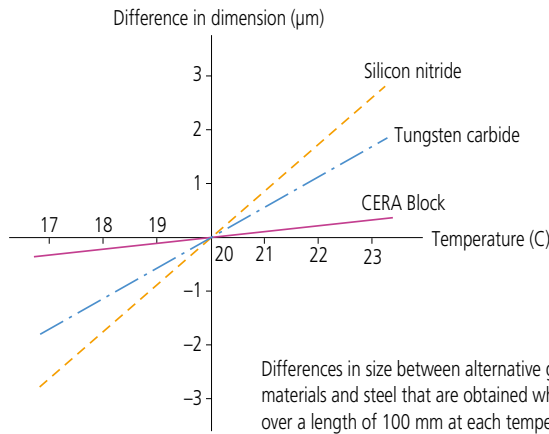
## 8. Characteristics of CERA Blocks Compared with other Gauge Block Materials

Property	Material			
	CERA Block (ZrO <sub>2</sub> )	Steel (Fe)	Tungsten Carbide (WC-Co)	Silicon nitride (Si <sub>3</sub> N <sub>4</sub> )
Hardness (HV)	1350	800	1650	1500
Coefficient of thermal expansion (10 <sup>-6</sup> /K)	9.3±0.5	10.8±0.5	5.5±1.0	2
Flexural strength by 3-point bending (MPa)	1270	1960	1960	580
Fracture toughness K1c (MPa•m <sup>1/2</sup> )	7	120	12	6.5
Young's modulus x10 <sup>-4</sup> (MPa)	20.6	20.6	61.8	28.4
Poisson's ratio	0.3	0.3	0.2	0.3
Specific gravity	6.0	7.8	14.8	3.2
Thermal conductivity (W/m•k)	2.9	54.4	79.5	16.7

Note: Ceramics have the advantage of a slow response to temperature changes due to the low thermal conductivity. However, caution is required when using CERA blocks in an environment subject to rapid temperature change.

## 9. Closest Expansion Coefficient to Steel

The thermal expansion coefficient of a CERA Block is quite similar to that of a steel gauge block.



## 10. Highly Resistant to Impact Damage

The CERA Block material is one of the toughest ceramics. It is extremely difficult to crack a CERA block in normal use.

## Accuracy Specifications: BS 4311: Part 1: 1993 (UK)

Inch						
Grade*		Nominal length (inch)				
		over 0 up to 0.4	over 0.4 up to 1	over 1 up to 2	over 2 up to 3	over 3 up to 4
0	Tolerance on deviation of measured central length	±5 µin	±6 µin	±8 µin	±10 µin	±12 µin
	Parallelism	4 µin			5 µin	
	Flatness	4 µin				
1	Tolerance on deviation of measured central length	±10 µin	±12 µin	±15 µin	±20 µin	±25 µin
	Parallelism	6 µin		7 µin		8 µin
	Flatness	6 µin				
2	Tolerance on deviation of measured central length	±20 µin	±25 µin	±30 µin	±40 µin	±50 µin
	Parallelism	12 µin			14 µin	
	Flatness	10 µin				

Metric						
Grade*		Nominal length (mm)				
		over 0 up to 10	over 10 up to 25	over 25 up to 50	over 50 up to 75	over 75 up to 100
0	Tolerance on deviation of measured central length	±0.12 µm	±0.15 µm	±0.2 µm	±0.25 µm	±0.3 µm
	Parallelism	0.1 µm			0.12 µm	
	Flatness	0.1 µm				
1	Tolerance on deviation of measured central length	±0.25 µm	±0.3 µm	±0.4 µm	±0.5 µm	±0.6 µm
	Parallelism	0.16 µm		0.18 µm		0.2 µm
	Flatness	0.15 µm				
2	Tolerance on deviation of measured central length	±0.5 µm	±0.6 µm	±0.8 µm	±1.0 µm	±1.2 µm
	Parallelism	0.3 µm			0.35 µm	
	Flatness	0.25 µm				

\* At 20°C

# Gauge Blocks

## SERIES 516 – Gauge Block Sets

- Mitutoyo provides a wide selection of boxed sets of gauge blocks to meet the various needs of industry. Selecting the best set, or sets, to acquire usually depends on the accuracy required by the target applications, the level of convenience desired (larger sets offer more combination possibilities) and the environmental conditions in which they will be used.



Steel 103-block set



CERA 81-block set



Steel 88-block set.



CERA 47-block set.



Steel 32-block set.



Steel 9-block set.

### Specifications

#### Metric

Blocks per set	Code No.	Grade	Set configuration	Price
<b>Steel 1 mm base block sets</b>				
103	516-942-11	0	1.005 mm, 1.01-1.49 mm by 0.01 step,	£2850.00
	516-943-11	1	0.5-24.5 mm by 0.5 step,	£2260.00
	516-944-11	2	25-100 mm by 25 step	£1920.00
88	516-970-11	0	1.0005 mm, 1.001-1.009 mm by 0.001 step,	£2330.00
	516-971-11	1	1.01-1.49 mm by 0.01 step, 0.5-9.5 mm by 0.5 step,	£1790.00
	516-972-11	2	10-100 mm by 10 step	£1490.00
47	516-962-11	0	1.005 mm, 1.01-1.19 mm by 0.01 step,	£1380.00
	516-963-11	1	1.2-1.9 mm by 0.1 step, 1-9 mm by 1 step,	£1150.00
	516-964-11	2	10-100 mm by 10 step	£990.00
32	516-966-11	0	1.005 mm, 1.01-1.09 mm by 0.01 step,	£920.00
	516-967-11	1	1.1-1.9 mm by 0.1 step, 1-9 mm by 1 step,	£710.00
	516-968-11	2	10-30 mm by 10 step, 60 mm	£590.00
<b>Steel 0.001 mm step block sets</b>				
9	516-982-11	0	1.001-1.009 mm by 0.001 step	£264.00
	516-983-11	1		£204.00
	516-984-11	2		£180.00

#### CERA 1 mm base block sets

88	516-370-11	0	1.0005 mm, 1.001-1.009 mm by 0.001 step,	£4050.00
	516-371-11	1	1.01-1.49 mm by 0.01 step, 0.5-9.5 mm by 0.5 step,	£3370.00
	516-372-11	2	10-100 mm by 10 step	£2840.00
47	516-362-11	0	1.005 mm, 1.01-1.19 mm by 0.01 step,	£2390.00
	516-363-11	1	1.2-1.9 mm by 0.1 step, 1-9 mm by 1 step,	£2090.00
	516-364-11	2	10-100 mm by 10 step	£1670.00

#### Inch

Blocks per set	Code No.	Grade	Set configuration	Price
<b>Steel</b>				
81	516-903-11	1	0.1001-0.1009" by 0.0001 step, 0.101-0.149" by	£1960.00
	516-904-11	2	0.001 step, 0.05-0.95" by 0.05 step, 1-4" by 1 step	£1450.00
49	516-911-11	1	0.1001-0.1009" by 0.0001 step, 0.101-0.109" by	£1070.00
	516-912-11	2	0.001 step, 0.01-0.19" by 0.01 step, 0.2-0.9" by 0.1 step, 1-4" by 1 step	£925.00
<b>CERA</b>				
81	516-302-11	0	0.1001-0.1009" by 0.0001 step,	£6640.00
	516-303-11	1	0.101-0.149" by 0.001 step,	£3140.00
	516-304-11	2	0.05-0.95" by 0.05 step, 1-4" by 1 step	£2390.00

### Optional Accessory

Code No.	Description	Price
516-607	Gauge block holder	£419.00



516-607  
(Gauge blocks not included.)



Sample application.

### SERIES 516 – Micrometer Inspection Gauge Block Set

- Set comprises ten gauge blocks and an optical parallel.
- For adjusting and calibrating outside micrometers.



516-106-10

#### Specifications

Metric				
Blocks per set	Code No.	Grade	Set configuration	Price
Steel				
10	516-106-10	0	2.5, 5.1, 7.7, 10.3, 12.9, 15, 17.6, 20.2, 22.8, 25 mm, optical parallel (t = 12 mm)	£545.00

### SERIES 516 – Caliper Inspection Gauge Block Set

- Set includes two gauge blocks and a setting ring.
- For adjusting and calibrating calipers.



516-122-10

#### Specifications

Metric				
Blocks per set	Code No.	Grade	Set configuration	Price
Steel				
2	516-122-10	1	41.3, 131.4 mm, setting ring (ø20 mm), glove	£637.00

# Gauge Blocks

## Individual Metric Steel Gauge Blocks Grade 1



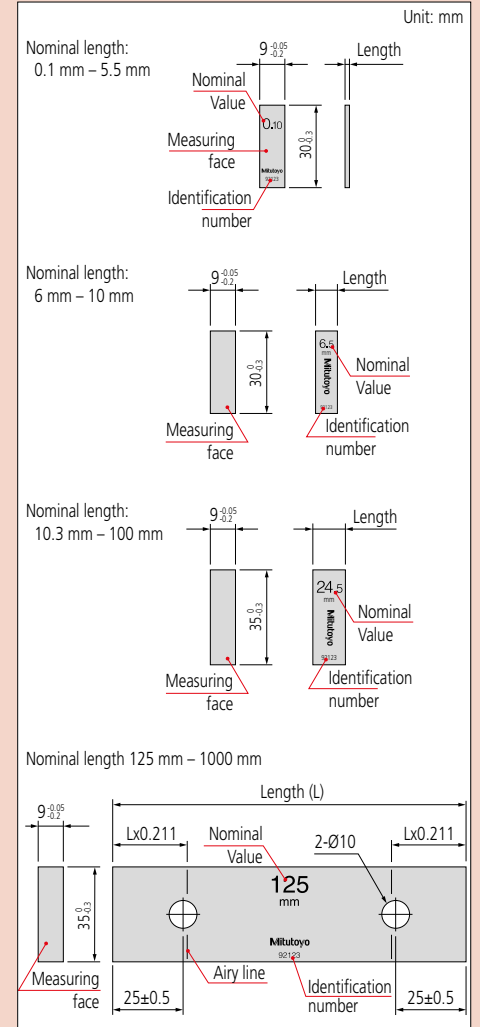
611675-131

### Specifications

#### Metric

Length (mm)	Code No.	Price	Length (mm)	Code No.	Price	Length (mm)	Code No.	Price
0.1	611821-131	£117.00	0.48	611890-131	£78.00	0.86	611927-131	£41.60
0.11	611860-131	£117.00	0.49	611891-131	£78.00	0.87	611928-131	£41.60
0.12	611861-131	£117.00	0.5	611506-131	£47.40	0.88	611929-131	£41.60
0.13	611862-131	£117.00	0.51	611892-131	£47.40	0.89	611930-131	£41.60
0.14	611863-131	£117.00	0.52	611893-131	£47.40	0.9	611931-131	£41.60
0.15	611822-131	£117.00	0.53	611894-131	£47.40	0.91	611932-131	£41.60
0.16	611864-131	£117.00	0.54	611895-131	£47.40	0.92	611933-131	£41.60
0.17	611865-131	£117.00	0.55	611896-131	£47.40	0.93	611934-131	£41.60
0.18	611866-131	£117.00	0.56	611897-131	£47.40	0.94	611935-131	£41.60
0.19	611867-131	£117.00	0.57	611898-131	£47.40	0.95	611936-131	£41.60
0.2	611823-131	£110.00	0.58	611899-131	£47.40	0.96	611937-131	£41.60
0.21	611868-131	£110.00	0.59	611900-131	£47.40	0.97	611938-131	£41.60
0.22	611869-131	£110.00	0.6	611901-131	£47.40	0.98	611939-131	£41.60
0.23	611870-131	£110.00	0.61	611902-131	£47.40	0.99	611940-131	£41.60
0.24	611871-131	£110.00	0.62	611903-131	£47.40	0.991	611551-131	£28.00
0.25	611824-131	£110.00	0.63	611904-131	£47.40	0.992	611552-131	£28.00
0.26	611872-131	£110.00	0.64	611905-131	£47.40	0.993	611553-131	£28.00
0.27	611873-131	£110.00	0.65	611906-131	£47.40	0.994	611554-131	£28.00
0.28	611874-131	£110.00	0.66	611907-131	£47.40	0.995	611555-131	£28.00
0.29	611875-131	£110.00	0.67	611908-131	£47.40	0.996	611556-131	£28.00
0.3	611825-131	£95.00	0.68	611909-131	£47.40	0.997	611557-131	£28.00
0.31	611876-131	£95.00	0.69	611910-131	£47.40	0.998	611558-131	£28.00
0.32	611877-131	£95.00	0.7	611911-131	£41.60	0.999	611559-131	£28.00
0.33	611878-131	£95.00	0.71	611912-131	£41.60	1	611611-131	£26.10
0.34	611879-131	£95.00	0.72	611913-131	£41.60	1.0005	611520-131	£26.10
0.35	611826-131	£95.00	0.73	611914-131	£41.60	1.001	611521-131	£26.10
0.36	611880-131	£95.00	0.74	611915-131	£41.60	1.002	611522-131	£26.10
0.37	611881-131	£95.00	0.75	611916-131	£41.60	1.003	611523-131	£26.10
0.38	611882-131	£95.00	0.76	611917-131	£41.60	1.004	611524-131	£26.10
0.39	611883-131	£95.00	0.77	611918-131	£41.60	1.005	611525-131	£26.10
0.4	611827-131	£78.00	0.78	611919-131	£41.60	1.006	611526-131	£26.10
0.41	611884-131	£78.00	0.79	611920-131	£41.60	1.007	611527-131	£26.10
0.42	611885-131	£78.00	0.8	611921-131	£41.60	1.008	611528-131	£26.10
0.43	611886-131	£78.00	0.81	611922-131	£41.60	1.009	611529-131	£26.10
0.44	611887-131	£78.00	0.82	611923-131	£41.60	1.01	611561-131	£26.10
0.45	611828-131	£78.00	0.83	611924-131	£41.60	1.02	611562-131	£26.10
0.46	611888-131	£78.00	0.84	611925-131	£41.60	1.03	611563-131	£26.10
0.47	611889-131	£78.00	0.85	611926-131	£41.60	1.04	611564-131	£26.10

### Dimensions





Length (mm)	Code No.	Price
1.05	611565-131	£26.10
1.06	611566-131	£26.10
1.07	611567-131	£26.10
1.08	611568-131	£26.10
1.09	611569-131	£26.10
1.1	611570-131	£26.10
1.11	611571-131	£26.10
1.12	611572-131	£26.10
1.13	611573-131	£26.10
1.14	611574-131	£26.10
1.15	611575-131	£26.10
1.16	611576-131	£26.10
1.17	611577-131	£26.10
1.18	611578-131	£26.10
1.19	611579-131	£26.10
1.2	611580-131	£26.10
1.21	611581-131	£26.10
1.22	611582-131	£26.10
1.23	611583-131	£26.10
1.24	611584-131	£26.10
1.25	611585-131	£26.10
1.26	611586-131	£26.10
1.27	611587-131	£26.10
1.28	611588-131	£26.10
1.29	611589-131	£26.10
1.3	611590-131	£26.10
1.31	611591-131	£26.10
1.32	611592-131	£26.10
1.33	611593-131	£26.10
1.34	611594-131	£26.10
1.35	611595-131	£26.10
1.36	611596-131	£26.10
1.37	611597-131	£26.10
1.38	611598-131	£26.10
1.39	611599-131	£26.10
1.4	611600-131	£26.10
1.41	611601-131	£26.10
1.42	611602-131	£26.10
1.43	611603-131	£26.10
1.44	611604-131	£26.10
1.45	611605-131	£26.10
1.46	611606-131	£26.10
1.47	611607-131	£26.10
1.48	611608-131	£26.10
1.49	611609-131	£26.10
1.5	611641-131	£26.10
1.6	611516-131	£24.50
1.7	611517-131	£24.50
1.8	611518-131	£24.50
1.9	611519-131	£24.50
2	611612-131	£24.50
2.0005	611690-131	£24.50
2.001	611691-131	£24.50
2.002	611692-131	£24.50
2.003	611693-131	£24.50
2.004	611694-131	£24.50
2.005	611695-131	£24.50
2.006	611696-131	£24.50
2.007	611697-131	£24.50
2.008	611698-131	£24.50

Length (mm)	Code No.	Price
2.009	611699-131	£24.50
2.01	611701-131	£24.50
2.02	611702-131	£24.50
2.03	611703-131	£24.50
2.04	611704-131	£24.50
2.05	611705-131	£24.50
2.06	611706-131	£24.50
2.07	611707-131	£24.50
2.08	611708-131	£24.50
2.09	611709-131	£24.50
2.1	611710-131	£24.50
2.11	611711-131	£24.50
2.12	611712-131	£24.50
2.13	611713-131	£24.50
2.14	611714-131	£24.50
2.15	611715-131	£24.50
2.16	611716-131	£24.50
2.17	611717-131	£24.50
2.18	611718-131	£24.50
2.19	611719-131	£24.50
2.2	611720-131	£24.50
2.21	611721-131	£24.50
2.22	611722-131	£24.50
2.23	611723-131	£24.50
2.24	611724-131	£24.50
2.25	611725-131	£27.20
2.26	611726-131	£27.20
2.27	611727-131	£27.20
2.28	611728-131	£27.20
2.29	611729-131	£27.20
2.3	611730-131	£27.20
2.31	611731-131	£27.20
2.32	611732-131	£27.20
2.33	611733-131	£27.20
2.34	611734-131	£27.20
2.35	611735-131	£27.20
2.36	611736-131	£27.20
2.37	611737-131	£27.20
2.38	611738-131	£27.20
2.39	611739-131	£27.20
2.4	611740-131	£27.20
2.41	611741-131	£27.20
2.42	611742-131	£27.20
2.43	611743-131	£27.20
2.44	611744-131	£27.20
2.45	611745-131	£27.20
2.46	611746-131	£27.20
2.47	611747-131	£27.20
2.48	611748-131	£27.20
2.49	611749-131	£27.20
2.5	611642-131	£27.20
2.6	611750-131	£27.20
2.7	611751-131	£27.20
2.8	611752-131	£27.20
2.9	611753-131	£27.20
3	611613-131	£27.20
3.5	611643-131	£27.20
4	611614-131	£27.20
4.5	611644-131	£27.20
5	611615-131	£27.60

Length (mm)	Code No.	Price
5.1	611850-131	£86.50
5.5	611645-131	£33.00
6	611616-131	£33.60
6.5	611646-131	£33.60
7	611617-131	£33.60
7.5	611647-131	£33.60
7.7	611851-131	£33.60
8	611618-131	£33.60
8.5	611648-131	£33.60
9	611619-131	£33.60
9.5	611649-131	£33.60
10	611671-131	£33.60
10.3	611852-131	£34.50
10.5	611650-131	£34.50
11	611621-131	£41.20
11.5	611651-131	£41.20
12	611622-131	£41.80
12.5	611652-131	£41.80
12.9	611853-131	£96.50
13	611623-131	£41.80
13.5	611653-131	£41.80
14	611624-131	£42.30
14.5	611654-131	£42.30
15	611625-131	£42.30
15.5	611655-131	£42.30
16	611626-131	£44.60
16.5	611656-131	£44.60
17	611627-131	£44.60
17.5	611657-131	£44.60
17.6	611854-131	£110.00
18	611628-131	£44.60
18.5	611658-131	£44.60
19	611629-131	£44.60
19.5	611659-131	£44.60
20	611672-131	£44.60
20.2	611855-131	£110.00
20.5	611660-131	£44.60
21	611631-131	£48.50
21.5	611661-131	£48.50
22	611632-131	£48.50
22.5	611662-131	£48.50
22.8	611856-131	£110.00
23	611633-131	£48.50
23.5	611663-131	£48.50
24	611634-131	£48.50
24.5	611664-131	£48.50
25	611635-131	£49.50
25.25	611754-131	£50.50
30	611673-131	£55.50
35	611755-131	£60.20
40	611674-131	£61.50
41.3	611857-131	£65.20
45	611756-131	£66.50
50	611675-131	£68.80
60	611676-131	£79.60
70	611677-131	£87.00
75	611801-131	£89.50
80	611678-131	£96.40
90	611679-131	£99.70
100	611681-131	£106.00

Note: larger sizes available on request.

# Gauge Blocks

## Individual Inch Steel Gauge Blocks Grade 1



611201-131

### Specifications

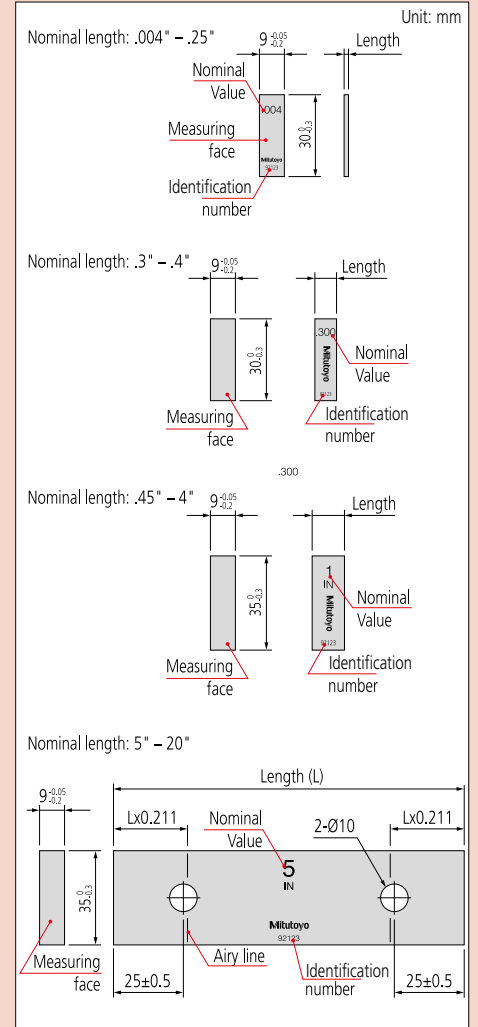
#### Inch

Length (inch)	Code No.	Price
.05	611105-131	£26.00
.0625 (1/16)	611303-131	£25.60
.1	611191-131	£27.10
.10005	611135-131	£27.10
.1001	611121-131	£27.10
.1002	611122-131	£27.10
.1003	611123-131	£27.10
.1004	611124-131	£27.10
.1005	611125-131	£27.10
.1006	611126-131	£27.10
.1007	611127-131	£27.10
.1008	611128-131	£27.10
.1009	611129-131	£27.10
.101	611141-131	£27.10
.102	611142-131	£27.10
.103	611143-131	£27.10
.104	611144-131	£27.10
.105	611145-131	£27.10
.106	611146-131	£27.10
.107	611147-131	£27.10
.108	611148-131	£27.10
.109	611149-131	£27.10
.11	611150-131	£27.10
.111	611151-131	£27.10
.112	611152-131	£27.10
.113	611153-131	£27.10
.114	611154-131	£27.10
.115	611155-131	£27.10
.116	611156-131	£27.10
.117	611157-131	£27.10
.118	611158-131	£27.10
.119	611159-131	£27.10
.12	611160-131	£27.10
.121	611161-131	£27.10
.122	611162-131	£27.10
.123	611163-131	£27.10
.124	611164-131	£27.10
.125	611165-131	£27.10
.126	611166-131	£27.10
.127	611167-131	£27.10
.128	611168-131	£27.30
.129	611169-131	£27.30
.13	611170-131	£27.30
.131	611171-131	£27.30
.132	611172-131	£27.30
.133	611173-131	£27.30
.134	611174-131	£27.30
.135	611175-131	£27.30

Length (inch)	Code No.	Price
.136	611176-131	£27.30
.137	611177-131	£27.30
.138	611178-131	£27.30
.139	611179-131	£27.30
.14	611180-131	£27.30
.141	611181-131	£27.30
.142	611182-131	£27.30
.143	611183-131	£27.30
.144	611184-131	£27.30
.145	611185-131	£27.30
.146	611186-131	£27.30
.147	611187-131	£27.30
.148	611188-131	£27.30
.149	611189-131	£27.30
.15	611115-131	£27.30
.16	611116-131	£27.30
.17	611117-131	£27.30
.18	611118-131	£27.30
.19	611119-131	£27.70
.2	611192-131	£27.70
.21	611221-131	£29.50
.25	611212-131	£33.90
.3	611193-131	£34.50
.315	611209-131	£35.20
.35	611213-131	£35.20
.375 (3/8)	611113-131	£35.20
.4	611194-131	£35.20
.420	611210-131	£35.20
.45	611214-131	£42.60
.5	611195-131	£43.00
.55	611215-131	£43.40
.6	611196-131	£44.00
.605	611211-131	£44.00
.65	611216-131	£45.50
.7	611197-131	£46.10
.710	611220-131	£46.10
.75	611217-131	£46.40
.8	611198-131	£46.80
.815	611226-131	£46.80
.85	611218-131	£48.00
.9	611199-131	£50.10
.920	611227-131	£50.10
.95	611219-131	£50.10
1	611201-131	£50.30
2	611202-131	£70.30
3	611203-131	£91.10
4	611204-131	£110.00

Note: larger sizes available on request.

### Dimensions



## SERIES 516 – Wear Block Sets

- For protecting the measuring surfaces of the working gauge blocks in a set from excessive wear. Incorporated into a stack at one or both ends, these inexpensive and easily replaced blocks absorb the wear due to contact with abrasive workpieces and so help maintain the condition and accuracy of all the gauge blocks in a set.



516-806-10



516-834-16

### Specifications

Metric					
Blocks per set	Code No.	Grade	Contents	Nominal size	Price
Carbide					
2	516-807-10	0	2 pcs.	1 mm	£194.00
	516-806-10	1			£180.00
	516-803-10	0		2 mm	£194.00
	516-802-10	1			£180.00
CERA					
2	516-832-10	0	2 pcs.	1 mm	£108.00
	516-833-10	1			£92.00
	516-830-10	0		2 mm	£108.00
	516-831-10	1			£92.00
Inch					
Blocks per set	Code No.	Grade	Contents	Nominal size	Price
Carbide					
2	516-809-16	0	2 pcs.	.05"	£205.00
	516-808-16	1			£195.00
	516-805-16	0		.1"	£205.00
	516-804-16	1			£195.00
CERA					
2	516-836-16	0	2 pcs.	.05"	£108.00
	516-837-16	1			£92.00
	516-834-16	0		.1"	£108.00
	516-835-16	1			£92.00

# Gauge Blocks

## SERIES 516 – Gauge Block Accessory Sets

- To expand the range of gauge block applications, Mitutoyo offers gauge block accessory sets. By assembling the items in a set, together with gauge blocks, you can easily and quickly build up a custom precision gauge to suit your application.



**516-601J**  
(22 pcs)

### Specifications

Item description	Code No.	Set of 22 pcs 516-601J	Quantity	Price
Holder	619002	—	1 pc.	£209.00
	619003	✓		£218.00
	619004	✓		£242.00
	619005	✓		£253.00
Base	619009	✓	One pair (2 pcs)	£322.00
	619010	✓		£228.00
Half round jaw	619011	✓		£227.00
	619012	✓		£267.00
	619013	✓		£322.00
	619014	✓		£410.00
Plain jaw	619018	✓	£246.00	
Scriber point	619019	✓	1 pc.	£84.90
Centre point	619020	✓		£107.00
Tram point	619021	✓	One pair (2 pcs)	£371.00
Triangular straight edge	619022	✓		1 pc.
	619023	✓	£342.00	

Code No.	Description	Price
<b>516-601J</b>	22 pc set	<b>£3960.00</b>

### Application Examples



Gauging a bore using a pair of half round jaws and a holder.



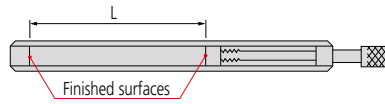
Marking a workpiece using the base, a holder and the scriber point.



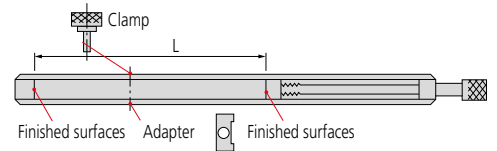
Setting a bore gauge using a holder with the pair of Type I half-round jaws arranged as flat contact surfaces.

### Holder Dimensions

Thickness = 15 mm, width = 29.5 mm



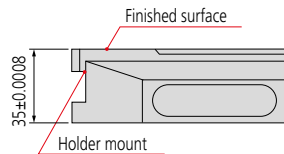
**619002** L = 15 - 60 mm  
**619003** L = 5 - 100 mm



**619004** L = 15 - 160 mm  
**619005** L = 20 - 250 mm

Used to clamp a stack of gauge blocks and jaws (or scriber point, etc.) together to form a gauge

### Base Dimensions

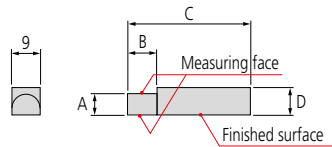


**619009**

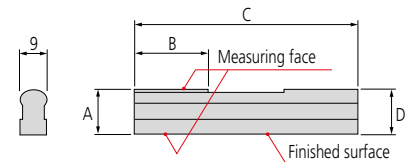
Flatness tolerance of the finished surface: 0.5 μm  
 Flatness tolerance of the bottom surface: 1 μm

### Half Round Jaw Dimensions

Type I



Type II



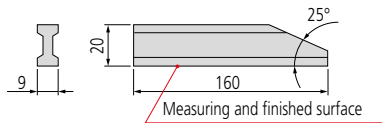
Flatness tolerance of the finished surface: 0.5 μm

Unit: mm

Code No.	Type	Size	A	B	C	D
<b>619010</b>	I	2	2±0.0005	5.5	40	7.5
<b>619011</b>		5	5±0.0005	14	45	7.5
<b>619012</b>		8	8±0.0005	20	50	8.5
<b>619013</b>	II	12	12±0.0005	25	75	13
<b>619014</b>		20	20±0.0005	25	125	20

### Plain Jaw (B type) Dimensions

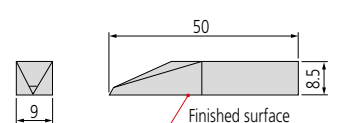
**619018**



Flatness tolerance of the finished surface: 1 μm

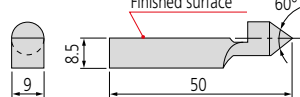
### Scriber Point Dimensions

**619019**



### Centre Point Dimensions

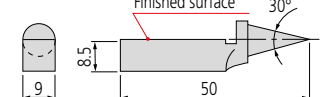
**619020**



Eccentricity tolerance of the point: ±10 μm  
 Flatness tolerance of the finished surface: 0.5 μm

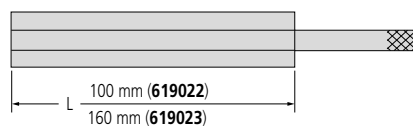
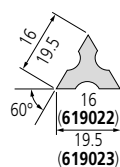
### Tram Point Dimensions

**619021**



Eccentricity tolerance of the point: ±10 μm  
 Flatness tolerance of the finished surface: 0.5 μm

### Triangular Straight Edge Dimensions



Straightness tolerance of the edges: 1.2 μm

# Gauge Blocks

## SERIES 516 – Maintenance Kit for Gauge Blocks

- Maintenance kit for gauge blocks includes all the necessary maintenance tools for removing burrs and contamination before use, and applying anti-corrosion treatment after use, etc.



**516-650E**  
Shown with anti-corrosion oil (optional accessory).



### Recommendation for regular calibration

Gauge blocks are often used to define a company's standard of length for manufacturing and as such must be reliable. This means that they need regular calibration to verify accuracy. (The problem of damage or corrosion should be addressed during use and blocks seriously affected must be discarded immediately.) The frequency of calibration depends on the tolerance requirements of the work, the amount of use and conditions under which the gauge blocks are used. The most economical cycle for any particular set of gauge blocks is best determined by studying the calibration history. The list below indicates timings for a typical initial calibration cycle for the various grades of block.

Application	Cycle	Grade
Reference	1 - 2 years	K
Calibration	2 years	K or 0
Inspection	2 years	0 or 1
Shop floor	0.5 - 1 year	1 or 2

As an accredited calibration laboratory, Mitutoyo offers a traceable calibration service for customers' gauge blocks. Our regular calibration service features:

- Gauge blocks manufactured by any maker can be calibrated.
- Cleansing and removal of burrs.
- Central dimension and maximum deviation of each block are measured.
- Calibration results are provided for immediate use and for building a calibration history of each block.

### Specifications

Code No.	Tools and accessories included	Price
<b>516-650E</b>	Ceraston ( <b>601645</b> ): For removing burrs on the measuring surfaces (100x25x12 mm).	<b>£590.00</b>
	Optical flat ( <b>158-117</b> ): For checking whether burrs exist on the measuring surfaces (ø45x12 mm).	
	Tweezers ( <b>600004</b> ): For handling thin blocks.	
	Blower brush ( <b>600005</b> ): For blowing dust off the measuring surfaces.	
	Cleaning paper ( <b>600006</b> ): For wiping off anti-corrosion oil and contamination (500 pcs.).	
	Artificial leather mat ( <b>600007</b> ): For handling blocks on a benchtop to prevent contamination and damage.	
	Reagent bottle ( <b>600008</b> ): Bottle of cleansing solution (100 ml).	
Gloves ( <b>600009</b> ): For handling large blocks to prevent expansion due to heat transfer from operator.		

## Removing burrs

Figure 1

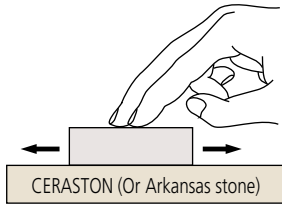
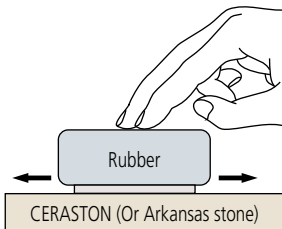


Figure 2



1. Wipe any dust and oil films from the gauge block and the Ceraston (or Arkansas stone) using a solvent.
2. Place the gauge block on the Ceraston so that the measuring face that has burrs is on the abrasive surface of the stone. While applying light pressure, move the gauge block to and fro about ten times (Fig. 1). Use a block rubber for thin gauge blocks to apply even pressure (Fig. 2).
3. Check the measuring face for burrs with an optical flat. If the burrs have not been removed, repeat step (2). If burrs are too large, they may not be removed with an abrasive stone. If so, discard the gauge block.

Note: The abrasive surface of a Ceraston must be made flat by lapping it from time to time. After lapping the Ceraston, the lapping powder must be completely removed from the surface to prevent the surface of the gauge block from being scratched.

Mitutoyo does not offer Arkansas stones.

## Ceraston – Accessory for Gauge Block Maintenance

- Alumina-ceramic abrasive stone for removing burrs from hard materials such as ceramics that ordinary stones cannot handle.
- Can be used both for steel gauge blocks and CERA blocks.
- Excellent in the ease with which burrs can be removed and for durability compared with Arkansas stones.
- Both sides can be used.



601644



601645

### Specifications

Code No.	Dimensions (WxDxH)	Price
601644	150x50x20 mm	£338.00
601645	100x25x12 mm	£145.00



Application example.

# Reference Gauges

## SERIES 515 – Height Master

- For calibrating and setting height gauges.
- A double gauge block height micrometer with integrated counter that makes reading faster, easier and error-free.
- The gauge blocks in the Height Master are arranged in two parallel rows, with a block step of 20 mm or 1" depending on model.
- The Digimatic models are equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.

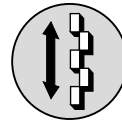
**MeasurLink** ENABLED  
Data Management Software by Mitutoyo



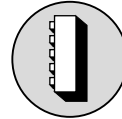
515-322



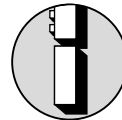
515-374



Staggered 20 mm or 1" blocks (movable)



Vertical orientation



Riser block

### Specifications

Metric							
Code No.	Measuring range	Block pitch accuracy	Parallelism of blocks	Feed error	Retrace error	Mass	Price
<b>Height Master</b>							
515-322	5-310 mm	±1.5 µm	1 µm	±1 µm	1 µm	23 kg	£2690.00
<b>Digimatic Height Master</b>							
515-374	10-310 mm	±1.5 µm	2 µm	±2 µm	2 µm	9.5 kg	£2250.00
Inch							
Code No.	Range (H)	Block pitch accuracy	Parallelism of blocks	Feed error	Retrace error	Mass	Price
<b>Height Master</b>							
515-311	.2-12.2"	±50 µin	40 µin	±40 µin	40 µin	23 kg	£2690.00
<b>Digimatic Height Master</b>							
515-375	.5-12"	±100 µin	50 µin	±100 µin	100 µin	9.5 kg	£2250.00

Note: The block accuracy and the parallelism of blocks are relative to the main unit reference surfaces.

### Technical Data

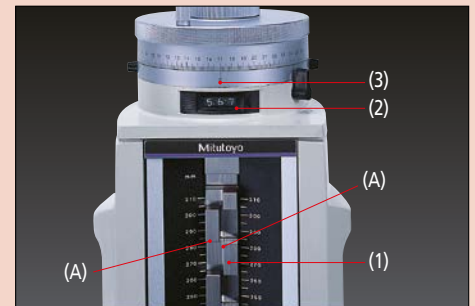
Graduation:	0.001 mm (.00001")
Micrometer adjustment:	20 mm (1")
Micrometer feed:	0.5 mm/rev (.025"/rev)
<b>Digimatic models only</b>	
Display:	LCD
Battery:	SR44 (2 pcs.), <b>938882</b>
Battery life:	Approx. 1.8 years under normal use

### Functions (Digimatic models only)

Zero setting, Presetting, ABS/INC switching, Data hold, Data output, Auto power off, inch/mm reading (inch/mm models)  
Alarm: Low voltage, Counting value composition error

### Optional Accessories (Digimatic models only)

Code No.	Description	Price
959149	SPC data cable with pushbutton (1 m)	£35.70
959150	SPC data cable with pushbutton (2 m)	£40.60



Mechanical height readout of adjacent top and bottom block surfaces (A) relative to base.

(1) Scale	280.
(2) Counter	5.67
(3) Thimble	0.000
	<hr/> 285.670 mm



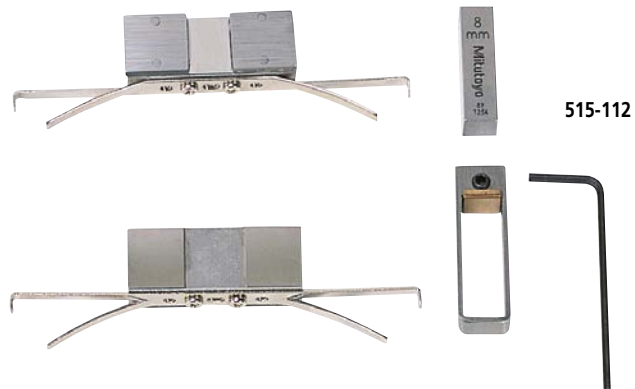
Digital height readout.





## SERIES 515 – Height Master Auxiliary Block Kit for Bore Gauge Setting

- Used for efficient reference-setting of dial bore gauges and tubular inside micrometers (18-150 mm) on a Height Master.

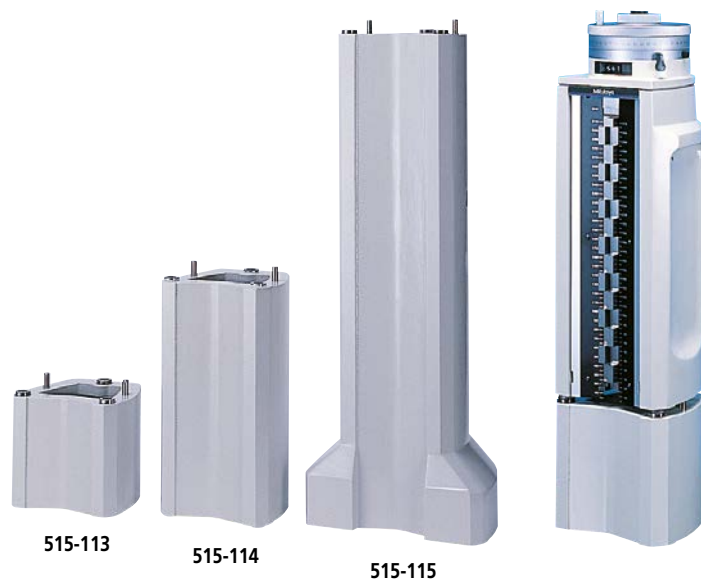


### Specifications

Metric			Inch		
Code No.	Suitable type	Price	Code No.	Suitable type	Price
515-111	Digimatic Height Master (515-374)	£232.00	515-120	Digimatic Height Master (515-375)	£232.00
515-112	Height Master (515-322)	£232.00	515-121	Height Master (515-311)	£232.00

## SERIES 515 – Height Master Riser Blocks

- The measuring range of a Height Master can be extended up to 900 mm by using 150, 300 or 600 mm riser blocks.



### Specifications

Metric					
Code No.	Height	Accuracy	Variation in length	Mass	Price
515-113	150 mm	±0.6 µm	0.6 µm	5.7 kg	£395.00
515-114	300 mm	±1 µm	0.8 µm	11.8 kg	£560.00
515-115	600 mm	±2 µm	1 µm	26.8 kg	£890.00

Inch					
Code No.	Height	Accuracy	Variation in length	Mass	Price
515-116	6"	±20 µin	20 µin	5.7 kg	£395.00
515-117	12"	±40 µin	30 µin	11.8 kg	£560.00
515-118	24"	±80 µin	40 µin	27.9 kg	£890.00

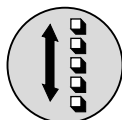
# Reference Gauges

## SERIES 515 – Check Master

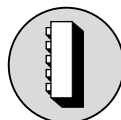
- This calibration fixture is designed for calibrating the X-, Y- and Z-coordinate axes of precision machine tools and coordinate measuring machines.
- Rigidly clamped 10 mm gauge blocks provide a step of 20 mm.



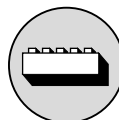
515-722



Single-row  
10 mm blocks



Vertical  
orientation



Horizontal  
orientation

### Specifications

Metric				
Code No.	515-720	515-721	515-722	515-723
Range (H)	300 mm	450 mm	600 mm	1000 mm
Block pitch accuracy	$H \leq 310$ mm	$\pm 2.5 \mu\text{m}$		
	$310 < H \leq 610$ mm	—	$\pm 3.5 \mu\text{m}$	
	$610 < H \leq 1010$ mm	—	—	$\pm 5 \mu\text{m}$
Parallelism of blocks	$H \leq 310$ mm	$1.2 \mu\text{m}$		
	$310 < H \leq 610$ mm	—	$1.5 \mu\text{m}$	
	$610 < H \leq 1010$ mm	—	—	$2 \mu\text{m}$
Mass	7 kg	10 kg	13 kg	22 kg
Price	<b>£2920.00</b>	<b>£3370.00</b>	<b>£3820.00</b>	<b>£6270.00</b>

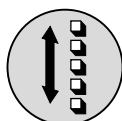
Notes: 1) The block accuracy and the parallelism of blocks are relative to the main unit reference surface.  
2) Supplied with a wooden storage case as standard.

## SERIES 515 – High Accuracy Check Master

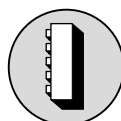
- This calibration fixture is designed for calibrating the X-, Y- and Z-coordinate axes of precision machine tools and coordinate measuring machines.
- Rigidly clamped 10 mm (or .5") gauge blocks provide a step of 20 mm (or 1").



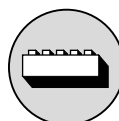
515-742



Single-row  
10 mm (.5") blocks



Vertical  
orientation



Horizontal  
orientation

### Specifications

Metric			
Code No.	515-741	515-742	515-743
Range (R)	450 mm	600 mm	1000 mm
Block pitch accuracy	$H \leq 310$ mm	$\pm 1.2 \mu\text{m}$	
	$310 < H \leq 610$ mm	$\pm 1.8 \mu\text{m}$	
	$610 < H \leq 1010$ mm	—	$\pm 2.5 \mu\text{m}$
Parallelism of blocks	$H \leq 450$ mm	$1 \mu\text{m}$	
	$450 < H \leq 1010$ mm	—	$1.5 \mu\text{m}$
Mass	5.4 kg	7.2 kg	12 kg
Price	<b>£3500.00</b>	<b>£3970.00</b>	<b>£6470.00</b>

Inch			
Code No.	515-731	515-732	515-733
Range (R)	18"	24"	40"
Block pitch accuracy	$H \leq 12"$	$\pm 50 \mu\text{in}$	
	$12" < H \leq 24"$	$\pm 70 \mu\text{in}$	
	$24" < H \leq 40"$	—	$\pm 100 \mu\text{in}$
Parallelism of blocks	$H \leq 18"$	$40 \mu\text{in}$	
	$18" < H \leq 40"$	—	$60 \mu\text{in}$
Mass	5.4 kg	7.2 kg	12 kg
Price	<b>£3500.00</b>	<b>£3970.00</b>	<b>£6470.00</b>

Notes: 1) The block accuracy and the parallelism of blocks are relative to the main unit reference surface.  
2) Supplied with a wooden storage case as standard.

### Optional Accessory

Code No.	Description	Price
601167	Supporting base for vertical operation	<b>£510.00</b>



Supporting base

## Technical Data

Section: 60° vee

## SERIES 528 – Straight Edge

- Designed for testing the straightness of workpiece features.
- Hardened, ground and micro-lapped measuring edge.
- Made of tool steel with heat shield.



## Specifications

Metric			
Code No.	Length	Remarks	Price
528-100	50 mm	—	£24.50
528-101	75 mm	—	£27.70
528-102	100 mm	—	£31.10
528-103	150 mm	—	£33.70
528-104	200 mm	—	£43.70
528-105	300 mm	Supplied in a wooden case	£97.90
528-106	400 mm	Supplied in a wooden case	£160.00
528-107	500 mm	Supplied in a wooden case	£217.00

## Technical Data

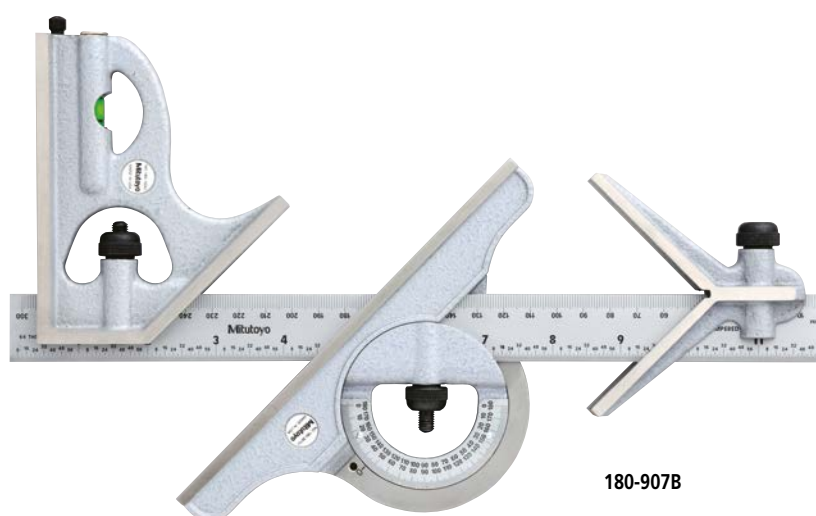
Square head: Used to set the rule at 90° or 45° to an edge of a workpiece.

Centre head: Used to locate centres of round workpieces.

Protractor head: Used to set the rule at a desired angle to an edge of a workpiece. Also used for measuring angles.

## SERIES 180 – Combination Square Set

- Three heads are attachable to the satin-chrome plated rule (blade), allowing versatile measurements on various types of workpieces.



## Specifications

Inch/Metric			
Code No.	Size	Graduation	Price
180-907B	12" / 300 mm	1/32", 1/64", 1 mm, 0.5 mm	£240.00

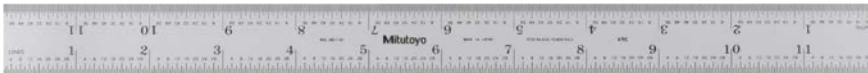
# Reference Gauges

## SERIES 182 – Steel Rules

- Clear graduations on satin-chrome finish.
- Made of stainless steel, hardened and tempered.



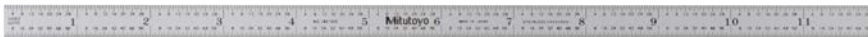
182-131



182-121



182-125



182-225

### Specifications

#### Metric

Code No.	Graduations	Range	Width	Price
Wide rigid rules				
182-111	1 mm, 0.5 mm (on both faces)	150 mm	19 mm	£8.20
182-131		300 mm	25 mm	£15.50
Fully flexible rules				
182-211	1 mm, 0.5 mm (on both faces)	150 mm	12 mm	£13.70
182-231		300 mm	12 mm	£14.10

#### Inch

Code No.	Graduations	Range	Width	Price
Wide rigid rules				
182-101	1/8", 1/16", 1/32", 1/64"	6"	.75"	£8.20
182-121		12"	.98"	£15.50
Fully flexible rules				
182-201	1/8", 1/16", 1/32", 1/64"	6"	.47"	£10.20
182-221		12"	.47"	£14.10

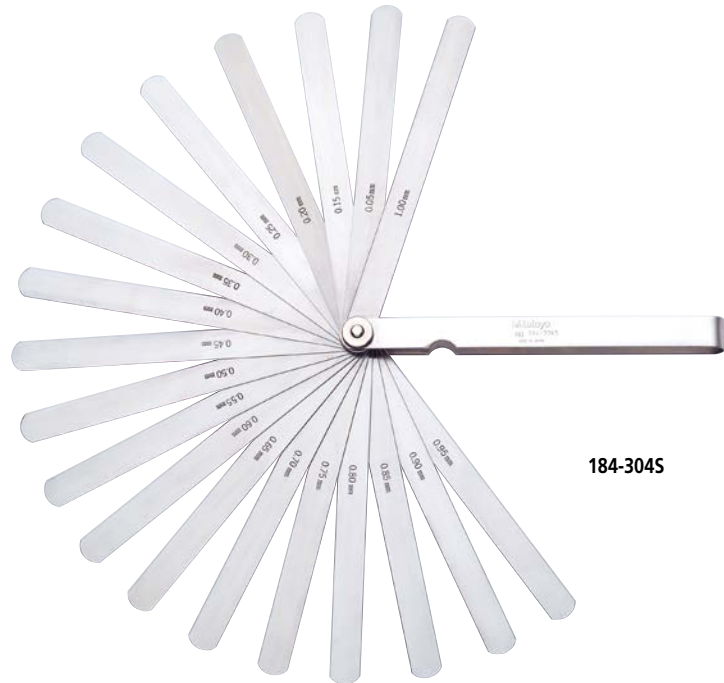
#### Inch/Metric

Code No.	Graduations	Range	Width	Price
Wide rigid rules				
182-105	1/32", 1/64", 1 mm, 0.5 mm	6" / 150 mm	.75"	£10.80
182-125		12" / 300 mm	.98"	£22.60
182-145		18" / 450 mm	1.18"	£38.20
182-165		24" / 600 mm	1.18"	£54.20
Semi-flexible rules				
182-309*	1/16", 1/32", 1/64", 1 mm, 0.5 mm	40" / 1000 mm	.59"	£58.50
Fully flexible rules				
182-205	1/32", 1/64", 1 mm, 0.5 mm	6" / 150 mm	.47"	£10.20
182-225		12" / 300 mm	.47"	£14.10
182-245		18" / 450 mm	.75"	£35.90
182-265		24" / 600 mm	.75"	£45.60

\* Graduations engraved on the front side only.

## SERIES 184 – Thickness Gauges

- Designed for gauging the width of narrow gaps.
- Each leaf is marked with its thickness.
- Each leaf is detachable if necessary.

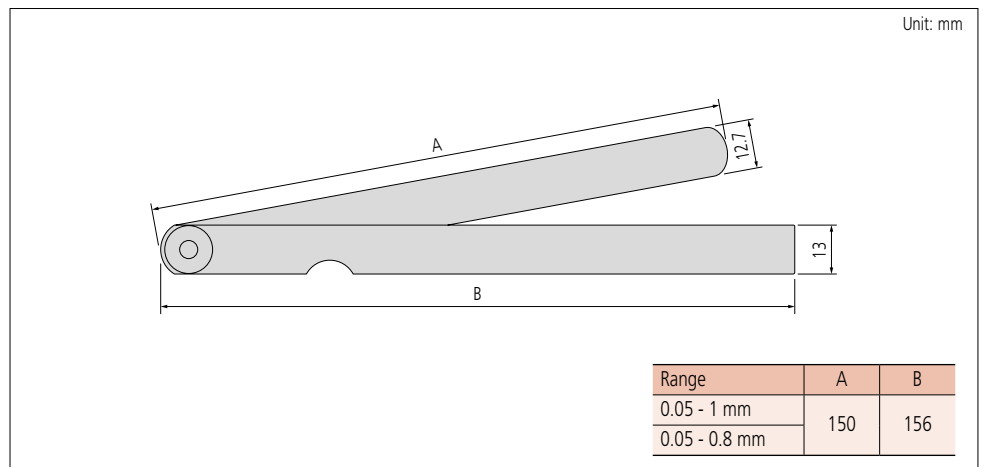


184-304S

### Specifications

Metric				
Code No.	Range	Composition of leaves	Remarks	Price
184-303S	0.05 - 1 mm	28 leaves: 0.05 - 0.15 mm by 0.01 mm, 0.2 - 1 mm by 0.05 mm	Long leaf	£65.50
184-304S		20 leaves: 0.05 - 1 mm by 0.05 mm		£42.40
184-308S	0.05 - 0.8 mm	10 leaves: 0.05 - 0.2 mm by 0.05 mm, 0.3 - 0.8 mm by 0.1 mm		£19.90

### Dimensions



# Reference Gauges

## SERIES 186 – Radius Gauges

- Designed for gauging small internal and external radii.
- Each leaf comprises an internal and an external radius gauge of the same size.
- Radius size is stamped on each leaf.
- With locking clamp to enable convenient handling.



186-105



186-110

### Specifications

#### Metric

Code No.	Range	Composition of leaves	Remarks	Price
186-110	0.4 - 6 mm	18 leaves: 0.4, 0.8, 1, 1.2, 1.5, 1.6 mm, 1.75 - 3 mm by 0.25 mm, 3.5 - 6 mm by 0.5 mm	90° arc	£37.50
186-902	0.5 - 13 mm	26 leaves: 0.5 - 13 mm by 0.5 mm	90° arc	£166.00
186-105	1 - 7 mm	34 leaves: 1 - 3 mm by 0.25 mm 3.5 - 7 mm by 0.5 mm	180° arc	£33.20
186-106	7.5 - 15 mm	32 leaves: 7.5 - 15 mm by 0.5 mm	180° arc	£39.70
186-107	15.5 - 25 mm	30 leaves: 15.5 - 20 mm by 0.5 mm, 21 - 25 mm by 1 mm	180° arc	£63.70

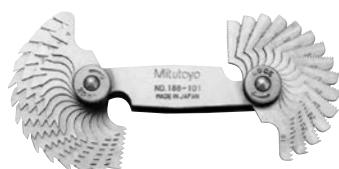
#### Inch

Code No.	Range	Composition of leaves	Remarks	Price
186-103	1/32" - 17/64"	16 leaves: 1/32" - 17/64" by 64ths	90° arc	£33.80
186-101	1/32" - 1/4"	15 leaves: 1/32" - 1/4" by 64ths	180° arc	£33.70
186-102	17/64" - 1/2"	16 leaves: 17/64" - 1/2" by 64ths	180° arc	£38.70
186-104	9/32" - 33/64"	16 leaves: 9/32" - 33/64" by 64ths	90° arc	£37.40
186-901*	1/64" - 1/2"	25 leaves: 1/64" - 17/64" by 64ths, 9/32" - 1/2" by 32nds	—	£161.00

\* Each gauge has five measuring locations.

## SERIES 188 – Thread Pitch Gauges

- Thread pitch is stamped on each gauge.
- Metric, Unified, and Whitworth screw pitch gauges.



188-101

### Specifications

Code No.	Range	Composition of leaves	Price
<b>Metric screw pitch gauges</b>			
188-130	0.35 - 6 mm	22 leaves: 0.35, 0.4, 0.45, 0.5, 0.6, 0.7, 0.75, 0.8, 1, 1.25, 1.5, 1.75, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6 mm and 60° angle gauge	£35.20
188-122	0.4 - 7 mm	21 leaves: 0.4, 0.5, 0.7, 0.75, 0.8, 0.9, 1, 1.25, 1.5, 1.75, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7 mm	£35.20
188-121	0.4 - 7 mm	18 leaves: 0.4, 0.5, 0.75, 1, 1.25, 1.5, 1.75, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7 mm	£35.20
<b>Unified screw pitch gauges</b>			
188-111	4 - 42 TPI	30 leaves: 4, 4 1/2, 5, 5 1/2, 6, 7, 8, 9, 10, 11, 11 1/2, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42 TPI	£38.90
<b>Metric and Unified screw pitch gauge set</b>			
188-151	0.4 - 7 mm/ 4 - 42 TPI	51 leaves: consisting of sets 188-122 and 188-111	£66.00
<b>Whitworth screw pitch gauges</b>			
188-101	4 - 42 TPI	30 leaves: 4, 4 1/2, 5, 5 1/2, 6, 7, 8, 9, 10, 11, 11 1/2, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 27, 28, 30, 32, 34, 36, 38, 40, 42 TPI	£36.50
188-102	4 - 60 TPI	28 leaves: 4, 4 1/2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 16, 18, 19, 20, 22, 24, 25, 26, 28, 30, 32, 34, 36, 40, 48, 60 TPI	£35.20

### Technical Data

Battery: Lithium Battery  
 Battery life: 2,000 hours

### Functions

Presetting

### Accessory Included

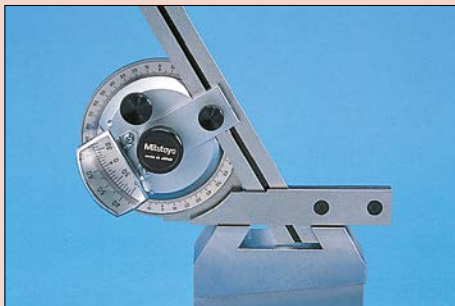
950749: Holder for mounting on height gauges

### Optional Accessories

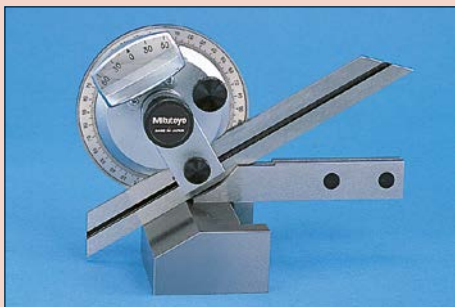
Code No.	Description	Price
187-103	300 mm / 12" blade	£28.30
187-104	150 mm / 6" blade	£18.70
905338	SPC data cable (1 m)	£33.90
905409	SPC data cable (2 m)	£38.00

### Accessory Included

950750: Holder for mounting on height gauges



Measuring an internal dovetail slide angle.



Measuring an external angle.

## SERIES 187 – Digimatic Universal Protractor

- Universal Bevel Protractor with easy-to-read digital display.
- Automatic turn-off after 10 minutes; fixed reference points for easy adjustment.
- Fine adjustment for precise setting of angles.
- The protractor head slides and clamps at any point along the blade.
- Will mount on Series 192 height gauges via holder.
- Data output port that enables incorporation into measurement networking and statistical process control systems.

### MeasurLink<sup>®</sup> ENABLED

Data Management Software by Mitutoyo



187-552

### Specifications

#### Inch/Metric

Code No.	Blade length	Measuring range	Accuracy	Resolution	Repeatability	Price
187-551	150 mm / 6"	-360° to +360°	±2' (±0.03°)	1' (0.01°)	1' (0.01°)	£825.00
187-552	300 mm / 12"					£855.00

## SERIES 187 – Universal Bevel Protractor

- High-precision instrument for accurate angle measurement on machines, moulds, and jigs.
- Can be attached to height gauges.



187-908

### Specifications

#### Inch/Metric

Code No.	Blade length	Graduation	Circle division	Remarks	Price
187-907	150 mm / 6"	5' (0° - 90° - 0°)	90° x 4 (360°)	w/60°, 45° edges	£220.00
187-908	300 mm / 12"				£235.00

# Reference Gauges

## SERIES 950 – Digital Protractor

- Newly developed instrument for measurement of flatness, squareness and angularity.
- Precision support surface in aluminium frame for high rigidity and low weight.



950-317

### Technical Data

Accuracy:	See table
Measuring range:	360° (4 x 90°)
Power supply:	Standard battery (9 V)
Operating temperature:	-5 to 50 °C
Mounting holes:	M3 x 0.5

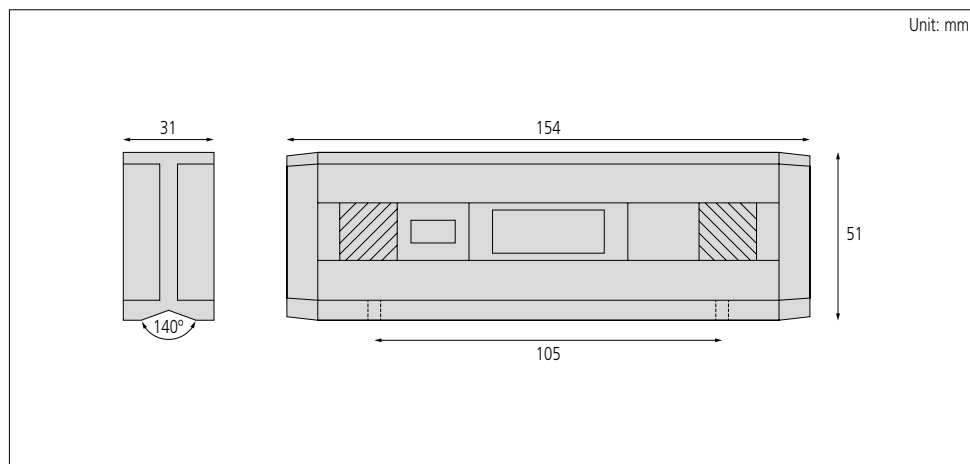
### Optional Accessory (for 950-318 only)

Code No.	Description	Price
50AAA983	RS-232C cable with footswitch (3 m)	£186.00

### Specifications

Code No.	Resolution/sensitivity	Accuracy	Repeatability	Mass	Price
Model Pro 360					
950-317	0.1°	0.05 m horizontal ±0.1° vertical ±0.2° m/m	± 0.1°	325 g	£310.00
Model Pro 3600					
950-318	0.01° (0° to 9.99°) 0.1° (10° to 90°)	±0.05° (0° to 10°) ±0.2° (10° to 80°) ±0.1° (80° to 90°)	± 0.05°	332 g	£504.00

### Dimensions





### SERIES 960 – Precision Level

- Intended for setting elements of machine tools and instruments precisely level.
- Longitudinal and transverse vials.
- Flat base, precision ground with vee for accurate location on cylindrical features.
- Adjustable for zero level.



960-601

#### Specifications

Code No.	Sensitivity	Accuracy of graduations	Dimensions (W x D x H)	Price
960-601	0.1 mm/m	0.05 mm/m	200 x 44 x 38.2 mm	£292.00
960-602	0.05 mm/m	0.025 mm/m		£330.00
960-603	0.02 mm/m	0.01 mm/m		£356.00

### SERIES 960 – Precision Frame Level

- Intended for setting elements of machine tools and instruments precisely level or perpendicular.
- Longitudinal and transverse vials.
- Flat measuring faces, precision ground with two faces vee-ground for accurate location on cylindrical features.
- Adjustable for zero level.



960-703

#### Specifications

Code No.	Sensitivity	Accuracy of graduations	Dimensions (W x D x H)	Price
960-703	0.02 mm/m	±0.3 DIV	200 x 44 x 200 mm	£585.00

# Reference Gauges

## SERIES 967 – Bench Centres

- Used with a dial test indicator (optional), these Bench Centres provide support for precision measurement of concentricity on cylindrical workpieces.
- With an indicator clamp (holding stem diameter: 8 mm).

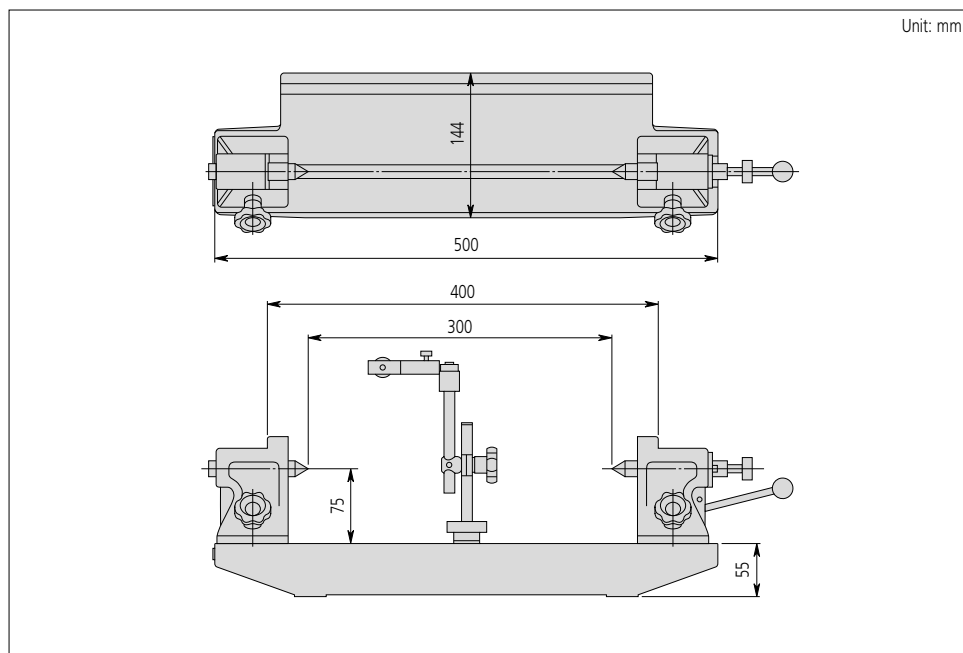


967-201-10

### Specifications

Code No.	Maximum workpiece length	Maximum workpiece diameter	Mass	Price
967-201-10	300 mm	150 mm	13 kg	£1160.00

### Dimensions



## Technical Data

Grade: Conforms to BS 817 1988

## Optional Accessory

Code No.	Description	Price
CM0700	Granite cleaner (1 l)	£21.30

## SERIES 517 – Black Granite Surface Plates

- Natural granite is free from deterioration or dimensional change over time.
- Granite surface plates have significant advantages over cast iron surface plates: twice as hard as cast iron; non-magnetic; low thermal expansion.
- Free from burrs or protrusions because of the fine grain structure and insignificant stickiness; this ensures a high degree of flatness over a long service life and causes no damage to workpieces or instruments.
- Free from wringing, so there is no interruption of work.
- Use these plates in a stable temperature environment. Since flatness error occurs when there is a temperature difference between the working surface and the underside, avoid working in direct sunlight. Also, do not place a plate in the vicinity of an air conditioner, etc. (Recommended environment: temperature 20±1°C, humidity 58±2%.)



Granite surface plate and stand

## Specifications

Grade 1			Grade 0		
Code No.	Dimensions (LxWxH)	Price	Code No.	Dimensions (LxWxH)	Price
<b>Without stand</b>			<b>Without stand</b>		
517-901-1	300x200x65 mm	£129.00	517-901-0	300x200x65 mm	£150.00
517-902-1	300x300x65 mm	£165.00	517-902-0	300x300x65 mm	£185.00
517-903-1	450x300x75 mm	£195.00	517-903-0	450x300x75 mm	£215.00
517-904-1	450x450x75 mm	£260.00	517-904-0	450x450x75 mm	£290.00
517-905-1	600x450x75 mm	£380.00	517-905-0	600x450x75 mm	£430.00
517-906-1	600x600x75 mm	£480.00	517-906-0	600x600x75 mm	£550.00
517-907-1	750x600x100 mm	£590.00	517-907-0	750x600x100 mm	£670.00
517-908-1	900x600x100 mm	£720.00	517-908-0	900x600x100 mm	£790.00
<b>With stand</b>			<b>With stand</b>		
517-909-1	900x600x100 mm	£1250.00	517-909-0	900x600x100 mm	£1350.00
517-910-1	900x900x125 mm	£1630.00	517-910-0	900x900x125 mm	£1720.00
517-911-1	1200x600x100 mm	£1650.00	517-911-0	1200x600x100 mm	£1750.00
517-912-1	1200x900x125 mm	£1880.00	517-912-0	1200x900x125 mm	£1950.00
517-913-1	1200x1200x150 mm	£2480.00	517-913-0	1200x1200x150 mm	£2690.00
517-914-1	1500x1000x150 mm	£2840.00	517-914-0	1500x1000x150 mm	£3080.00
517-915-1	1500x1200x150 mm	£3190.00	517-915-0	1500x1200x150 mm	£3270.00
517-916-1	2000x1000x150 mm	£3620.00	517-916-0	2000x1000x150 mm	£3760.00
517-917-1	2000x1200x150 mm	£3870.00	517-917-0	2000x1200x150 mm	£4070.00
517-918-1	2400x1200x200 mm	£5620.00	517-918-0	2400x1200x200 mm	£6130.00

# **DIGIMATIC INDICATORS DIAL INDICATORS DIAL TEST INDICATORS INSTRUMENTS & STANDS**



## Digimatic Indicators



## Dial Indicators



## Dial Test Indicators



## Instruments & Stands



## Contents

### Digimatic Indicators

Solar Indicator ID-SS	F-03
Indicators ID-N/B	F-05
High Accuracy/Functionality Indicator ID-H	F-07
Indicator ID-CX	F-09
Peak Value Hold Indicator ID-C	F-11
Calculating Indicator ID-C	F-12
Signal Output Indicator ID-C	F-13
Bore Gauge Indicator ID-C	F-14
Multi-Function Indicator ID-F	F-15
Economical Indicator ID-S	F-16
Slim Body Economical Indicator ID-U	F-17
Low-Cost Modular Display Unit	F-18

### Dial Indicators

Compact Dial Indicators	F-21
0.01 mm Graduation Dial Indicators	F-23
0.001 mm and 0.005 mm Graduation Dial Indicators	F-25
Inch Reading Dial Indicators	F-27
One Revolution Dial Indicators	F-29
Long Stroke Dial Indicators	F-31
Long Stroke Large Dial Indicators	F-33
Special Purpose Dial Indicators	F-35
Back Plunger Dial Indicator	F-36
Optional Accessories	F-37

### Dial Test Indicators

Lever Dial Test Indicators	F-44
Horizontal Dial Test Indicator	F-45
Vertical and Parallel Face Dial Test Indicators	F-47
Pocket Dial Test Indicator	F-49
Universal Dial Test Indicator	F-50
Optional Accessories	F-51

### Instruments

i-Checker	F-54
UDT-2 Dial Indicator Tester	F-55
Calibration Tester	F-56
Digimatic Thickness Gauges	F-57
Dial Thickness Gauges	F-59
Contact Force Gauge	F-61
Digimatic Outside Caliper Gauge	F-62
Outside Dial Caliper Gauge	F-63
Digimatic Inside Caliper Gauge	F-64
Inside Dial Caliper Gauge	F-65
Dial Snap Gauges	F-66

### Stands

Magnetic Stands	F-67
Dial Gauge Stands	F-69
Comparator Stands	F-70
Granite Comparator Stands	F-71
Transfer Stand	F-72
V-Block Set	F-73
Magnetic V-Block	F-74

# Digimatic Indicators

## SERIES 543 – ABSOLUTE Digimatic Solar Indicator ID-SS

- Solar power supply. An environmentally friendly measuring instrument that does not require batteries, eliminating the hassle and cost of battery replacement. Can operate under minimum light conditions of 40 lux – lower than the level of warehouse lighting.
- Built-in recharger. The large-capacity built-in recharger allows you to use the indicator for long periods of time under light conditions below the minimum level.\*
- User-friendly operation. All functions can be accessed by using the large buttons on the front of the indicator.
- Origin recorded even if display disappears. The indicator includes an ABSOLUTE sensor that allows the previously set origin to be stored even if the display disappears due to insufficient light, making it easy to resume measurement. This feature makes ID-SS ideal for long-time or multi-point measurement.

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**ABSOLUTE**



**SOLAR**

### Technical Data

Display:	6-digit LCD and sign
Scale type:	ABSOLUTE electrostatic linear encoder
Measuring force:	1.5 N or less
Usable orientation:	All
Power supply:	Solar battery (for indoor use)
Min. operating light:	40 lux*
Max. response speed:	No limit (scanning measurement is not supported)
Stem diameter:	8 mm
Standard contact point:	<b>901312</b>

\* A built-in recharger allows a fully charged ID-SS to be used for about 3.5 hours under light conditions below the minimum level. The charging time differs depending on the environment, but it usually takes about 1.5 hours for a fully discharged ID-SS to fully recharge under light conditions of 500 lux.

### Functions

Origin set (zero-set), count direction switching, data output, inch/mm reading

Alarm: Counting value composition error, insufficient illumination intensity or charge



543-501



543-506

ID-SS can be used in standard work environments.

The following is excerpted from JIS Z9110:2010 General rules of recommended lighting levels; 5.4 Factories:

Luminance (lux)	Location (permissible work)
1500	Very detailed visual work
750	Detailed visual work; design and drawing work
500	Regular visual work such as work carried out in a factory; monitoring work such as using instrument panels and control panels
300	Administrative work carried out in a warehouse
200	Control rooms, bathrooms, and places where manual light work is carried out
150	Work such as loading, unloading, and shifting loads
100	Hallways, corridors, entrances and exits, and warehouses
50	Indoor emergency staircases

## Optional Accessories

Code No.	Description	Price
540774	Plunger lifting cable	£24.40
905338	SPC data cable (1 m)	£33.90
905409	SPC data cable (2 m)	£38.00
02AZD790F	U-WAVE-T data cable (160 mm)	£62.00
02AZE140F	U-WAVE-T data cable with footswitch connection (160/500 mm)	£127.00
21EZA105	Plunger lifting knob	£13.60
21EZA198	Plunger lifting lever	£6.30

Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

Interchangeable backs refer to page F-41 for details.

Measuring stands refer to pages F-67 to F-72 for details.

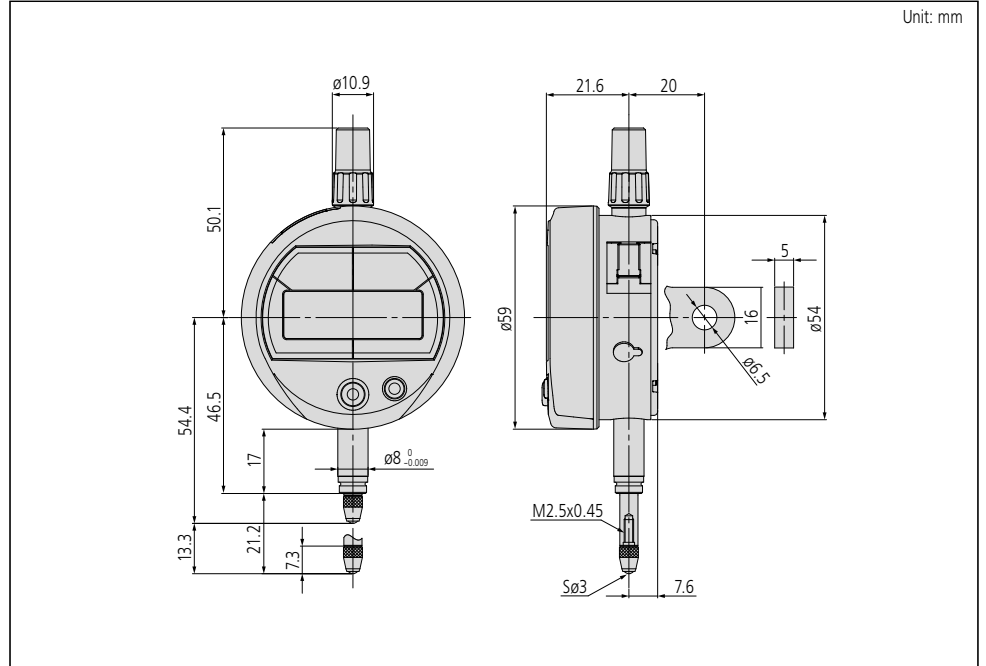


## Specifications

Inch/Metric					
Code No.	Resolution	Range	Accuracy*	Repeatability*	Price
With lug					
543-501	.00005" / 0.001 mm	.5" / 12.7 mm	±.0001" / 0.003 mm	.0001" / 0.002 mm	£249.00
543-506	.0005" / 0.01 mm		±.001" / 0.02 mm	.005" / 0.01 mm	£122.00
Flat					
543-501B	.00005" / 0.001 mm	.5" / 12.7 mm	±.0001" / 0.003 mm	.0001" / 0.002 mm	£249.00
543-506B	.0005" / 0.01 mm		±.001" / 0.02 mm	.005" / 0.01 mm	£122.00

\* Quantizing error of ±1 count is excluded.

## Dimensions



F

# Digimatic Indicators

## SERIES 543 – ABSOLUTE Digimatic Indicators ID-N/B

- Our unique ABSOLUTE sensor restores the last origin position automatically when the indicator is turned on.
- Rated to IP66: can be used satisfactorily even in adverse environments where the indicator is subject to splashing by cutting fluid or coolant.
- Slim body design (body width: only 35 mm) is advantageous in multipoint measurement situations where space is restricted.
- A 5 mm-stroke plunger with a higher degree of accuracy has been implemented by adopting a direct reading scale for plunger displacement.
- The chance of overspeed errors has been eliminated thanks to the ABSOLUTE sensor.
- Built-in tolerance judgement function provides OK, +NG, or –NG judgement of measurement with respect to the preset upper and lower limit values, indicating the status of a measurement with the appropriate symbol.
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.
- There is a choice of convenient Interface Input Tools which enable the conversion of measurement data to keyboard signals and direct input to cells in off-the-shelf spreadsheet software such as Excel.

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**ABSOLUTE IP66**



543-576



543-586



### Specifications

Inch/Metric				
Code No.	Resolution	Range	Accuracy*	Price
Slim type ID-N				
543-571	.0005", 0.01 mm	.5", 12.7 mm	.0008", 0.02 mm	<b>£208.00</b>
543-576	.0005" / .00005", 0.01 mm / 0.001 mm		.0004" / .00012", 0.01 mm / 0.003 mm	<b>£292.00</b>
Back plunger type ID-B				
543-581	.0005", 0.01 mm	.2", 5 mm	.0008", 0.02 mm	<b>£230.00</b>
543-586	.0005" / .00005", 0.01 mm / 0.001 mm		.0004" / .00012", 0.01 mm / 0.003 mm	<b>£310.00</b>

\* Quantizing error of ±1 count is excluded.

### Technical Data

Display: 6-digit LCD and sign  
 Scale type: ABSOLUTE electrostatic line encoder  
 Max. response speed: Unlimited (scanning measurement is not supported)  
 Measuring force: 2.5 N or less (ID-N), 2.0 N or less (ID-B)  
 Stem diameter: 3/8"  
 Standard contact point: **21BZA005**  
 Battery: SR4A (1 pc.), **938882**  
 Battery life: Approx. 7,000 hours under normal use

### Functions

Zero-setting, presetting, direction switching, tolerance judgement, display hold, data output, inch/mm reading (inch/mm models), LCD readout rotation  
 Alarm: Low voltage, counting value composition error, overflow error, tolerance limit setting error



LCD readout rotation function.



Rated to IP66 water- and dust-proofing standard and oil resistance improved.



Body width 35 mm.



## Optional Accessories

Code No.	Description	Price
125317	Rubber boot for ID-B, NBR	£4.60
238774	Rubber boot for ID-N, silicone	£14.20
02ACA376	Rubber boot for ID-N, NBR	£3.40
02AZD790G	U-WAVE-T data cable (160 mm)	£62.00
02AZE140G	U-WAVE-T data cable with footswitch connection (160/500 mm)	£127.00
21EAA194	SPC data cable (1 m)	£47.40
21EAA190	SPC data cable (2 m)	£53.40
21EAA210	Bifurcated connecting cable with zero-setting terminal (1 m)*	£122.00
21EAA211	Bifurcated connecting cable with zero-setting terminal (2 m)*	£137.00
21EAA212	Rubber boot for ID-B, silicone	£9.80
21EZA146	Lug	£12.50
21EZA150	Lifting knob (ID-N only)	£13.60

Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

\* Two of the wires inside the cable are separated for zero setting without touching the SET switch on the main body. Use these cables in combination with commercially available switches. Zero setting is performed by briefly connecting these two wires together (less than a second), and ABS preset & recall by connecting for a second or more.



Lifting knob

Plunger can be manually lifted. Remove the plunger cap for ID-N and attach the lifting knob to the plunger. Note that water resistance is not maintained in this configuration.

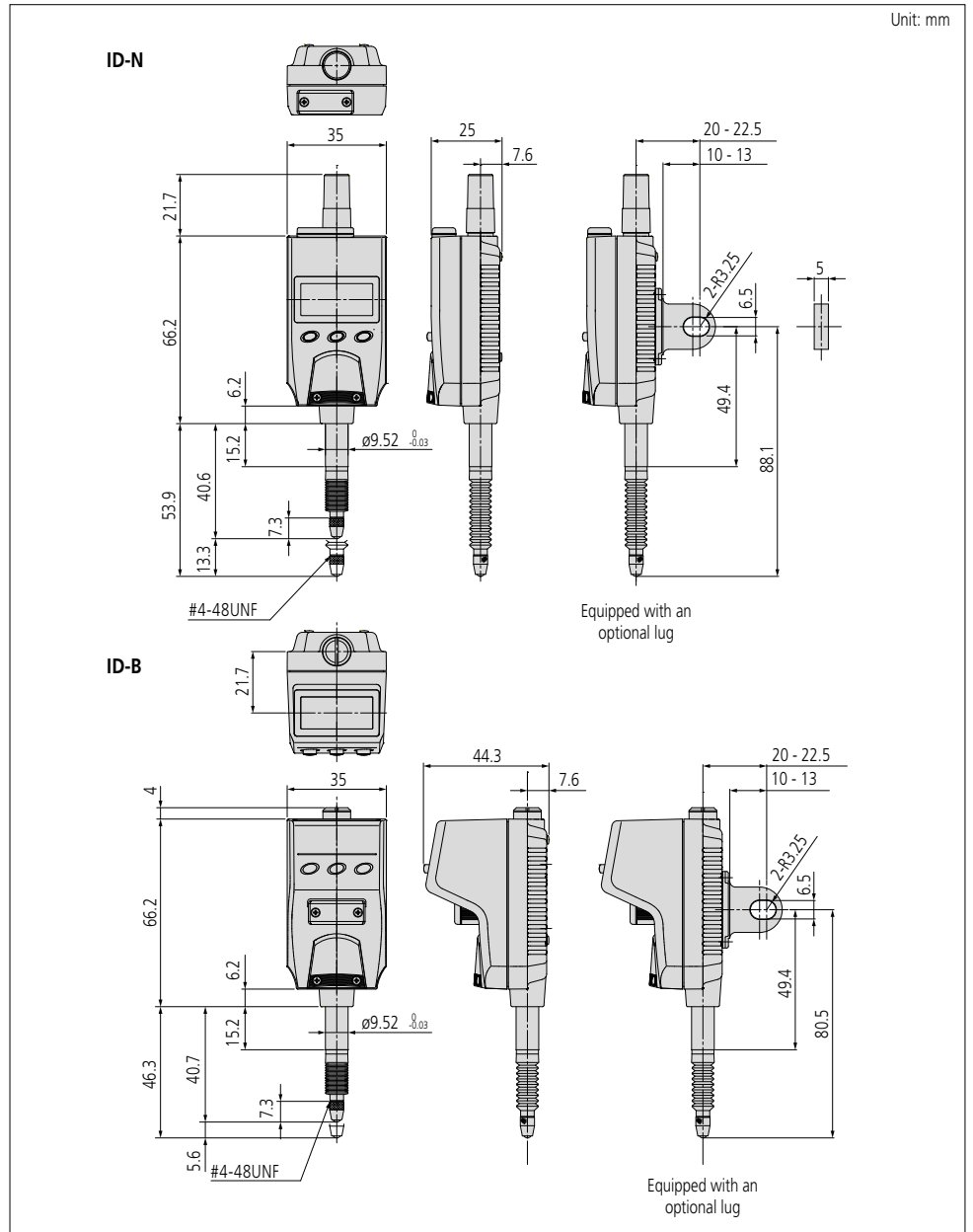


SPC cable.

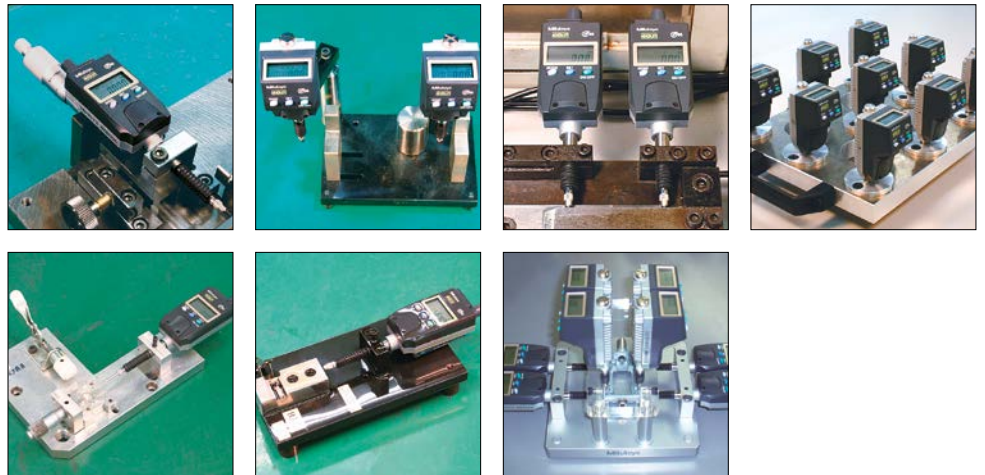


Bifurcated connecting cable with zero-setting terminal.

## Dimensions



## Sample Applications



# Digimatic Indicators

## SERIES 543 – Digimatic High Accuracy/Functionality Indicator ID-H

- This new-generation digital indicator offers the excellent accuracy and functionality expected from the top class of indicator.
- Take advantage of its high accuracy backed up by  $0.5 \mu\text{m} / .00002''$  resolution, remote control functionality via a handheld controller (or an RS-232C interface) and easy runout measurements with the well-established analogue bar display.
- Functionality meets the needs of diverse measurement applications.
- Measuring maximum value, minimum value and runout (difference between a maximum and a minimum value).
- GO/NO-GO judgement function: If a judgement result shows an out of tolerance condition the display backlighting changes from green to red.
- With the optional remote controller, operations such as zero-setting and presetting can be made without touching the indicator body, thereby avoiding disturbance to the set-up.
- An advanced, remote control system can be implemented with the built-in RS-232 interface and a PC.
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.

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543-562E



543-564E

### Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy*	Measuring force	Price
543-562E	1.2" / 30.4 mm	.00002", .00005", .0001" / 0.0005 mm,	.00006" / 0.0015 mm	2.0 N or less	<b>£650.00</b>
543-564E	2.4" / 60.9 mm	0.001 mm	.0001" / 0.0025 mm	2.5 N or less	<b>£748.00</b>

\* Quantizing error of  $\pm 1$  count is excluded.

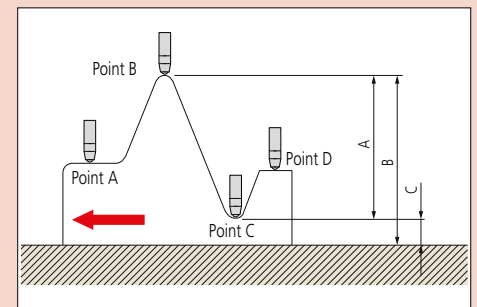
### Technical Data

Display:	7-digit LCD, sign, and analogue bar with 2-colour backlight
Power supply:	6V DC (via AC adapter)
Positional detection method:	Photoelectric type reflection linear encoder
Max. response speed:	1000 mm/sec
Plunger direction:	Up to direction in which plunger is horizontal
Standard contact point:	<b>21BZB005</b>
Lifting lever:	<b>137693</b>

### Functions

Zero set, preset, GO/ $\pm$ NG judgement, max/min value hold, runout measurement, resolution switching, counting direction switching, data output, data hold, function lock, inch/mm reading (inch/mm models)  
Alarm: Over speed error, setting error, overflow error

### Difference/runout measurement



Example: Indicator travel from points A to D  
Difference (or Total Runout) is displayed as A. Dimensions B (maximum value) and C (minimum value) can be recalled from memory with a simple pushbutton sequence.

## Optional Accessories

Code No.	Description	Price
101306	Centre-lug back	£3.40
540774	Plunger lifting cable (stroke: 30 mm)	£24.40
936937	SPC data cable (1 m)	£33.90
965014	SPC data cable (2 m)	£49.80
02AZD790D	U-WAVE-T data cable (160 mm)	£62.00
02AZE140D	U-WAVE-T data cable with footswitch connection (160/500 mm)	£127.00
06AFM380D	USB input tool direct USB-ITN-D (2 m)	£119.00
21EAA131	Connecting cable for RS-232 (2 m)	£143.00
21EZA099	Remote controller	£69.40
21EZA101	Plunger lifting knob	£18.90

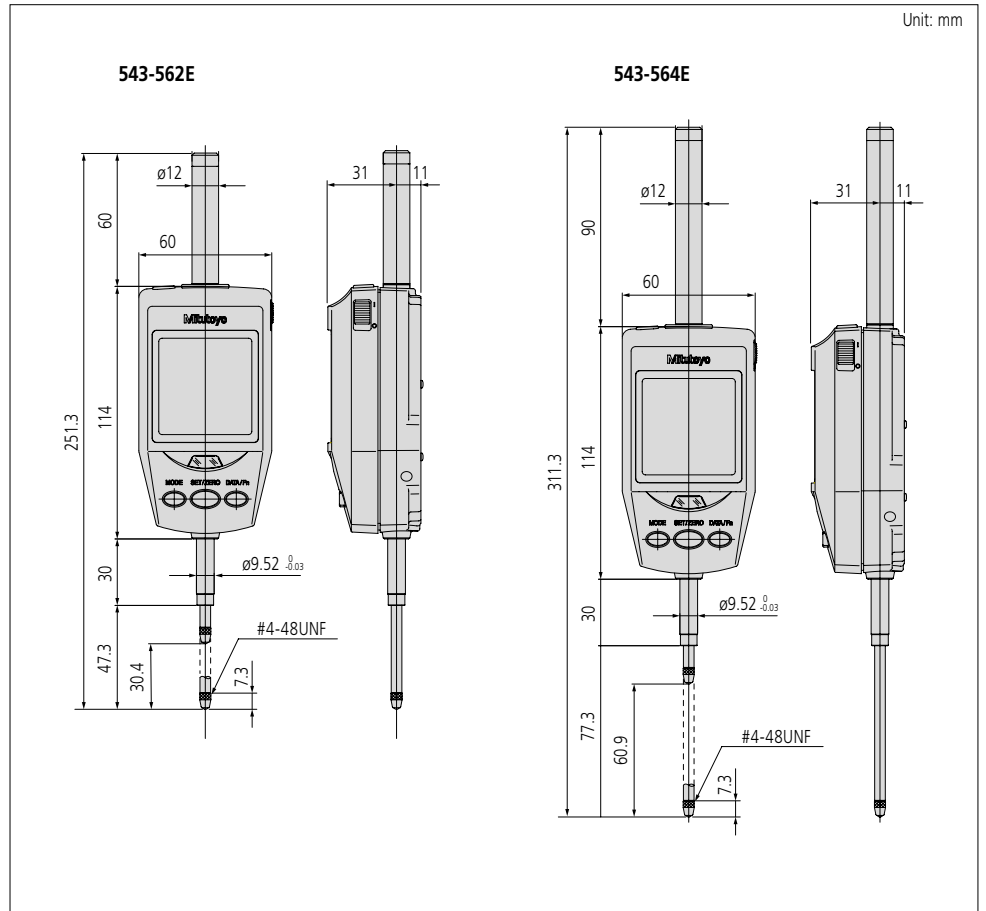
Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

Measuring stands refer to pages F-67 to F-72 for details.



Remote controller (optional).

## Dimensions



Tolerance judgement GO/+NG



Analogue bar display



Maximum value / minimum value measurement



Resolution switching



Difference / runout measurement



# Digimatic Indicators

## SERIES 543 – ABSOLUTE Digimatic Indicator ID-CX

- Employing the ABSOLUTE Linear Encoder, the ID-CX indicator always displays the absolute position of the plunger from the origin at power-on.
- Thanks to the ABSOLUTE Linear Encoder, reliability has been increased due to elimination of over-speed errors.
- Tolerance-judging measurement is available by setting upper and lower limit values. The tolerance judgement result can be enlarged.
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.

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543-391B



543-471B



543-491B

### Specifications

Inch/Metric

Code No.	Range	Accuracy* <sup>1</sup>	Repeatability* <sup>1</sup>	Measuring force	Remarks	Price
Resolution: .0005" / .0001" / .00005" / 0.01 mm / 0.001 mm						
543-391B	.5" / 12.7 mm	.0001" / 0.003 mm	.0001" / 0.002 mm	1.5 N or less	—	£300.00
543-395B	.5" / 12.7 mm			0.4 N - 0.7 N	Low measuring force	£348.00
543-471B	1" / 25.4 mm			1.8 N or less* <sup>2</sup>	—	£432.00
543-491B	2" / 50.8 mm	.0002" / 0.005 mm		2.3 N or less* <sup>2</sup>	—	£468.00
Resolution: .0005" / 0.01 mm						
543-401B	.5" / 12.7 mm	.001" /	.0005" /	0.9 N or less	—	£235.00
543-475B	1" / 25.4 mm	0.02 mm	0.02 mm	1.8 N or less* <sup>2</sup>	—	£343.00

\*<sup>1</sup> Quantizing error of ±1 count is excluded.

\*<sup>2</sup> Applies up to a horizontal plunger orientation.

### Technical Data

Display:	6-digit LCD and sign
Scale type:	ABSOLUTE electrostatic linear encoder
Max. response speed:	Unlimited (scanning measurement is not supported)
Stem diameter:	8 mm
Standard contact point:	901312
Battery:	SR44 (1 pc.), 938882
Battery life:	Approx. 7,000 hours under normal use

### Functions

Preset, zero-set, GO/±NG judgement, counting direction switching, Power ON/OFF, simplified calculation, function lock, data hold, data output, inch/mm reading  
 Alarm: Low voltage, counting value composition error, overflow error, tolerance limit setting error

### Setting Measuring Force on Low Measuring Force Model

Plunger orientation	Spring	Weight (approx. 0.1 N)	Max. measuring force
Pointing vertically downward	Yes	Yes	0.7 N or less
	Yes	No	0.6 N or less
	No	Yes	0.4 N or less
	No	No	Not guaranteed
Horizontal	Not guaranteed		

Note: Operation using configurations other than shown above is not guaranteed.

## Optional Accessories

Code No.	Description	Price
540774	Plunger lifting cable (12.7 mm and 25.4 mm)	£24.40
905338	SPC data cable (1 m)	£33.90
905409	SPC data cable (2 m)	£38.00
02ACA571	Auxiliary plunger spring (25.4 mm / 1" type)*4	£6.30
02ACA773	Auxiliary plunger spring (50.8 mm / 2" type)*4	£6.70
02AZD790F	U-WAVE-T data cable (160 mm)	£62.00
02AZE140F	U-WAVE-T data cable with footswitch connection (160/500 mm)	£127.00
06AFM380F	USB input tool direct USB-ITN-F (2 m)	£109.00
21EZA105	Plunger lifting knob (12.7 mm / .5" type)*3	£13.60
21EZA197	Plunger lifting knob (25.4 mm / 1" type)	£46.90
21EZA198	Plunger lifting lever (12.7 mm / .5" type)*3	£6.30
21EZA200	Plunger lifting knob (50.8 mm / 2" type)	£46.90

Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

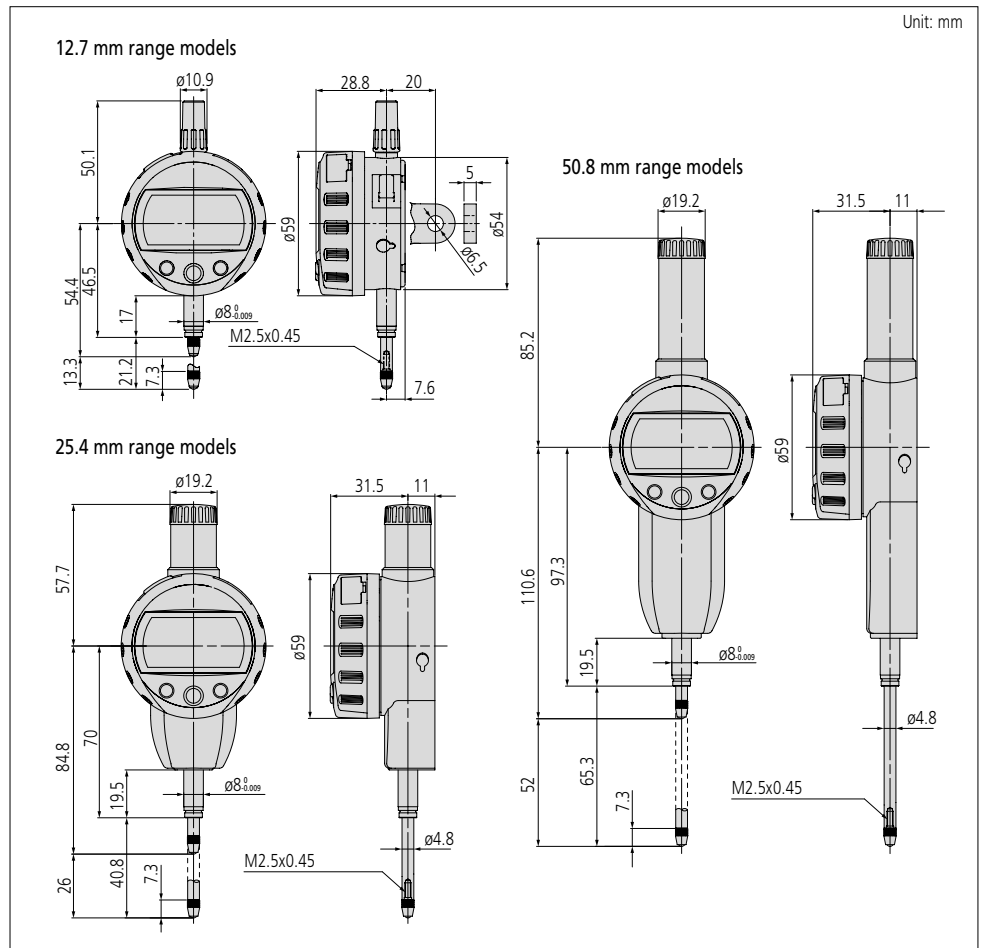
Interchangeable backs refer to page F-41 for details.

Measuring stands refer to pages F-67 to F-72 for details.

\*3 Not available for low measuring force models.

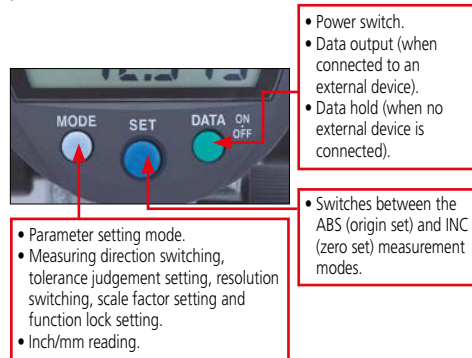
\*4 Required when orienting the indicator upside down.

## Dimensions



### Three large buttons

The popular three-large-button design, which is used in products such as the ABSOLUTE Coolant Proof Digimatic Indicators ID-N/ID-B, makes buttons easier to press and operations easier to perform.



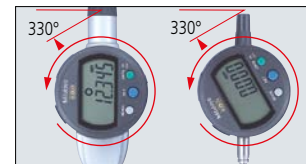
### Large LCD

The large LCD incorporates 11 mm characters giving 1.5 times the character area of existing products (which display 8.5 mm characters) making measurement values much easier to read.



### 330° rotary display

The display can be rotated 330°, allowing use at a position where you can easily read the measurement value.



### Calculation: f(x) = Ax

Mounting the ID-C on a measuring jig and setting the multiplying factor 'A' (to any value) allows direct measurement without using a conversion table and improves measurement efficiency.



### Function locking

Ensures reliability of measurement by locking the settings to prevent preset function settings from being changed by mistake.



# Digimatic Indicators

## SERIES 543 – ABSOLUTE Digimatic Peak Value Hold Indicator ID-C

- The maximum, minimum, or runout value can be measured and displayed during measurement.
- The ABSOLUTE sensor restores the last origin position automatically when the indicator is turned on. It also realizes high reliability by eliminating over-speed errors.
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.
- User friendly, battery-operated type.

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543-301B

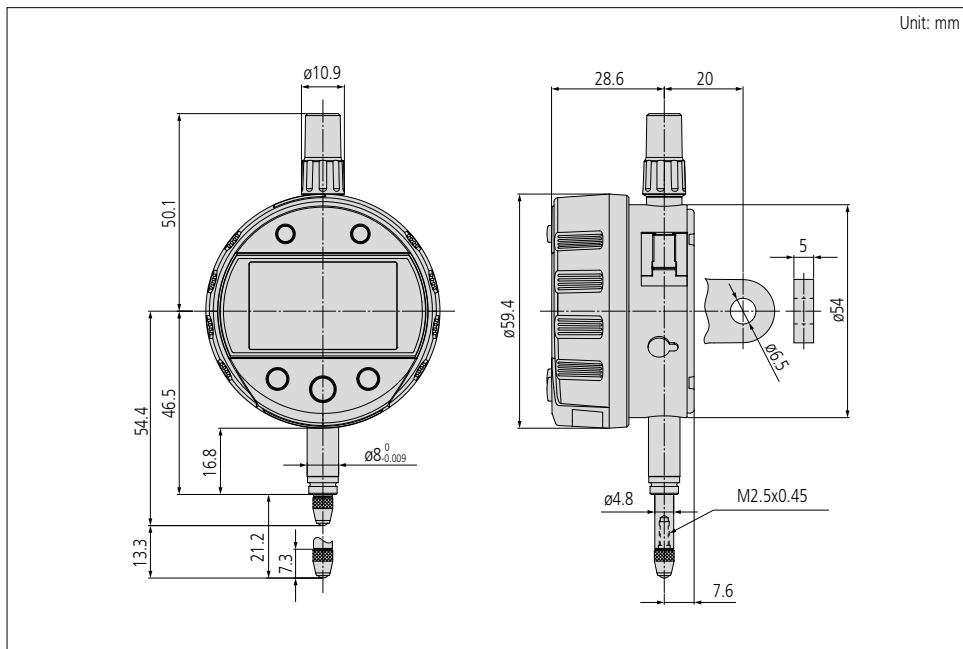
### Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy*1	Measuring force	Price
543-301B	.5" / 12.7 mm	.00005" / 0.001 mm	.00012" / 0.003 mm	1.5 N or less	£385.00

\*1 Quantizing error of ±1 count is excluded.

### Dimensions



### Technical Data

Display:	6-digit LCD and sign
Scale type:	ABSOLUTE electrostatic linear encoder
Stem diameter:	8 mm
Standard contact point:	901312
Battery:	CR2032 (055AA217)
Battery life:	6 months under normal use*2
*2 Operation time per day: 8 hours	

### Functions

Preset, zero-set, max/min value hold, runout value hold, GO/ΔNG judgement, counting direction switching, power ON/OFF, data output, inch/mm reading  
Alarm: Low voltage, counting value composition error, overflow error, tolerance limit setting error

### Optional Accessories

Code No.	Description	Price
540774	Plunger lifting cable	£24.40
905338	SPC data cable (1 m)	£33.90
905409	SPC data cable (2 m)	£38.00
02AZD790F	U-WAVE-T data cable (160 mm)	£62.00
02AZE140F	U-WAVE-T data cable with footswitch connection (160/500 mm)	£127.00
06AFM380F	USB input tool direct USB-ITN-F (2 m)	£109.00
21EZA198	Plunger lifting lever (12.7 mm / .5" type)*3	£6.30
21EZA313	Parameter setting kit	£490.00

Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

Interchangeable backs refer to page F-41 for details.

Measuring stands refer to pages F-67 to F-72 for details.



Parameter setting software (shown above) is available free-of-charge with the Parameter setting kit (optional accessory).

## Technical Data

Display:	6-digit LCD and sign
Scale type:	ABSOLUTE electrostatic linear encoder
Stem diameter:	8 mm
Standard contact point:	<b>901312</b>
Battery:	CR2032 ( <b>055AA217</b> )
Battery life:	1 year under normal use*1

\*1 Operation time per day: 8 hours

## Functions

Origin-set/preset, zero-set, GO/±NG judgement, power ON/OFF, data output, inch/mm reading (inch/mm models), max/min value holding, function lock, data hold	
Alarm:	Low voltage, counting value composition error, overflow error, tolerance limit setting error

## Optional Accessories

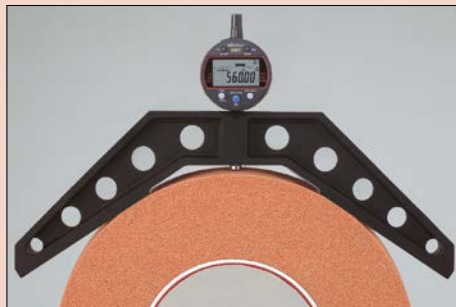
Code No.	Description	Price
<b>540774</b>	Plunger lifting cable	<b>£24.40</b>
<b>905338</b>	SPC data cable (1 m)	<b>£33.90</b>
<b>905409</b>	SPC data cable (2 m)	<b>£38.00</b>
<b>02AZD790F</b>	U-WAVE-T data cable (160 mm)	<b>£62.00</b>
<b>02AZE140F</b>	U-WAVE-T data cable with footswitch connection (160/500 mm)	<b>£127.00</b>
<b>06AFM380F</b>	USB input tool direct USB-ITN-F (2 m)	<b>£109.00</b>
<b>21EZA198</b>	Plunger lifting lever *2	<b>£6.30</b>
Measuring bridges*2		
<b>21FAJ394</b>	Radius: 25-70 mm (outside)	<b>£560.00</b>
<b>21FAJ395</b>	Radius: 45-140 mm (outside)/65-100 mm (inside)	<b>£635.00</b>
<b>K541281</b>	Radius: 50-100 mm (outside)	<b>£1120.00</b>
<b>K541282</b>	Radius: 100-200 mm (outside)	<b>£1750.00</b>

Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

Interchangeable backs refer to page F-41 for details.

Measuring stands refer to pages F-67 to F-72 for details.

\*2 The accuracy of a radial measurement using the measuring bridges depends on the size of the radius to be measured and the form error of the workpiece.



Outside diameter measurement using bridge fixtures. Various fixtures suited for individual workpieces can be prepared. Measuring accuracy is subject to fixture accuracy.

## SERIES 543 – ABSOLUTE Digimatic Calculating Indicator ID-C

- This indicator incorporates an internal calculation function that operates from plunger displacement. Using dedicated fixtures, measurements of outside and inside diameter and radius of curvature can easily be made without needing to use conversion tables or manual calculations, and requiring access to only one side of the component to be measured.
- The ABSOLUTE sensor restores the last origin position automatically when the indicator is turned on.
- The chance of over-speed error has been avoided thanks to the ABSOLUTE sensor.
- Tolerance judgement is available by presetting upper and lower limit values.
- Large, easy-to-read 7-digit LCD readout with a character height of 8 mm. Can be rotated up to 330° to achieve the optimum reading position.
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.

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Calculation function:  $f(x) = Ax + B + C/x$

x = plunger movement  
A, B and C are user definable over a wide range

**543-341B**

## Specifications

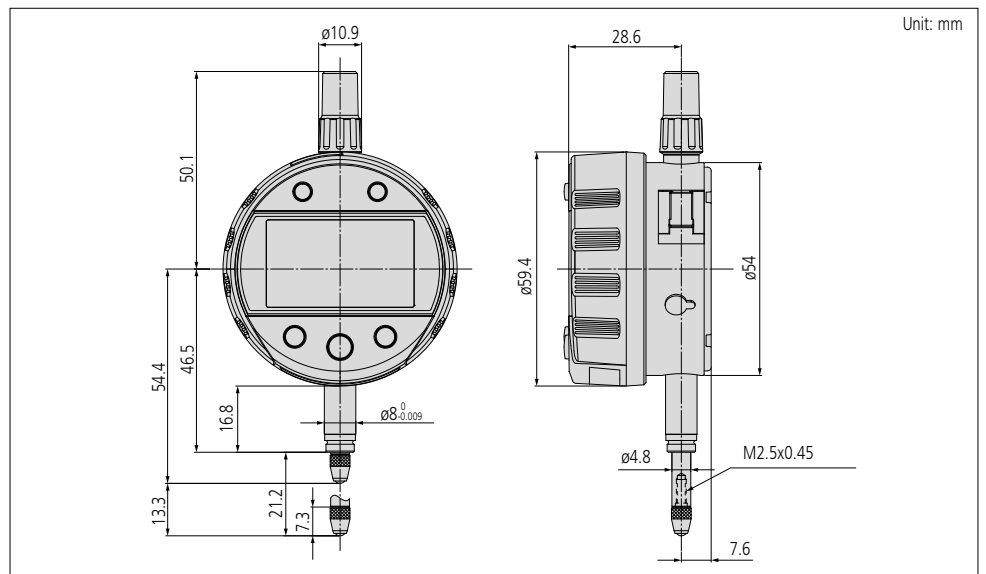
### Inch/Metric

Code No.	Range	Resolution (switchable)*3	Accuracy*4	Measuring force	Price
<b>543-341B</b>	.5" / 12.7 mm	.00001" - .05" / 0.0002 - 1 mm	.00012" / 0.003 mm	1.5 N or less	<b>£430.00</b>

\*3 Since the calculation resolution is one micrometre (0.001 mm), using sub-micrometre resolution settings may result in the 4th-place digit being unreliable, particularly when B is set to a very low value and C = 0. It does not change at all with certain combinations of calculation coefficient (e.g. A = 1, B = C = 0). The 3rd-place digit representing micrometres (if displayed) is always reliable.

\*4 Quantizing error of ±1 count is excluded.

## Dimensions



# Digimatic Indicators

## SERIES 543 – ABSOLUTE Digimatic Signal Output Indicator ID-C

- Enables a tolerance judgement to be output to external equipment for a measurement result against user-defined limits. Solid-state switching provides high reliability by avoiding metallic switch contacts.
- Output is enabled by directly connecting to external devices (sequencers etc., for which a logical invert is available if required). The measurement and judgement results are displayed on the LCD. The judgement result is also indicated by 2 LEDs.
- A peak-detection function is equipped for measuring and judging peak values such as runout.
- The ABSOLUTE sensor restores the last origin position automatically when the indicator is turned on, and realizes high reliability by eliminating over-speed errors.
- Provided with a 4 m cable.
- External power 5–24VDC required.



543-351B

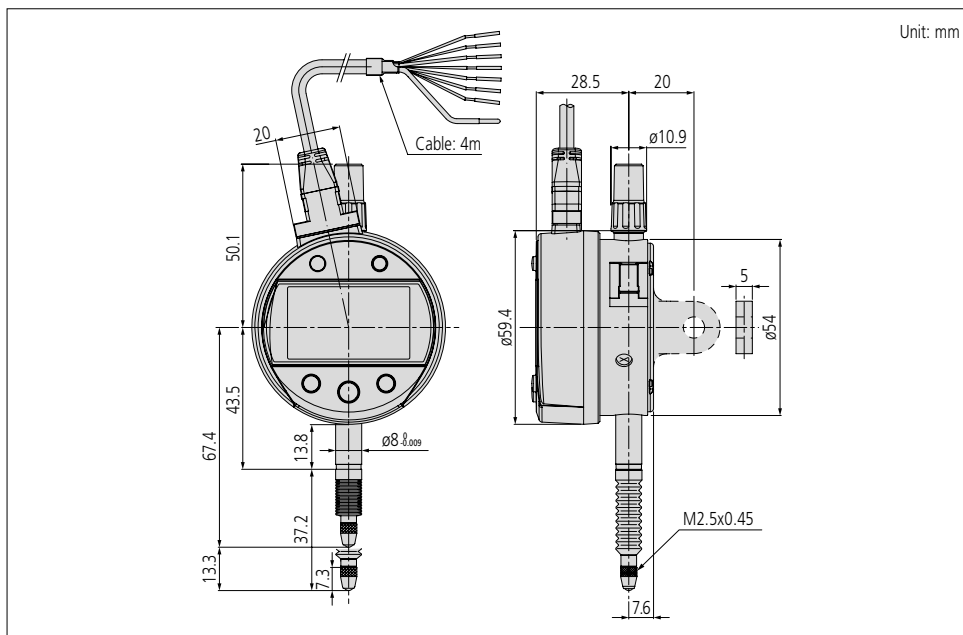
### Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy*1	Measuring force	Price
543-351B	.5" / 12.7 mm	.00005", .0001", .005" / 0.001 mm, 0.01 mm	.00012" / 0.003 mm	2.5 N or less	£536.00

\*1 Quantizing error of ±1 count is excluded.

### Dimensions



### Technical Data

Display:	6-digit LCD and sign
Scale type:	ABSOLUTE electrostatic linear encoder
Stem diameter:	8 mm
Standard contact point:	901312
Dust/water protection level:	IP54

### Functions

Signal output (–NG/OK/+NG, N-ch open drain, logical invert is available), remote control (peak start preset/zero-set), peak detection (max./min.), zero-setting (INC system), presetting (ABS system), direction switching, tolerance judgement (3 pairs of ABS, INC memory function), resolution switching, calculation  $f(x) = Ax$ , key lock, calibration mode (signal output in Digimatic code format), error alarm display.

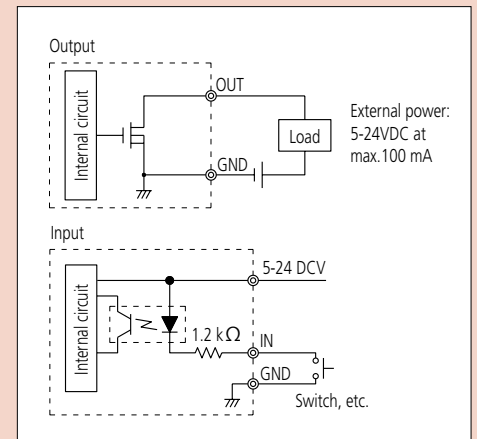
### Output Pattern

Wire	– NG	OK	+ NG	Composition error
Orange (– NG)	Low	High	High	High
Green (OK)	High	Low	High	High
Brown (+ NG)	High	High	Low	High
LCD	◀	○	▶	"x.xx"E" indication

### I/O Specifications

Wire	Signal	I/O	Description
Black	– V (GND)	–	Connected to minus (–) terminal
Red	+ V	I	Power supply (5-24VDC)
Orange	– NG	O	Tolerance judgement result output: Only the terminal corresponding to a judgement result is set to the low level.
Green	OK	O	
Brown	+ NG	O	
Yellow	PRESET_RECALL ZERO	I	External input terminal: If the relevant terminal is set to the low level, its signal becomes true.
Blue	PEAK_START	I	
Shield	FG	–	Connected to GND (earth)

Note: Measurement data cannot be output.



### Optional Accessories

Code No.	Description	Price
540774	Plunger lifting cable *2	£24.40
21EZA198	Plunger lifting lever *2	£6.30

Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

Interchangeable backs refer to page F-41 for details.

Measuring stands refer to pages F-67 to F-72 for details.

\*2 Dust and water protection not guaranteed.



## Technical Data

Display:	6-digit LCD and sign
Scale type:	ABSOLUTE electrostatic linear encoder
Stem diameter:	8 mm
Standard contact point:	<b>901312</b>
Battery:	SR44 (2 pcs.) <b>938882</b>
Battery life:	9 months under normal use*1

\*1 Operation time per day: 8 hours

## Functions

Presetting, power on/off, inch/mm conversion (inch/mm type only), 3 sets of master value and tolerance value memory, GO/±NG tolerance judgement, min value holding, data hold.

## Optional Accessories

Code No.	Description	Price
<b>905338</b>	SPC data cable (1 m)	<b>£33.90</b>
<b>905409</b>	SPC data cable (2 m)	<b>£38.00</b>
<b>02AZD790F</b>	U-WAVE-T data cable (160 mm)	<b>£62.00</b>
<b>02AZE140F</b>	U-WAVE-T data cable with footswitch connection (160/500 mm)	<b>£127.00</b>
<b>06AFM380F</b>	USB input tool direct USB-ITN-F (2 m)	<b>£109.00</b>



ABSOLUTE Digimatic Bore Gauges, which integrate the display with a bore gauge measuring unit, are also available.



Example of bore gauge (optional) equipped with an ID-C Digimatic Indicator.



## SERIES 543 – ABSOLUTE Digimatic Bore Gauge Indicator ID-C

- Exclusively designed for Bore Gauges: this ID-C series indicator has the minimum value holding and GO/NO-GO judgement functions.
- Employing an ABSOLUTE Linear Encoder, the Bore Gauge ID-C always displays the absolute position of the plunger from the origin at power-on. Also, the reliability has been increased due to elimination of over-speed errors.
- An analogue bar indication is integrated to provide the advantages of analogue display for minimum value measurements.
- Up to three sets of reference diameter and upper/lower tolerance values can be stored to simplify the start-up key operation in repetitive hole inspection of mixed-diameter holes.
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.

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**543-311B**

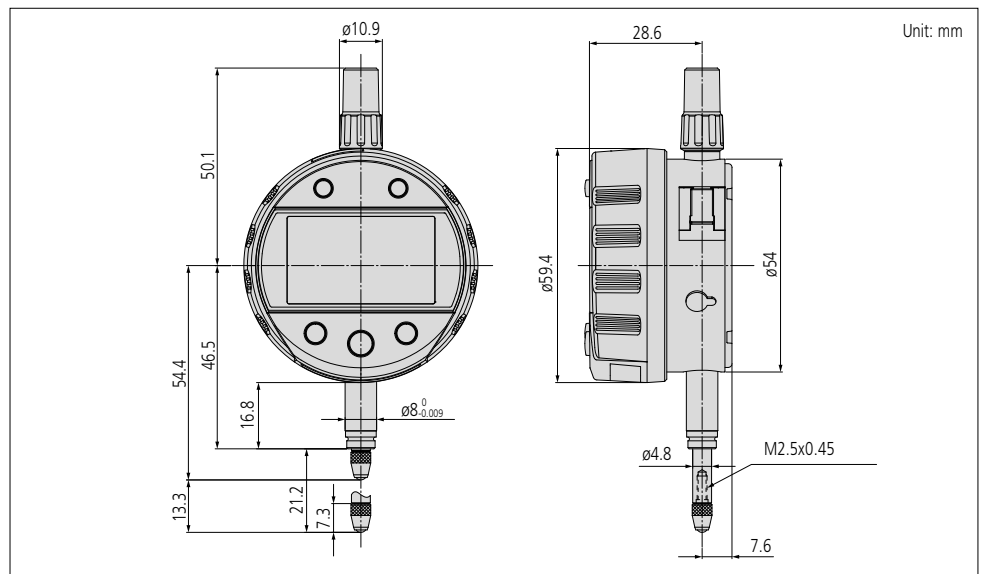
## Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy*2	Measuring force	Price
<b>543-311B</b>	.5" / 12.7 mm	.00005" / 0.001 mm	.00012" / 0.003 mm	1.5 N or less	<b>£417.00</b>

\*2 Quantizing error of ±1 count is excluded.

## Dimensions



# Digimatic Indicators

## SERIES 543 – ABSOLUTE Digimatic Multi-Function Indicator ID-F

- GO/NO-GO judgement function: If a judgement result shows an out of tolerance condition, the display backlighting changes from green to red.
- An analogue bar indicator has been integrated to make upper/lower limit and turnover point reading more comfortable.

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Green indication for GO judgement    Red indication for  $\pm$ NG judgement



- With the ABSOLUTE Linear Encoder technology, once the measurement reference point has been set it will not be lost when the power is turned off. Also, reliability has been increased due to the elimination of over-speed errors.
- Easy-to-read large back-lit LCD readout with a character height of 8.5 mm.
- External power supply type: battery change is not necessary. Power is supplied via the AC adapter supplied as a standard accessory.
- The resolution can be switched between 0.001/0.01 mm (or .001"/.0005"/.0001"/.0005") / .0005").
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.



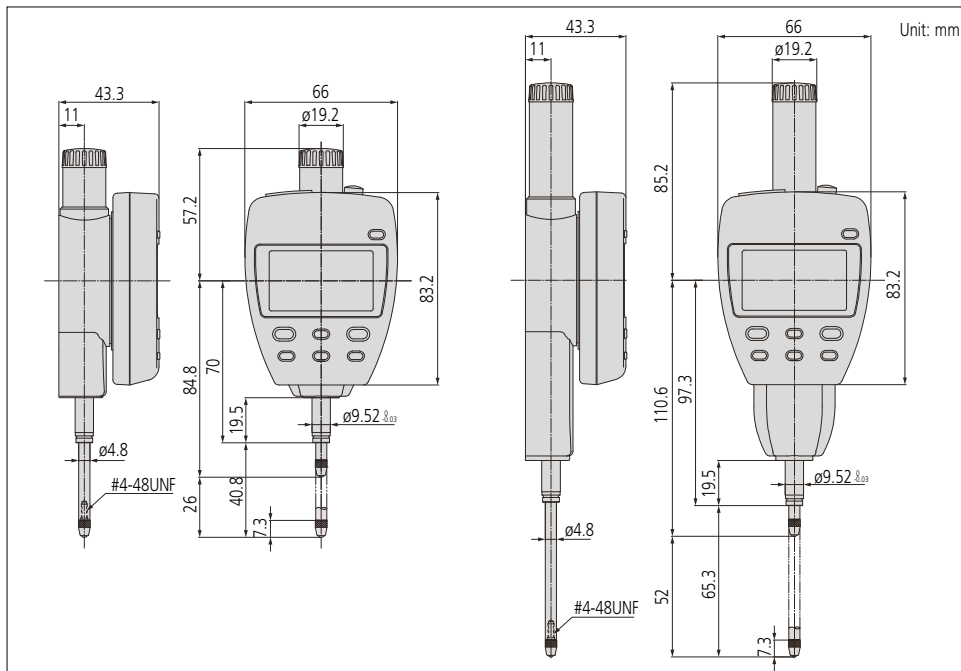
### Specifications

#### Inch/Metric

Code No.	Range	Resolution	Accuracy*1	Measuring force	Price
543-552E	1" / 25 mm	.00002", .00005", .0001", .0005"	.00012" / 0.003 mm	1.8 N or less	£500.00
543-554E	2" / 50 mm	.001" / 0.001 mm, 0.01 mm	.00024" / 0.006 mm	2.3 N or less	£530.00

\*1 Quantizing error of  $\pm 1$  count is excluded.

### Dimensions



### Technical Data

Display: Back-lit LCD, 8.5 mm character height  
 Scale type: ABSOLUTE electrostatic linear encoder  
 Max. response speed: Unlimited  
 Stem diameter: 3/8"  
 Standard contact point: **21BZB005**  
 Power supply: 9V DC (via AC adapter)  
 Lifting lever: **137693**

### Functions

Preset, zero-set, GO/ $\pm$ NG judgement, max/min value hold, runout measurement, resolution switching, counting direction switching, power ON/OFF, data output, inch/mm reading.  
 Alarm: Counting value composition error, overflow error, tolerance limit setting error

### Optional Accessories

Code No.	Description	Price
101306	Centre-lug back	£3.40
540774	Plunger lifting cable (12.7 mm and 25.4 mm)	£24.40
936937	SPC data cable (1 m)	£33.90
965014	SPC data cable (2 m)	£49.80
02ACA571	Auxiliary plunger spring (25.4 mm / 1" type)*2	£6.30
02ACA773	Auxiliary plunger spring (50.8 mm / 2" type)*2	£6.70
02AZD790D	U-WAVE-T data cable (160 mm)	£62.00
02AZE140D	U-WAVE-T data cable with footswitch connection (160/500 mm)	£127.00
21EZA197	Plunger lifting knob (25.4 mm / 1" type)	£46.90
21EZA200	Plunger lifting knob (50.8 mm / 2" type)	£46.90

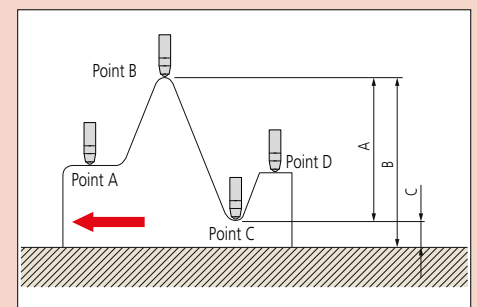
Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

Interchangeable backs refer to page F-41 for details.

Measuring stands refer to pages F-67 to F-72 for details.

\*2 Required to maintain the measuring force during inverted orientation (contact point upward).

### Difference/runout measurement



Example: Indicator travel from points A to D  
 Difference (or Total Runout) is displayed as A. Dimensions B (maximum value) and C (minimum value) can be recalled from memory with a simple pushbutton sequence.

## Technical Data

Display:	LCD, 8.5 mm character height
Scale type:	ABSOLUTE electrostatic linear encoder
Max. response speed:	Unlimited (scanning measurement is not supported)
Stem diameter:	8 mm
Standard contact point:	<b>901312</b>
Battery:	SR44 (1 pc.) <b>938882</b>
Battery life:	Approx. 20,000 hours under normal use

## Functions

Origin-set (zero-set), counting direction switching,	
Power ON/OFF, data output, inch/mm reading	
Alarm:	Low voltage, counting value composition error

## Optional Accessories

Code No.	Description	Price
<b>540774</b>	Plunger lifting cable	<b>£24.40</b>
<b>905338</b>	SPC data cable (1 m)	<b>£33.90</b>
<b>905409</b>	SPC data cable (2 m)	<b>£38.00</b>
<b>02ACB610</b>	Post-type back	<b>£17.60</b>
<b>02ACB630</b>	Adjustable back	<b>£17.60</b>
<b>02ACB640</b>	Offset-lug back	<b>£17.60</b>
<b>02ACB650</b>	Magnetic back	<b>£32.40</b>
<b>02ACB670</b>	Screw-mount back	<b>£17.60</b>
<b>02ACB680</b>	Adjustable-bracket back	<b>£51.20</b>
<b>02AZD790F</b>	U-WAVE-T data cable (160 mm)	<b>£62.00</b>
<b>02AZE140F</b>	U-WAVE-T data cable with footswitch connection (160/500 mm)	<b>£127.00</b>
<b>06AFM380C</b>	USB Input Tool Direct USB-ITN-C (2 m)	<b>£109.00</b>
<b>21EZA198</b>	Plunger lifting lever	<b>£6.30</b>

Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

Measuring stands refer to pages F-67 to F-72 for details.

## SERIES 543 – ABSOLUTE Digimatic Economical Indicator ID-S

- Cost-effective and user-friendly type equipped with only the basic functions necessary.
- The ABSOLUTE sensor restores the last origin position automatically when the indicator is turned on, and ensures high reliability by eliminating over-speed errors.
- Battery life of 20,000 hours in continuous use.
- Easy-to-read large LCD readout with a character height of 8.5 mm.
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.

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543-782

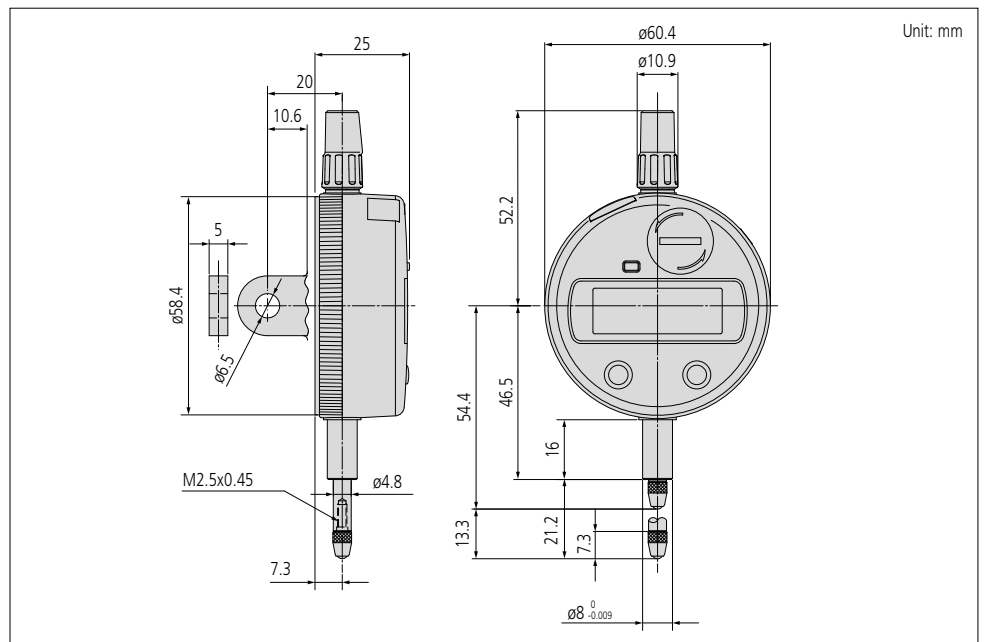
## Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy	Measuring force	Price
<b>543-782</b>	.5" / 12.7 mm	.0005" / 0.01 mm	.0008" / 0.02 mm	2.0N or less	<b>£122.00</b>

\* Quantizing error of  $\pm 1$  count is excluded.

## Dimensions



# Digimatic Indicators

## SERIES 575 – ABSOLUTE Digimatic Slim Body Economical Indicator ID-U

- General purpose indicator with the measuring range of 25.4 mm / 1".
- Cost-effective and user-friendly type equipped with only the basic functions necessary.
- The ABSOLUTE sensor restores the last origin position automatically when the indicator is turned on, and ensures high reliability by eliminating over-speed errors.
- Battery life of 20,000 hours in continuous use.
- Easy-to-read large LCD readout with a character height of 8 mm.
- Equipped with a data output port that enables incorporation into measurement networking and statistical process control systems.

**MeasurLink<sup>®</sup> ENABLED** ABSOLUTE

Data Management Software by Mitutoyo



575-123

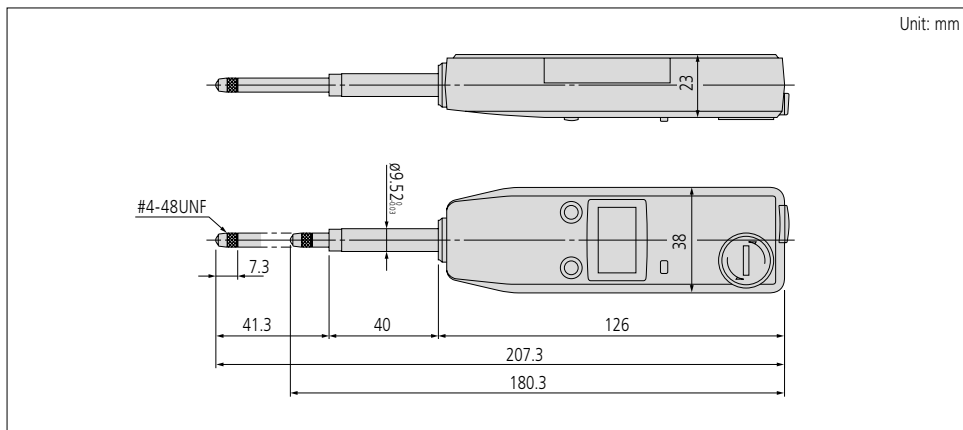
### Specifications

Inch/Metric

Code No.	Range	Resolution	Accuracy*	Measuring force	Price
575-123	1" / 25.4 mm	.0005" / 0.01 mm	.0008" / 0.02 mm	1.8 N or less	£163.00

\* Quantizing error of ±1 count is excluded.

### Dimensions



Unit: mm

### Technical Data

Display:	LCD, 8.5 mm character height
Scale type:	ABSOLUTE electrostatic linear encoder
Max. response speed:	Unlimited (scanning measurement is not supported)
Stem diameter:	3/8"
Standard contact point:	<b>21BZB005</b>
Battery:	SR44 (1 pc.) <b>938882</b>
Battery life:	Approx. 20,000 hours under normal use
Lifting lever:	<b>137693</b>

### Functions

Origin-set (zero-set), counting direction switching, power ON/OFF, data output, inch/mm reading  
 Alarm: Low voltage, counting value composition error

### Optional Accessories

Code No.	Description	Price
540774	Plunger lifting cable	£24.40
905338	SPC data cable (1 m)	£33.90
905409	SPC data cable (2 m)	£38.00
02AZD790F	U-WAVE-T data cable (160 mm)	£62.00
02AZE140F	U-WAVE-T data cable with footswitch connection (160/500 mm)	£127.00
06AFM380C	USB input tool direct USB-ITN-C (2 m)	£109.00

Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

Measuring stands refer to pages F-67 to F-72 for details.

# Optional Accessory

## SERIES 542 – EC Counter, Low-Cost Modular Display Unit

- 3 sets of limiting values can be displayed.
- Can be set to produce either tolerance judgement output or Digimatic measurement data output.
- Small size (96 x 48 mm) which conforms to DIN standards.

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### Technical Data

Functions:	Preset, GO/±NG judgement, output (selectable)
Tolerance judgement:	-NG, OK, +NG (open collector)
Data:	Digimatic code
External control signal input:	Preset, data hold
Power supply:	Via AC adapter

### Optional Accessories

Code No.	Description	Price
214938	DC plug PJ-2	£4.80
C162-155	I/O cable	£46.40

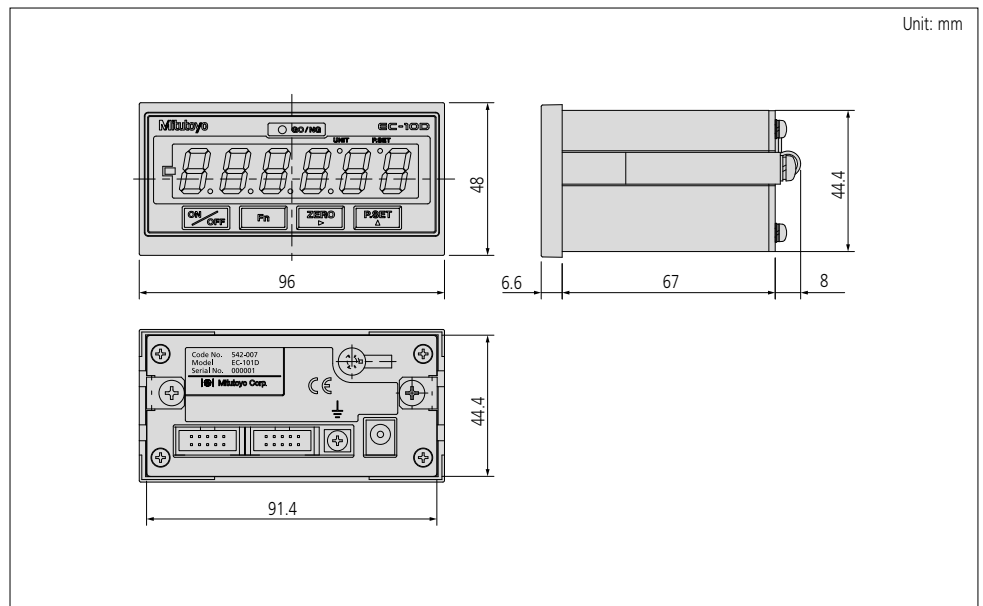


542-007E

### Specifications

Code No.	542-007E
Applicable input	Digimatic code (SPC)
Number of gauge inputs	1
Resolution	0.01, 0.001 mm (automatically set depending on the gauge)
Display	6-digit and a negative [-] sign LED (amber, green, red)
Price	£280.00

### Dimensions



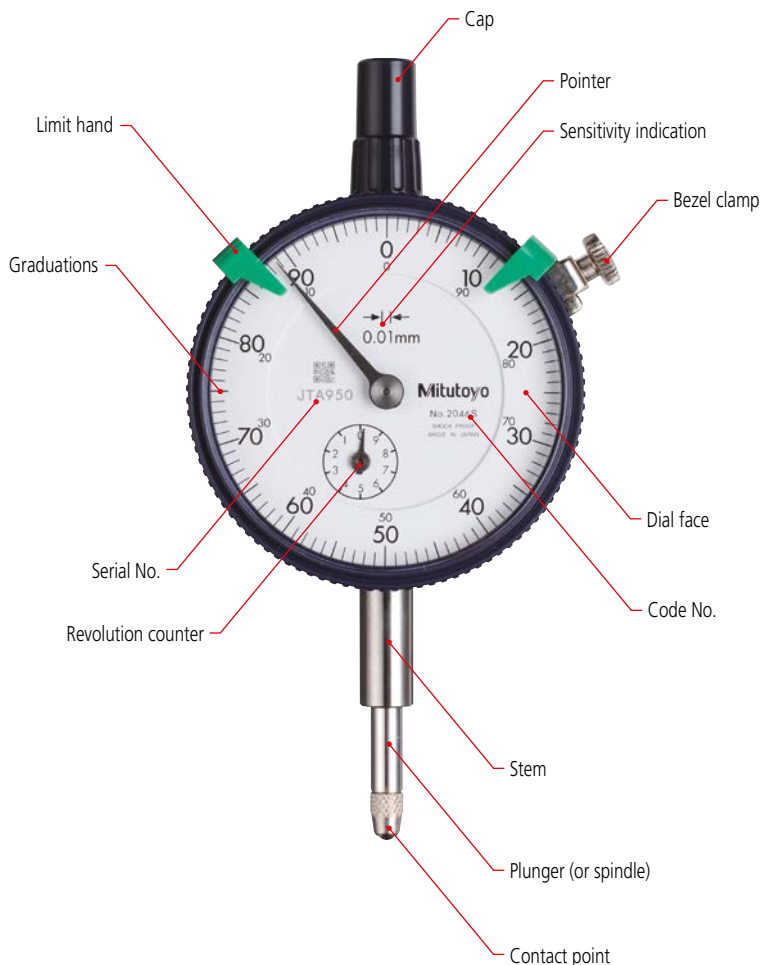
# Dial Indicators

Mitutoyo's dial indicators have long been used by many of our customers. In full recognition of their needs, we have devoted ourselves to the research and development necessary to produce high-quality and high-accuracy dial indicators. Due to the recent re-acknowledgement of the importance of measurement technologies, the demands on dial indicators are many and varied: installation in measuring jigs, mounting in countless types of precision equipment, etc. We offer numerous models with various dial faces, measuring ranges, graduation styles and environmental resistance ratings. The stems, which ensure the fixture reliability, and the plungers, which are the basis of accuracy, have excellent resistance against hard use thanks to the hardened stainless steel construction. 0.01 mm resolution dial indicators have a grand gear made of stainless steel with high resistance to wear and deformation. 0.001 mm resolution dial indicators employ a sector gear made of a special alloy in order to further increase the resistance to wear.

F- and S-type dial indicators employ an O-ring to ensure air tightness between the outer frame and the crystal case in order to prevent water or oil penetration.

Important factors in choosing a dial indicator: the size (bezel diameter), resolution (graduation) and measuring range. Use the table on the right to help choose a suitable model for your application.

## Parts of a Dial Indicator



## Feature Icons

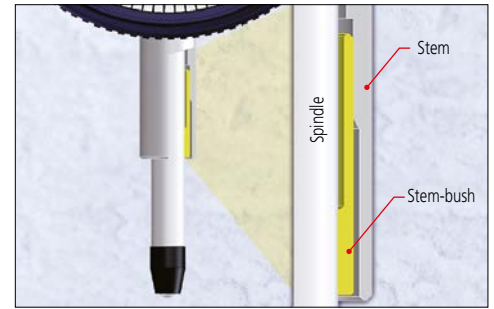
Icon	Feature description
	Continuous scale.
	Balanced scale.
	Reverse reading type. Suitable for depth and step measurement.
	One revolution type for easy and error-free reading.
	Double scale spacing type, easy-on-the-eyes.
	Shockproof type.
	Waterproof type (IP63).
	Waterproof type (IP64).
	With damper at lowest rest point.
	Jewelled bearing type.
	Peak retaining type.
	Dustproof type.
	With coaxial revolution counter.
	Back plunger type.
	Adjustable hand type.

Note: Mitutoyo produces ASME-compatible products. Contact us for details.

### Features: S Series (Series 2, 3, 4)



- No through screw-holes on the frame ensures high oil- and dust-resistance. The bezel clamp can be attached to either the right or left side.
- Improved Impact- and oil-resistant materials are employed in the outer frame. Easier reading is due to the improved shape of the crystal face.



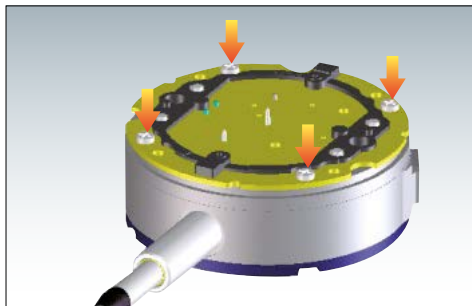
- Revolutionary stem-bush design for trouble-free stem clamping (longer clamping range; maximum tightening torque at the clamping point with M5 screw: 150 N-cm).



- The plunger lifting lever (optional: 21AZB149) can be attached to either the right or left side providing high operability and smooth movement. This lever can be easily installed and removed without tools.



- Limit markers ① can be moved without interfering with the clamp ②.



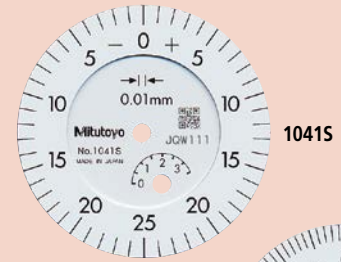
- Greater rigidity in the bearing plate for reduced retrace error (20%) and 4-screw mounting for increased impact resistance.

F

# Dial Indicators

## SERIES 1 – Compact Dial Indicators

- Compact dial indicators with outer bezel diameters of 31 and 40 mm for restricted-space applications in gauging fixtures.



1041S



1045S



1045S



1124S



1013S-10

### Specifications

#### Metric

Code No.	Graduation	Range (range/rev)	Accuracy				Repeat-ability	Scale	Measuring force	Price	
			Overall	Retrace	1/10 rev	1 rev					
1013S-10	0.002 mm	1 mm (0.2 mm)	6 µm	2.5 µm	2.5 µm	5 µm	1 µm	0-100-0	1.5 N or less	£108.00	
1040S	0.01 mm	3.5 mm (0.5 mm)	13 µm	4 µm	8 µm	11 µm	3 µm	±0-50	1.4 N or less	£71.10	
1041S	0.01 mm							0-25-0		£71.10	
1044S	0.01 mm							±0-100		£49.80	
1044S-15	0.01 mm							±0-100		0.4 N or less*1	£68.80
1044S-60	0.01 mm							±0-100		2.0 N or less	£83.00
1045S	0.01 mm							0-50-0		£54.50	
1124S	0.005 mm	3.5 mm (0.5 mm)	12 µm	3.5 µm	6 µm	10 µm	±0-50	1.4 N or less	£83.00		

\*1 Use in a vertical orientation only (contact point downward).

#### Inch

Code No.	Graduation	Range (range/rev)	Accuracy		Repeat-ability	Scale	Measuring force	Price
			First rev / 2.5 rev / 10 rev	Retrace				
1923TB-10*2	.0005"	.05" (.02")	±.0005" / ±.005" / —	.0016"	±.0001"	0-10-0	1.8 N or less	£120.00
1925T-10	.0001"	.025" (.01")	±.0002" / ±.0002" / —	.0001"	±.00003"	0-5-0		£125.00
1410S	.001"	.25" (.1")	±.001" / ±.001" / —	.0002"	±.0002"	0-100	1.4 N or less	£73.00
1411S						0-50-0		£73.00
1780S						0-50		£73.00
1781S						0-25-0		£73.00
1506S	.0005"	.125" (.05")	±.0005" / ±.0005" / —	.00016"	±.0001"	0-50	1.4 N or less	£75.20
1507S						0-25-0		£75.20
1670S						0-40		£73.00
1671S						0-20-0		£73.00
1802S-10						.0001"		.025" (.01")
1803S-10	0-5-0	£103.00						

\*2 Flat-back type.



## Features

Metric						
Code No.						
1013S-10	—	✓	—	✓	—	—
1040S	✓	—	✓	—	—	—
1041S	—	✓	✓	—	—	—
1044S	✓	—	—	—	—	—
1044S-15	✓	—	—	✓	—	—
1044S-60	✓	—	—	—	✓	—
1045S	—	✓	—	—	—	—
1124S	✓	—	—	—	—	—

Inch						
Code No.						
1410S	✓	—	—	—	—	—
1411S	—	✓	—	—	—	—
1506S	✓	—	—	—	—	—
1507S	—	✓	—	—	—	—
1670S	✓	—	—	—	—	—
1671S	—	✓	—	—	—	—
1780S	✓	—	—	—	—	—
1781S	—	✓	—	—	—	—
1802S-10	✓	—	—	✓	—	✓
1803S-10	—	✓	—	✓	—	✓
1923TB-10	—	✓	—	—	—	—
1925T-10	—	✓	—	✓	—	—

## Optional Accessories

Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

Interchangeable backs refer to page F-41 for details.

Plunger lifting aids refer to page F-42 for details.

Measuring stands refer to pages F-67 to F-72 for details.

## Dimensions

Unit: mm

**ISO/JIS type**

Note 1: Dimensions of the inch (ANSI/AGD type) dial indicator partly differ from those of the metric (ISO/JIS type) indicator.

Note 2: Inch (ANSI/AGD type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

**ANSI/AGD type**

Code No.	A	B	C	D	E	F	G	H	I
<b>ISO/JIS type</b>									
1013S-10	32.5	49	40	14.5	20	13.8	15.2	38	6.6
1040S	32.5	46	40	14.5	20	13.8	12.2	38	6.6
1041S	32.5	46	40	14.5	20	13.8	12.2	38	6.6
1044S	32.5	47.5	40	14.5	20	13.8	13.7	38	6.6
1044S-15*	32.5	47.5	40	14.5	20	13.8	13.7	38	6.6
1044S-60	32.5	57	40	14.5	20	12.2	24.8	38	6.6
1045S	32.5	47.5	40	14.5	20	13.8	13.7	38	6.6
1124S	32.5	46	40	14.5	20	13.8	12.2	38	6.6
<b>ANSI/AGD type</b>									
1923TB-10	15.5	38.3	31	12.5	19	15	7.8	30	7
1925T-10	15.5	37.5	31	12.5	19	15	7	30	7
1410S	32.5	47.6	40	14.5	19	12.8	14.8	38	6.6
1411S	32.5	47.6	40	14.5	19	12.8	14.8	38	6.6
1780S	32.5	44.1	40	14.5	19	12.8	11.3	38	6.6
1781S	32.5	44.1	40	14.5	19	12.8	11.3	38	6.6
1506S	32.5	44.1	40	14.5	19	12.8	11.3	38	6.6
1507S	32.5	44.1	40	14.5	19	12.8	11.3	38	6.6
1670S	32.5	43.4	40	14.5	19	12.8	10.6	38	6.6
1671S	32.5	43.4	40	14.5	19	12.8	10.6	38	6.6
1802S-10	32.5	41.3	40	14.5	19	12.5	8.5	38	6.6
1803S-10	32.5	41.3	40	14.5	19	12.5	8.5	38	6.6

F

# Dial Indicators

## SERIES 2 – 0.01 mm Graduation Dial Indicators

- Standard 0.01 mm graduation dial gauges having a bezel with an outside diameter of 57 mm. All types come with limit markers and a bezel clamp as standard.
- The bezel clamp and lifting lever (optional) can be attached to either the right or left side. These parts can be easily installed and removed without tools.
- Secure adhesion between the bezel and crystal as well as the use of an O-ring prevents water or oil penetration.
- The stem and plunger are made of high-strength quench-hardened stainless steel suitable for heavy-duty use.
- A carbide contact point is used.
- The grand gear is made of stainless steel with high resistance to wear and deformation.
- Application of a hard coating on the surface of the crystal makes it highly resistant to scratching and chemical attack.



2047S



2902S



2310S-10



2044S

### Specifications

#### Metric

Code No.	Graduation	Range (range/rev)	Accuracy				Repeat-ability	Scale	Measuring force	Price
			Overall	Retrace	1/10 rev	1 rev				
2046S	0.01 mm	10 mm (1 mm)	13 µm	3 µm	5 µm	10 µm	3 µm	±0-100	1.4 N or less	£37.50
2046S-60								2.5 N or less	£99.40	
2047S								0-50-0	£54.50	
2902S								100-0	£59.60	
2310S-10								1.4 N or less	£58.10	
2044S									±0-100	£52.20
2044S-60		2.5 N or less	£89.50							
2044S-09		1.4 N or less	£54.00							
2045S		5 mm (1 mm)	12 µm					0-50-0	1.4 N or less	£53.40

## Features

### Metric

Code No.							
2044S	✓	—	—	—	—	—	—
2044S-09	✓	—	✓	—	—	—	—
2044S-60	✓	—	—	✓	—	—	—
2045S	—	✓	—	—	—	—	—
2046S	✓	—	—	—	—	—	—
2046S-60	✓	—	—	✓	—	—	—
2047S	—	✓	—	—	—	—	—
2310S-10	✓	—	—	—	✓	✓	—
2902S	✓	—	—	—	—	—	✓

## Optional Accessories

Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

Interchangeable backs refer to page F-41 for details.

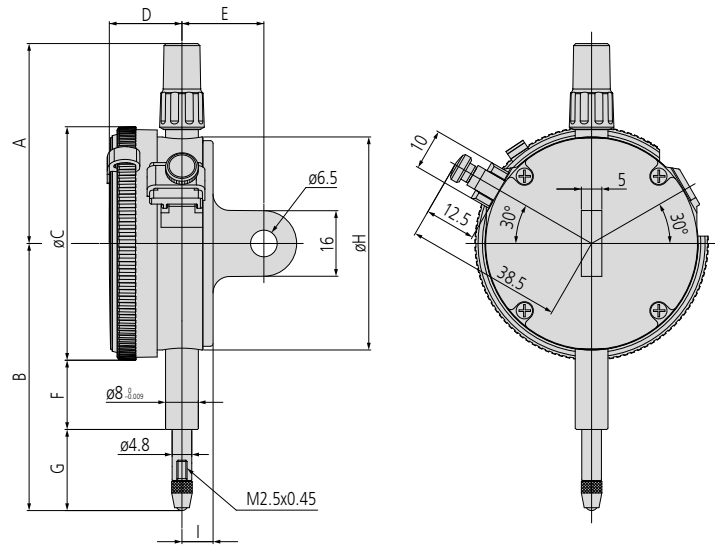
Plunger lifting aids refer to page F-42 for details.

Measuring stands refer to pages F-67 to F-72 for details.

## Dimensions

Unit: mm

ISO/JIS type



Note 1: Dimensions of the inch (ANSI/AGD type) dial indicator partly differ from those of the metric (ISO/JIS type) indicator.

Note 2: Inch (ANSI/AGD type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

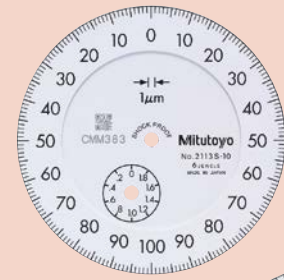
Code No.	A	B	C	D	E	F	G	H	I
2044S	48.8	65.2	57	17.7	20	16.9	19.8	52	7.6
2044S-09		70				12.3	29.2		
2044S-60						16.9	19.8		
2045S		70				12.3	29.2		
2046S						16.9	19.8		
2046S-60		65.2				12.3	29.2		
2047S						16.9	19.8		
2310S-10		16.9				19.8			
2902S									

F

# Dial Indicators

## SERIES 2 – 0.001 mm and 0.005 mm Graduation Dial Indicators

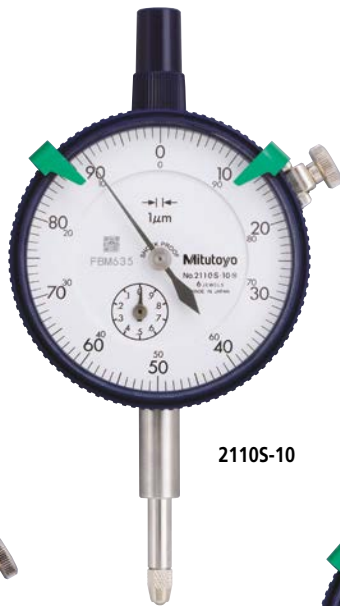
- Standard 0.001 mm and 0.005 mm graduation dial indicators having a bezel with an outside diameter of 57 mm. All types come with limit markers and a bezel clamp.
- The outer clamp and lifting lever (optional) can be attached to either the right or left side. These parts can be easily installed and removed without tools.
- Secure adhesion between the bezel and crystal as well as the use of an O-ring prevents water or oil penetration.
- The plunger is made of high-strength quench hardened stainless steel which resists arduous use.
- A carbide contact point is used.
- A special alloy is used for the sector gears to provide improved wear resistance.
- The indicator uses jewelled bearings, providing excellent indication sensitivity and durability.
- Application of a hard coating on the surface of the crystal makes it highly resistant to scratching and chemical attack.



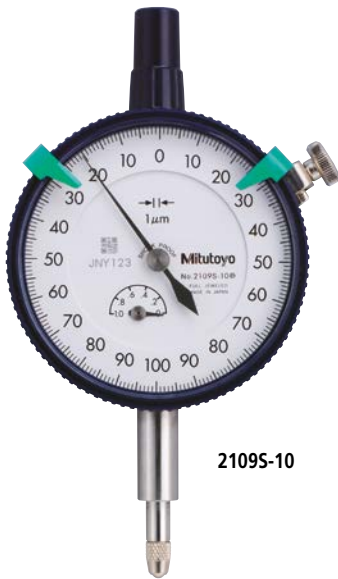
21135-10



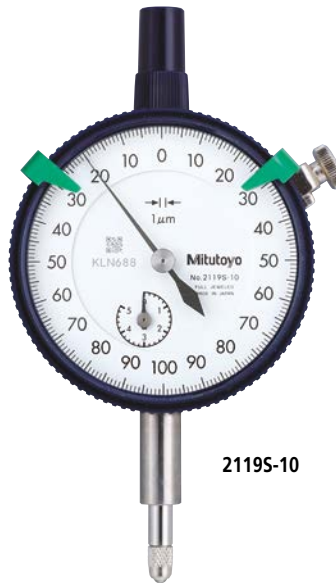
21245-10



21105-10



21095-10



21195-10

### Specifications

#### Metric

Code No.	Graduation	Range (range/rev)	Accuracy				Repeat-ability	Scale	Measuring force	Price
			Overall	Retrace	1/10 rev	1 rev				
21095-10	0.001 mm	1 mm (0.2 mm)	5 µm	2 µm	2 µm	4 µm	0.5 µm	0-100-0	1.5 N or less	£80.10
21105-10		1 mm (0.1 mm)						±0-100		£98.20
21105-70		2 mm (0.2 mm)	7 µm	5 µm	0-100-0	£94.90				
21135-10		5 mm (0.2 mm)	10 µm	6 µm	1 µm	1.5 N or less	£111.00			
21195-10	0.005 mm	5 mm (0.5 mm)	3 µm	5 µm	9 µm	3 µm	±0-50	1.5 N or less	£75.90	
21245-10		12 µm							5 µm	9 µm

## Features

Metric						
Code No.						
2109S-10	—	✓	✓	—	✓	—
2110S-10	✓	—	✓	—	✓	✓
2110S-70	✓	—	✓	✓	✓	✓
2113S-10	—	✓	✓	—	✓	—
2119S-10	—	✓	—	—	✓	—
2124S-10	✓	—	—	—	✓	—

## Optional Accessories

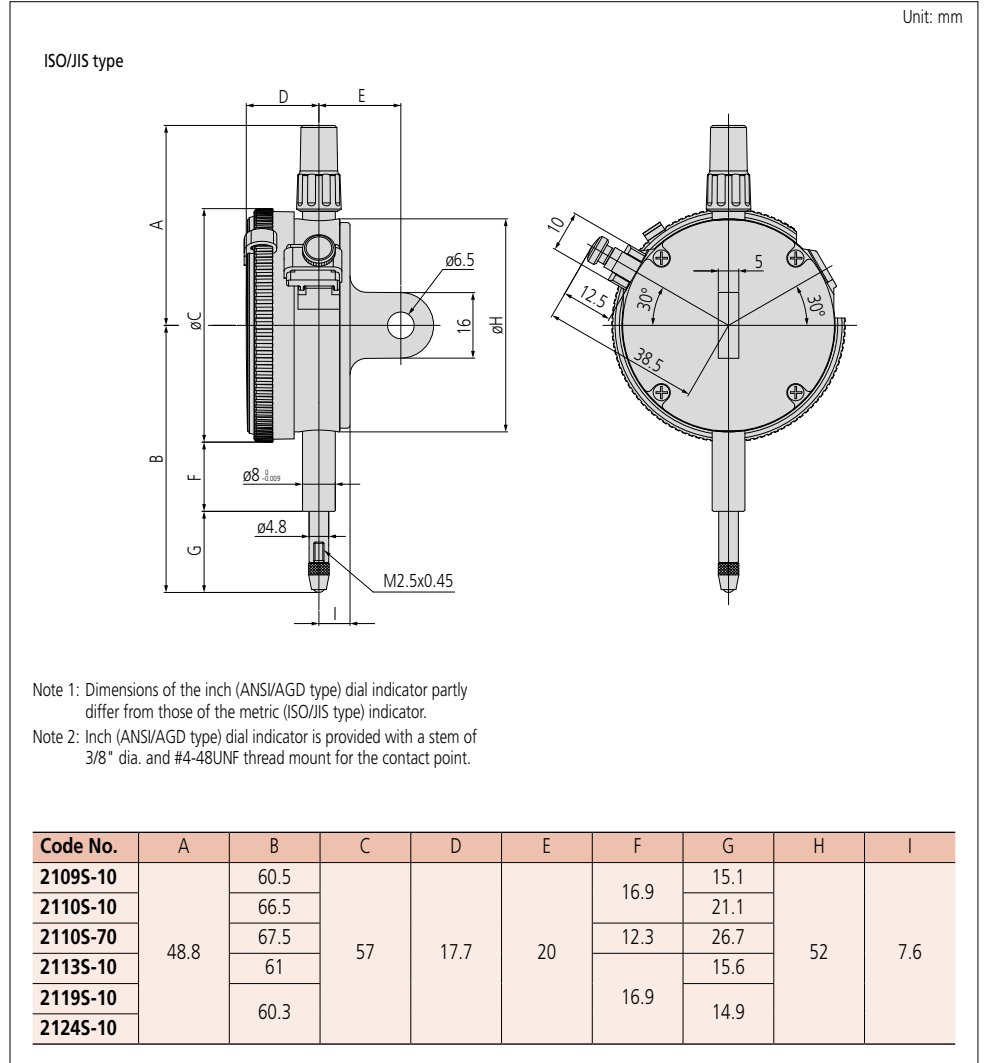
Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

Interchangeable backs refer to page F-41 for details.

Plunger lifting aids refer to page F-42 for details.

Measuring stands refer to pages F-67 to F-72 for details.

## Dimensions



F

# Dial Indicators

## SERIES 2 – Inch Reading Dial Indicators

- Standard .0001" to 0.001" graduation dial indicators having a bezel with an outside diameter of 57 mm.
- The outer clamp and lifting lever (optional) can be attached to either the right or left side. These parts can be easily installed and removed without tools.
- Secure adhesion between the bezel and crystal as well as the use of an O-ring prevents water or oil penetration.
- A carbide contact point is used.
- The stem and plunger are made of high-strength quench-hardened stainless steel which resists arduous use.
- A special alloy is used for the sector gears to provide improved wear resistance.
- The indicator uses jewelled bearings, providing excellent indication sensitivity and durability.
- Application of a hard coating on the surface of the crystal makes it highly resistant to scratching and chemical attack.



### Features

Inch					
Code No.					
23585-10	✓	—	—	✓	—
24145	✓	—	—	—	—
24155	—	✓	—	—	—
28025-10	✓	—	✓	✓	—
28035-10	—	✓	✓	✓	—
28045-10	✓	—	✓	✓	—
28055-10	—	✓	✓	✓	—
29225	—	✓	—	—	✓
29235-10	—	✓	✓	✓	✓

### Optional Accessories

Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

Interchangeable backs refer to page F-41 for details.

Plunger lifting aids refer to page F-42 for details.

Measuring stands refer to pages F-67 to F-72 for details.

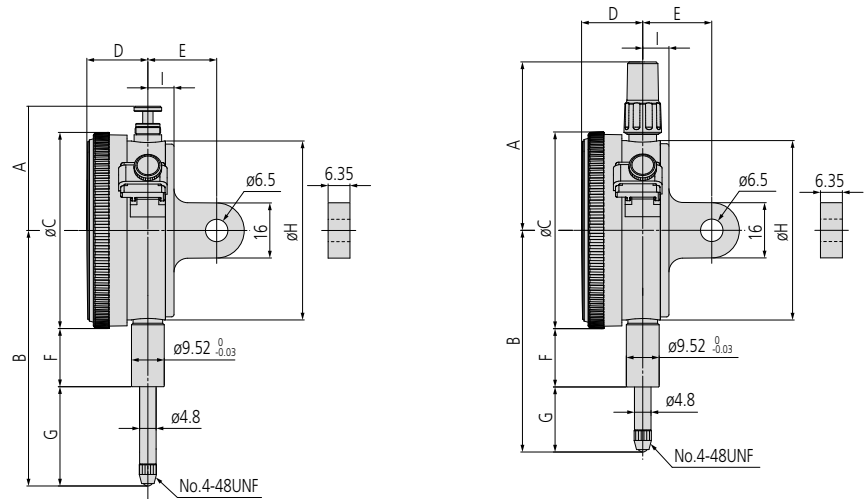
### Specifications

Inch								
Code No.	Graduation	Range (range/rev)	Accuracy		Repeat-ability	Scale	Measuring force	Price
			First rev / 2.5 rev / 10 rev	Retrace				
24145	.001"	.5" (.1")	±.001" / ±.001" / ±.001"	.0002"	±.0002"	±0-100	1.8N or less	£70.30
24155								£70.30
29225	.0005"	.125" (.05")	±.0005" / ±.0005" / —	.00016"	±.0001"	0-25-0		£67.60
23585-10	.0001"	.5" (.01")	±.0002" / .0002" / ±.0003" ±.0004" (first 20 rev) / ±.0008" (over 20 rev)	.00015"	±.00003"	0-10	2.0N or less	£133.00
28025-10								£111.00
28035-10		£111.00						
28045-10		£118.00						
28055-10		£118.00						
29235-10		£108.00						
		.05" (.01")	±.0001" / ±.0001" / ±.0002"	.0001"		0-5-0		

## Dimensions

Unit: mm

ANSI/AGD type



Code No.	A	B	C	D	E	F	G	H	I				
2358S-10		63.6					21.5						
2414S	38.9	64.1					22						
2415S													
2802S-10	48.8	51.4	57	17.7	19	13.6	9.3	52	7.6				
2803S-10													
2804S-10													9.6
2805S-10													
2922S													12.2
2923S-10													9.6

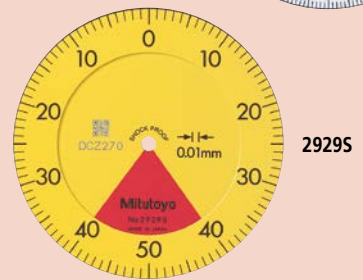
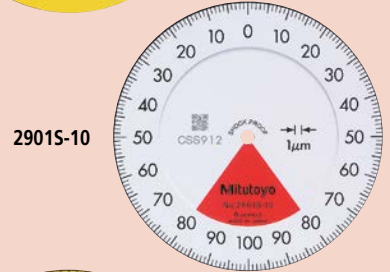
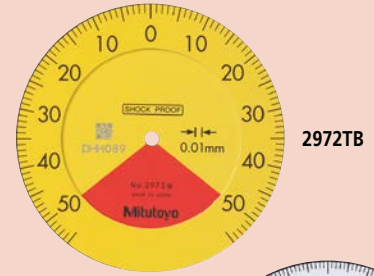
# Dial Indicators

## SERIES 1 and 2 – One Revolution Dial Indicators

- Mitutoyo's unique shock-proof mechanism is incorporated, providing improved resistance to shock due to sudden plunger retraction caused by impact.
- This series has been developed to eliminate the possibility of reading errors due to miscounting multiple revolutions.
- The dead zone in red indicates "accuracy not guaranteed".
- One revolution type Back plunger dial gauges are also available. (Refer to page F-36 for details.)

### 2970 Series:

- Excellent water- and drip-proof characteristics (IP43).
- Smooth movement thanks to the improved design of bush and stem.
- Application of a hard coating on the surface of the crystal makes it highly resistant to scratching and chemical attack.
- Lightweight (75 g).



## Specifications

### Metric

Code No.	Graduation	Range (range/rev)	Accuracy				Repeat-ability	Scale	Measuring force	Price
			Overall	Retrace	1/10 rev	1 rev				
Series 1										
1929S	0.01 mm	1 mm (1.4 mm)	11 µm	4 µm	7 µm	—	3 µm	50-0-50	1.4 N or less	£77.10
Series 2										
2929S	0.01 mm	0.8 mm (1 mm)	8 µm	3 µm	5 µm	—	3 µm	40-0-40	1.4 N or less	£77.10
2929S-62									2.0 N or less	£110.00
2900S-10	0.001 mm	0.08 mm (0.1 mm)	3 µm	2 µm	2 µm	—	0.5 µm	80-0-80	1.4 N or less	£111.00
2900S-72									2.0 N or less	£118.00
2901S-10									0.16 mm (0.2 mm)	4 µm
2971TB	0.01 mm	0.5 mm (0.7 mm)	8 µm	3 µm	5 µm	—	3 µm	25-0-25	1.4 N or less	£55.00
2972TB		1 mm (1.4 mm)								—

### Inch

Code No.	Graduation	Range (range/rev)	Accuracy		Repeat-ability	Scale	Measuring force	Price
			First rev / 2.5 rev / 10 rev	Retrace				
Series 2								
2910S-10	.0001"	.008" (.01")	±.0001" / — / —	.0001"	±.00003"	4-0-4	1.8 N or less	£98.70
2978TB	.001"	.06" (.079")	±.001" / — / —	.0002"	±.0002"	30-0-30	1.4 N or less	£61.50
2976TB	.0005"	.02" (.028")	±.0005" / — / —	.00016"	±.0001"	10-0-10		£63.90



## Features

Metric					
Code No.					
1929S	—	✓	✓	—	—
2900S-10	—	✓	✓	—	✓
2900S-72	—	✓	✓	✓	✓
2901S-10	—	✓	✓	—	✓
2929S	—	✓	✓	—	—
2929S-62	—	✓	✓	✓	—
2971TB	—	✓	✓	✓	—
2972TB	—	✓	✓	✓	—

Inch					
Code No.					
2976TB	—	✓	✓	✓	—
2978TB	—	✓	✓	✓	—
2910S-10	—	✓	✓	—	✓

## Optional Accessories

Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

Interchangeable backs refer to page F-41 for details.

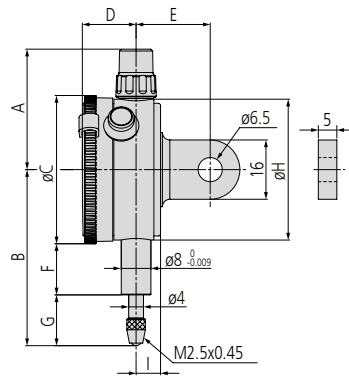
Plunger lifting aids refer to page F-42 for details.

Measuring stands refer to pages F-67 to F-72 for details.

## Dimensions

Unit: mm

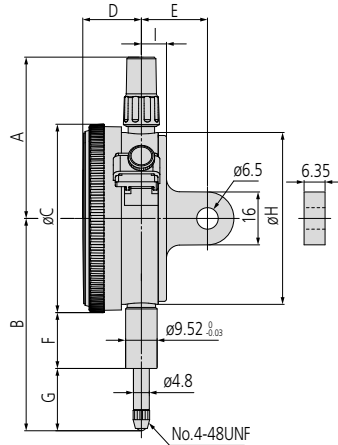
### 1929S



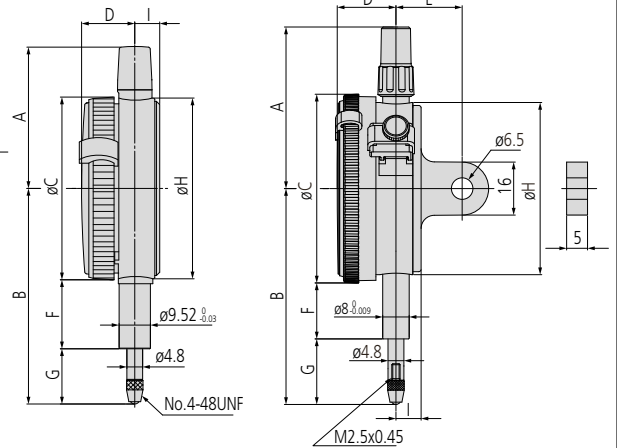
Note 1: Dimensions of the inch (ANSI/AGD type) dial indicator partly differ from those of the metric (ISO/JIS type) indicator.

Note 2: Inch (ANSI/AGD type) dial indicator is provided with a stem of 3/8" dia. and #4-48UNF thread mount for the contact point.

### ANSI/AGD type



### ISO/JIS type



Code No.	A	B	C	D	E	F	G	H	I	
ISO/JIS type										
1929S	32.5	47.5	40	14.5	20	13.8	13.7	38	6.6	
2900S-10	48.8	66	57	17.7		16.9	20.6	20.7	52	7.6
2900S-72		66.1								
2901S-10		65.2								
2929S		65.6								
2929S-62		66								
2971TB*	43.2	65.6	55.6	16.2	—	21	16.8	55	7.6	
2972TB*	66	17.2								
ANSI/AGD type										
2976TB*	43.2	64.7	55.6	16.2	—	21	15.9	55	7.6	
2978TB*		65.3					16.5			
2910S-10	48.8	51.2	57	17.7	19	13.6	9.1	52	7.6	

\* Plain back

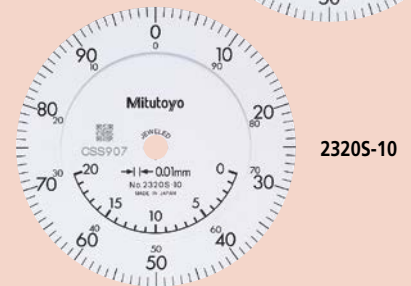
# Dial Indicators

## SERIES 2 – Long Stroke Dial Indicators

- Long stroke dial indicators with a  $\varnothing 57$  mm outer frame. All models are equipped with limit markers and a bezel clamp as standard.
- An O-ring is employed to ensure air-tightness between the outer frame and the crystal case to prevent water or oil penetration.
- Both the stem and the plunger are made of high-strength quench-hardened stainless steel suitable for heavy-duty use.
- A carbide-tipped contact point is employed.
- The grand gear is made of stainless steel with high resistance to wear and deformation.
- Application of a hard coating on the surface of the crystal makes it highly resistant to scratching and chemical attack.
- The bezel clamp and lifting lever (optional) can be attached to either the right or left side. These parts can be easily installed and removed without tools.



2330S-10



2320S-10

### Specifications

#### Metric

Code No.	Graduation	Range (range/rev)	Accuracy				Repeat-ability	Scale	Measuring force	Price
			Overall	Retrace	1/10 rev	1 rev				
2050S	0.01 mm	20 mm (1 mm)	20 $\mu$ m	5 $\mu$ m	8 $\mu$ m	15 $\mu$ m	4 $\mu$ m	$\pm 0-100$	2.0 N or less	£72.40
2320S-10										£75.40
2052S		30 mm (1 mm)	25 $\mu$ m	7 $\mu$ m	10 $\mu$ m	15 $\mu$ m	5 $\mu$ m		2.5 N or less	£88.40
2330S-10										£97.80

#### Inch

Code No.	Graduation	Range (range/rev)	Accuracy		Repeat-ability	Scale	Measuring force	Price
			First rev / 2.5 rev / 10 rev	Retrace				
2416S	.001"	1" (.1")	$\pm .001$ " / $\pm .001$ " / $\pm .002$ "	.0002"	$\pm .0002$ "	$\pm 0-100$	1.8 N or less	£70.30
2416S-10								£83.40
2417S		2" (.1")	$\pm .001$ " / $\pm .001$ " / $\pm .002$ " / $\pm .003$ " (first 20 rev)	.00033"	$\pm .0002$ "	$\pm 0-50-0$	2.5 N or less	£70.30
2424S-19								£131.00
2776S	.0005"	1" (.05")	$\pm .0005$ " / $\pm .0005$ " / $\pm .0015$ "	.0002"	$\pm .0001$ "	$\pm 0-50$	1.8 N or less	£80.60
2904S	.001"	1" (.1")	$\pm .001$ " / $\pm .001$ " / $\pm .002$ "	.0002"	$\pm .0002$ "	100-0	1.8 N or less	£73.00

## Features

Metric							
Code No.							
2050S	✓	—	—	✓	—	—	—
2052S	✓	—	—	✓	—	—	—
2320S-10	✓	—	—	✓	✓	✓	—
2330S-10	✓	—	—	✓	✓	✓	—

Inch							
Code No.							
2416S	✓	—	—	—	—	—	—
2416S-10	✓	—	—	—	✓	—	—
2417S	—	✓	—	—	—	—	—
2424S-19	✓	—	✓	—	✓	✓	—
2776S	✓	—	—	—	—	—	—
2904S	✓	—	—	—	—	—	✓

## Optional Accessories

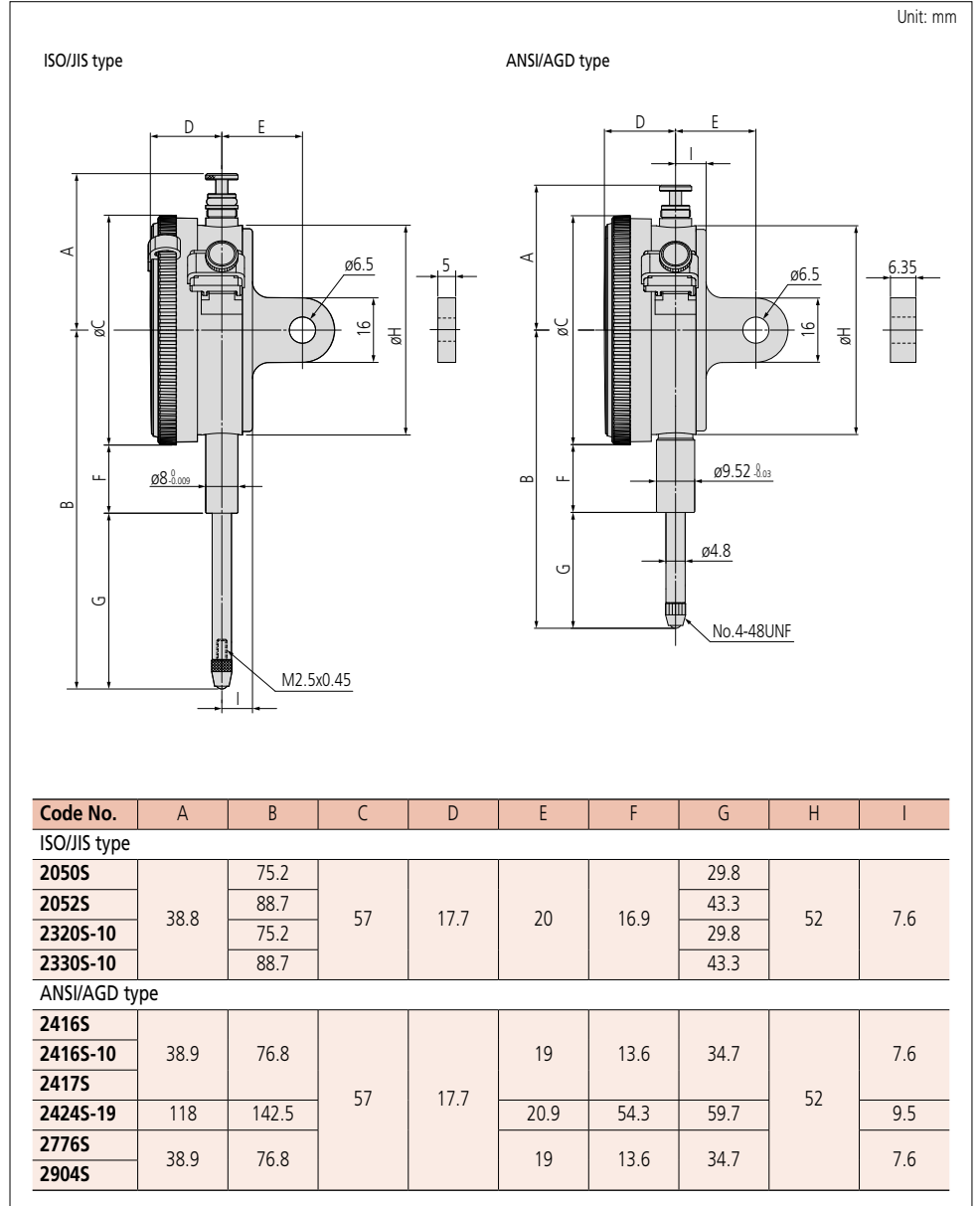
Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

Interchangeable backs refer to page F-41 for details.

Plunger lifting aids refer to page F-42 for details.

Measuring stands refer to pages F-67 to F-72 for details.

## Dimensions



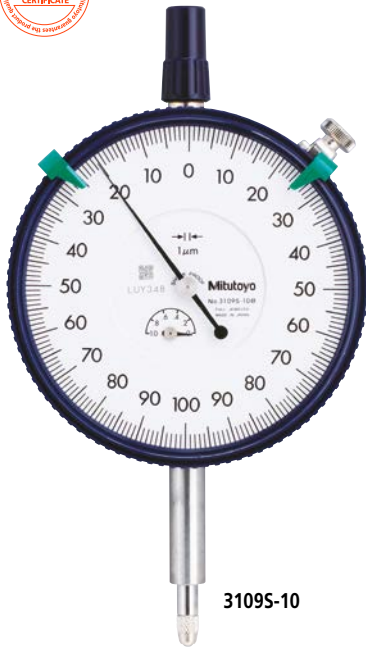
F

# Dial Indicators

## SERIES 3 and 4 – Long Stroke Large Dial Indicators

- Dial indicators with a large-diameter dial face for easy reading.
- Models with longer measuring ranges are also available.
- Both the stem and the plunger are made of high-strength quench-hardened stainless steel suitable for heavy-duty use.
- All types are supplied with limit markers and a bezel clamp as standard.
- The bezel clamp and lifting lever (optional)\*1 can be attached to either the right or left side. These parts can be easily installed and removed without tools.

\*1: Can be attached only to Code No. 3046S, 3047S, 3050S, 3109S-10 and 4046S.



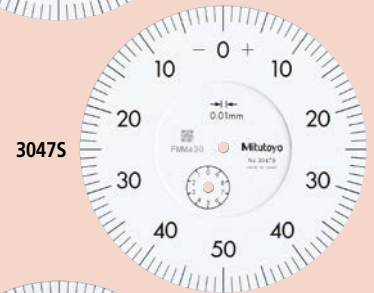
3109S-10



4046S



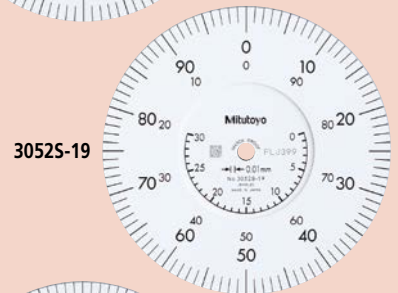
3046S



3047S



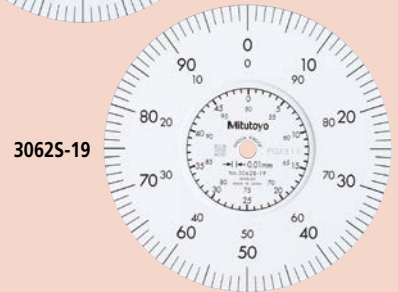
3050S



3052S-19



3060S-19



3062S-19

### Specifications

#### Metric

Code No.	Graduation	Range (range/rev)	Accuracy				Repeat-ability	Scale	Measuring force	Price
			Overall	Retrace	1/10 rev	1 rev				
3046S	0.01 mm	10 mm (1 mm)	15 µm	3 µm	5 µm	10 µm	3 µm	±0-100	1.4 N or less	£112.00
3047S										£112.00
3050S										£132.00
3052S-19										£148.00
3058S-19										£170.00
3060S-19*2										£220.00
3062S-19*2	£355.00									
3109S-10	0.001 mm	1 mm (0.2 mm)	5 µm	2 µm	2 µm	4 µm	0.5 µm	0-100-0	1.5 N or less	£139.00
4046S	0.01 mm	10 mm (1 mm)	15 µm	3 µm	5 µm	10 µm	3 µm	±0-100	1.4 N or less	£155.00

#### Inch

Code No.	Graduation	Range (range/rev)	Accuracy		Repeat-ability	Scale	Measuring force	Price
			First rev / 2.5 rev / 10 rev	Retrace				
3414S	.001"	.5" (.1")	±.001" / ±.001" / ±.001"	.0002"	±.0002"	1.8 N or less	£95.00	
3415S							£95.00	
3416S							£101.00	
3417S							£101.00	
3424S-19	.001"	2" (.1") (20 rev)	±.001" / ±.001" / ±.002" / ±.003"	.00033"	±0-100	3.0 N or less	£125.00	
3426S-19*2							£188.00	
3428S-19*2							£235.00	
3802S-10	.0001"	.025" (.01")	±.0001" / ±.0001" / —	.0001"	±.00003"	2.0 N or less	£119.00	
3803S-10							£114.00	
4887S-19*2	.001"	3" (.1")	±.001" / ±.001" / ±.002" / ±.003" (20 rev) / ±.005" (over 20 rev)	.00033"	±.0002"	±0-100	3.0 N or less	£210.00

\*2 Use in a vertical orientation only (contact point downward).

## Features

Metric						
Code No.						
3046S	✓	—	—	—	—	—
3047S	—	✓	—	—	—	—
3050S	✓	—	—	✓	—	—
3052S-19	✓	—	✓	—	✓	✓
3058S-19	✓	—	✓	—	✓	✓
3060S-19	✓	—	✓	—	✓	✓
3062S-19	✓	—	✓	—	✓	✓
3109S-10	—	✓	✓	—	✓	—
4046S	✓	—	—	—	—	—

Inch						
Code No.						
3414S	✓	—	—	—	—	—
3415S	—	✓	—	—	—	—
3416S	✓	—	—	—	—	—
3417S	—	✓	—	—	—	—
3424S-19	✓	—	✓	—	✓	✓
3426S-19	✓	—	✓	—	✓	✓
3428S-19	✓	—	✓	—	✓	✓
3802S-10	✓	—	✓	—	✓	—
3803S-10	—	✓	—	—	✓	—
4887S-19	✓	—	✓	—	✓	✓

## Optional Accessories

Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

Interchangeable backs refer to page F-41 for details.

Plunger lifting aids refer to page F-42 for details.

Measuring stands refer to pages F-67 to F-72 for details.

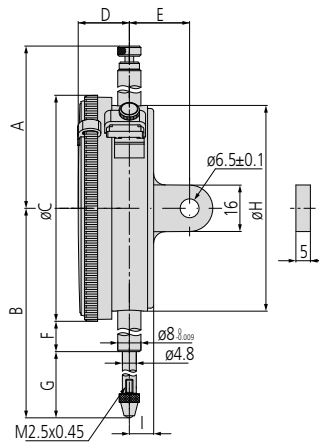


3058S-19

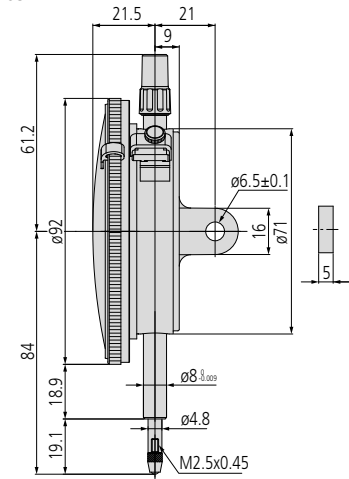
## Dimensions

Unit: mm

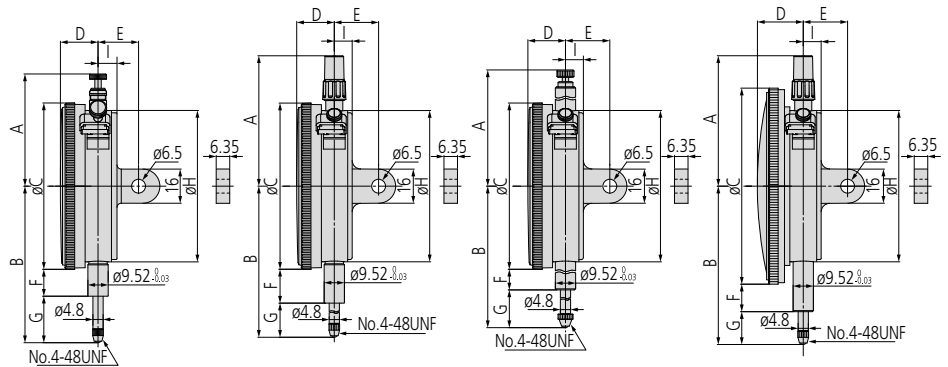
### ISO/JIS type



### 4046S



### ANSI/AGD type



Code No.	A	B	C	D	E	F	G	H	I
<b>ISO/JIS type</b>									
3046S	61.2	75.5				15.9	20.6		
3047S									
3050S	52.6	94				25.9	29.1		
3052S-19	72.9	104.3				43.9	59.4	71	9
3058S-19	81.9	142.3	78	17.7	21	73.9	89.4		
3060S-19	120.9	202.3				94.9	109.4		
3062S-19	141.9	243.3				25.9	14.1		
3109S-10	61.2	79							
<b>ANSI/AGD type</b>									
3414S		73.4					21.8		
3415S									
3416S	52.6	86.1				12.6	34.5		
3417S									
3424S-19	84	149.3	78	17.7	19	50.6	59.7	71	9
3426S-19	123	198.1				73.9	85.2		
3428S-19	144	244.5				94.9	110.6		
3803S-10						12.6	8.1		
3802S-10	61.2	59.7							
4887S-19	123	198.1	92	21.5		66.9	85.2		

# Dial Indicators

## SERIES 2 – Special Purpose Dial Indicators

### Adjustable-hand dial gauge

- The hand position can be adjusted independently of the position of the plunger by rotating the top knob.



### Peak-hold dial gauge

- A mechanism holds the pointer and the plunger at the position of maximum depression and hence displays the maximum value.\*

\* Clearance of peak hold: push the nut in the direction of the arrow indicated in the dimensions diagram for 2046S-80.



2048S-10



2046S-80

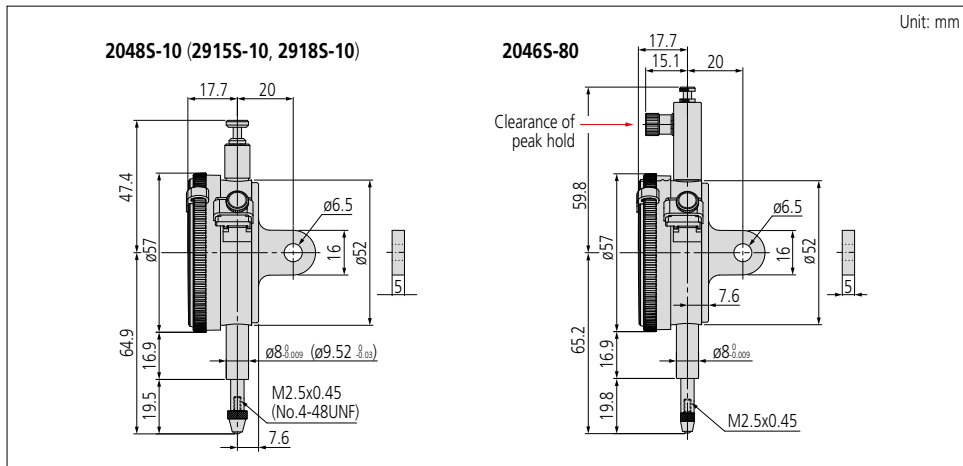
### Specifications

Metric										
Code No.	Graduation	Range (range/rev)	Accuracy				Repeat-ability	Scale	Measuring force	Price
			Overall	Retrace	1/10 rev	1 rev				
2048S-10	0.01 mm	10 mm (1 mm)	15 µm	3 µm	5 µm	10 µm	3 µm	0-100	1.4 N or less	£66.90
2046S-80									5.0 N or less	£104.50

Inch									
Code No.	Graduation	Range (range/rev)	Accuracy		Repeat-ability	Scale	Measuring force	Price	
			First rev / 2.5 rev / 10 rev	Retrace					
2915S-10	.001"	.5" (.1")	±.001" / ±.001" / ±.001"	.0002"	±.0002"	0-100	1.8 N or less	£88.20	
2918S-10								0-50-0	£88.20

### Dimensions



### Features

Metric					
Code No.					
2046S-80	✓	—	—	✓	—
2048S-10	✓	—	✓	—	✓

Inch					
Code No.					
2915S-10	✓	—	✓	—	✓
2918S-10	—	✓	✓	—	✓

### Optional Accessories

Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

Interchangeable backs refer to page F-41 for details.

Plunger lifting aids refer to page F-42 for details.

Measuring stands refer to pages F-67 to F-72 for details.

## Features

Metric					
Code No.					
1160T	✓	—	✓	—	—
1960T	—	✓	✓	✓	✓
2960T	—	✓	✓	✓	✓

Inch					
Code No.					
1166T	✓	—	✓	—	—
1167T	—	✓	✓	—	—
1168T	✓	—	✓	—	—
2961T	—	✓	✓	✓	✓

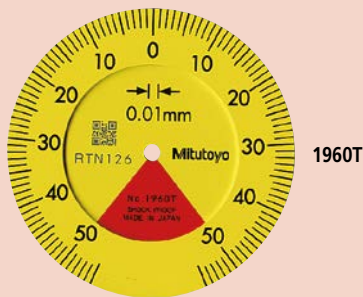
## Optional Accessories

Code No.	Description	Price
Holding bars		
124625	øD: 6.35 mm, L: 81 mm	£2.80
136567	øD: 6 mm, L: 81 mm	£2.80
136568	øD: 8 mm, L: 81 mm	£2.80
21AAA166	øD: 6 mm, L: 42 mm	£2.80
21AAA167	øD: 6.35 mm, L: 42 mm	£2.80
21AAA168	øD: 8 mm, L: 42 mm	£2.80

Note: øD and L are as in diagram below right.

Contact points for Mitutoyo's dial indicators refer to pages F-37 to F-40 for details.

Measuring stands refer to pages F-67 to F-72 for details.



## SERIES 1 and 2 – Back Plunger Dial Indicators

- Back plunger type dial gauges are suitable for mounting onto levelling machine tool tables or inspection jigs, and for use in situations where standard dial gauges are difficult to read.
- Models 1960T and 2960T, which use Mitutoyo's proprietary shock-proofing mechanism, have excellent durability and shock resistance.

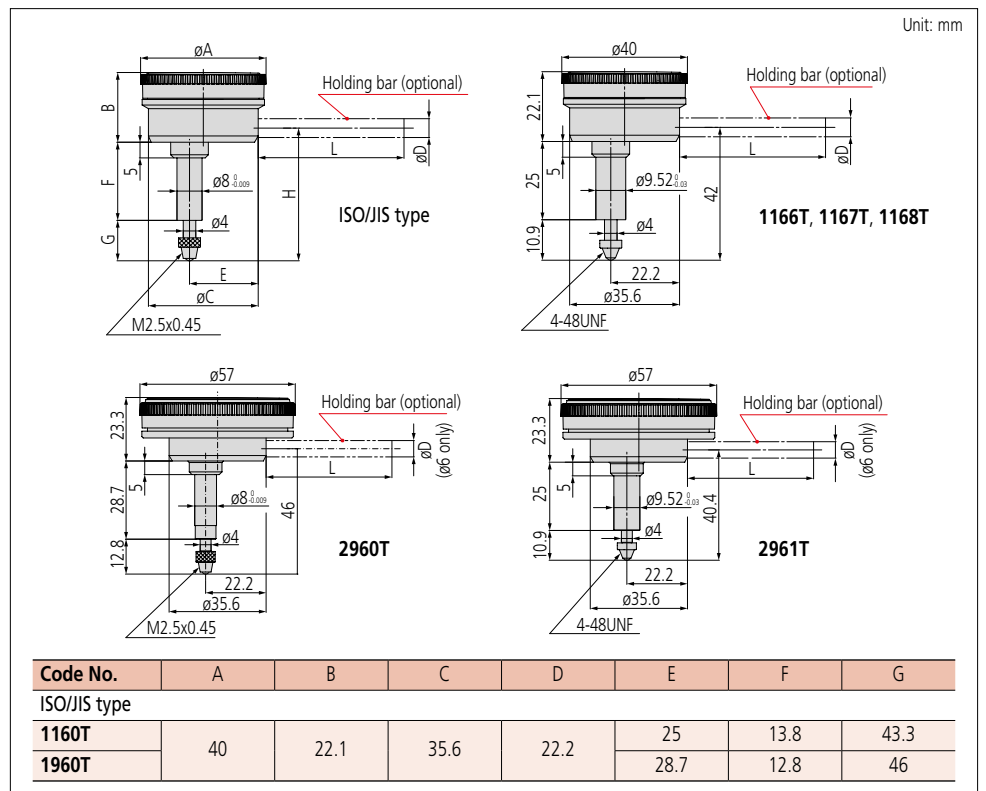


## Specifications

Metric										
Code No.	Graduation	Range (range/rev)	Accuracy				Repeat-ability	Scale	Measuring force	Price
			Overall	Retrace	1/10 rev	1 rev				
1960T		1 mm (1.27 mm)	14 µm			—	50-0-50	1.4 N or less	£108.00	
1160T	0.01 mm	5 mm (1 mm)	16 µm	4 µm	8 µm	14 µm	0-100		£97.20	
2960T		1 mm (1.27 mm)	14 µm			—	50-0-50		£131.00	

Inch									
Code No.	Graduation	Range (range/rev)	Accuracy		Repeat-ability	Scale	Measuring force	Price	
			First rev / 2.5 rev / 10 rev	Retrace					
1166T		.2" (.05")	±.001" / ±.001" / ±.001"	.00033"	±.0002"	±0-50	1.4 N or less	£88.90	
1167T	.001"	0-25-0				£109.00			
1168T		50-0				£114.00			
2961T	.0005"	.04" (.05")	±.0005" / — / —	.00016"	±.0001"	20-0-20		£131.00	

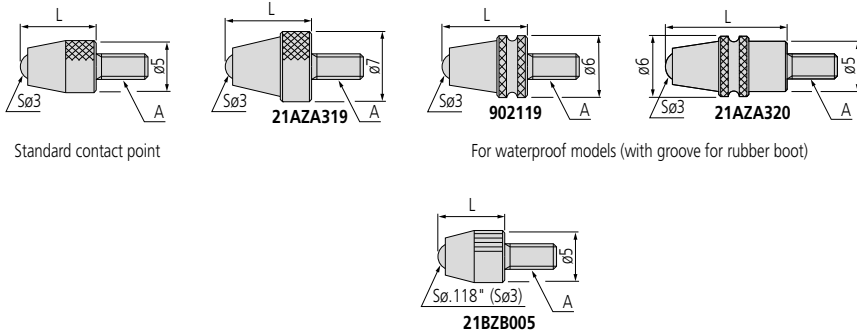
## Dimensions



# Optional Accessories

## Contact Points for Digimatic and Dial Indicators and Linear Gauges

### Ball Point



Standard contact point

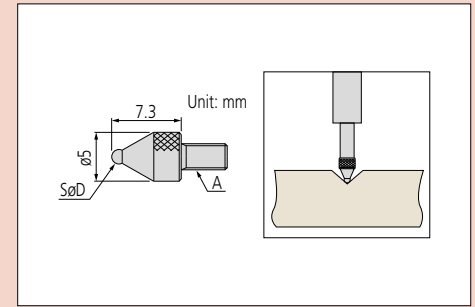
For waterproof models (with groove for rubber boot)

21BZB005

Unit: mm

### Ball Point

Optimal for workpieces with deep indentations.

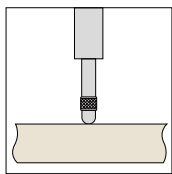
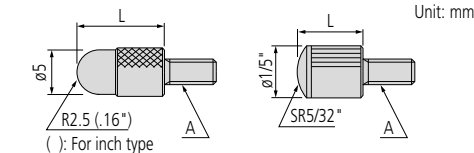


Code No.	Material	L	Price
A: M2.5x0.45			
901312	Carbide without groove	7.3	£6.30
120047	Ruby without groove		£12.20
901994	Plastic without groove		£10.50
21AZA319	Carbide without groove	8.3	£3.30
902119	Carbide with groove (waterproof type)		£14.00
21AZA320	Carbide with groove (waterproof type)	12.1	£8.20
21JAA225	Carbide without groove	14	£3.80
120049		15	£19.60
120051		15	£16.00
21JAA224	Carbide without groove	17	£4.90
120053		25	£19.60
120055		25	£16.00
A: 4-48UNF			
21BZB005	Carbide	1/4"	£7.10

Code No.	SøD	Price
A: M2.5x0.45		
21AAA349	1 mm, carbide	£47.80
21AAA350	1.5 mm, carbide	£40.20
101122	1.8 mm, steel	£5.10
21AAA351	2.5 mm, carbide	£40.20
21AAA352	4 mm, carbide	£48.20

### Shell Type Point

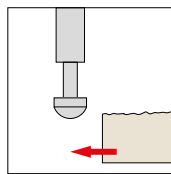
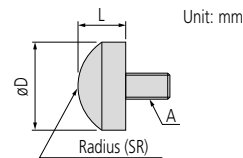
Contact point with a large radius. Optimal for use on flat surfaces.



Code No.	L	Price
A: M2.5x0.45		
101386	5	£5.10
101118	10	£5.10
137393	15	£5.10
101387	20	£5.10
101388	25	£5.10
A: 4-48UNF		
101184	5/32"	£5.10
21AAA031	1/4"	£4.30
101185	1/2"	£5.10
101186	3/4"	£5.10
21AAA034	7/8"	£4.30
101187	1"	£5.10

### Spherical Point

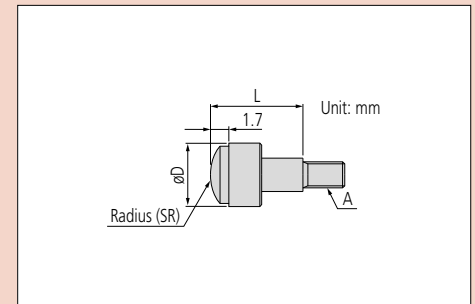
A large radius makes this contact point optimal for use where the workpiece needs to slide from the side.



Code No.	D	L	SR	Price
A: M2.5x0.45				
111460	5.5	3	5	£5.90
125258	7.9	5	5	£5.90
101119	10	5	7	£5.10
A: 4-48UNF				
101205	1/2"	1/8"	.35"	£5.10
101204	3/8"	3/32"	.28"	£5.10

### Spherical Point (Carbide)

A large radius makes this contact point optimal for use where the workpiece needs to slide from the side.



Code No.	D	L	SR	Price
A: M2.5x0.45				
120058	5.2	5	5	£50.50
120059	7.5	10	7	£57.90
120060	10.5	10	10	£69.30





101120



101385



120057



120068



120067



131365



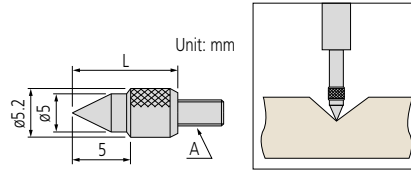
120059



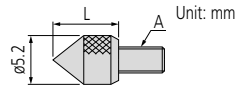
101117

### Conical Point

Used for positioning the measurement point. Since it can damage a workpiece easily, it is not suitable for use on soft materials.



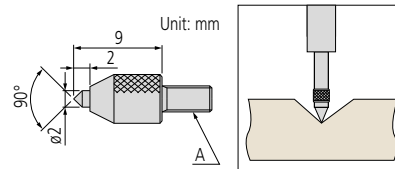
Code No.	Tip angle	L	Price
A: M2.5x0.45			
101120	60°	10	£5.10
A: 4-48UNF			
101190	60°	1/2"	£5.10



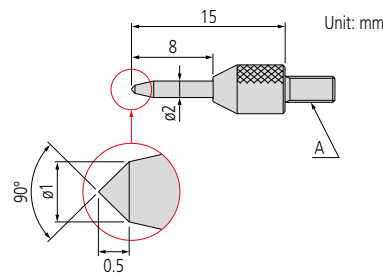
Code No.	Tip angle	L	Price
A: M2.5x0.45			
101385	90°	5	£5.10
A: 4-48UNF			
101191	90°	1/4"	£5.10

### Conical Point (Carbide)

Used for positioning the measurement point. Since it can damage a workpiece easily, it is not suitable for use on soft materials.



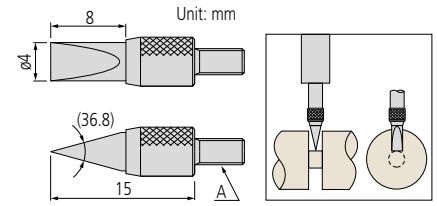
Code No.	Price
A: M2.5x0.45	
120057	£35.80



Code No.	Price
A: M2.5x0.45	
120068	£65.10

### Knife Edge Point (Carbide)

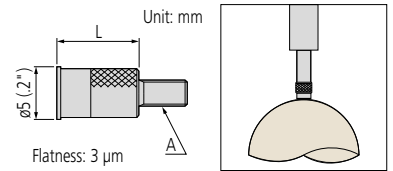
Suitable for measuring narrow groove diameter, etc.



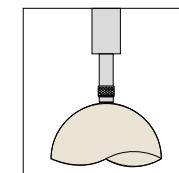
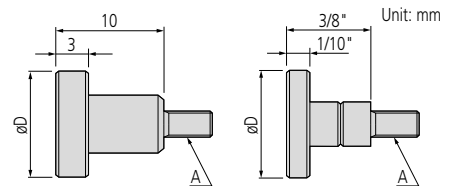
Code No.	Price
A: M2.5x0.45	
120067	£66.70

### Flat Point

Optimal for use on convex surfaces.



Code No.	L	Price
A: M2.5x0.45		
131365	8	£7.20
21AAA340	10	£39.30
A: 4-48UNF		
133017	5/16"	£7.20
21AAA043	1/2"	£6.50
21AAA044	3/4"	£7.90
21AAA045	1"	£7.90



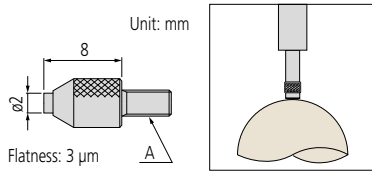
Code No.	D	Price
A: M2.5x0.45		
101117	10	£8.60
21AAA341	15	£39.30
21AAA342	20	£55.50
21AAA343	25	£71.10
21AAA344	30	£79.30
A: 4-48UNF		
101188	1/2"	£9.00
101189	3/8"	£9.00

# Optional Accessories

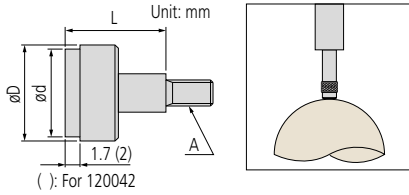
## Contact Points for Digimatic and Dial Indicators and Linear Gauges

### Flat Point

Optimal for use on convex surfaces.

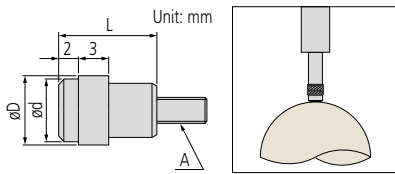


Code No.	Price
A: M2.5x0.45	
<b>120056</b>	<b>£14.80</b>



Code No.	D	d	L	Price
A: M2.5x0.45				
<b>120041</b>	5.2	4.3*	5	<b>£40.50</b>
<b>120042</b>	7	6.5*	10	<b>£45.00</b>
<b>120043</b>	10.5	9.5*	10	<b>£54.20</b>
<b>21AAA345</b>	17	15**	10	<b>£94.80</b>
<b>21AAA346</b>	22	20**	10	<b>£110.00</b>

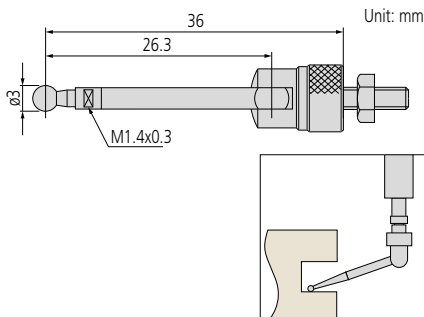
Flatness: \*3 µm, \*\*5 µm



Code No.	D	d	L	Price
A: M2.5x0.45				
<b>137255</b>	7	6.4	10	<b>£66.90</b>
<b>137399</b>	9	8	10	<b>£71.30</b>

### Lever Point

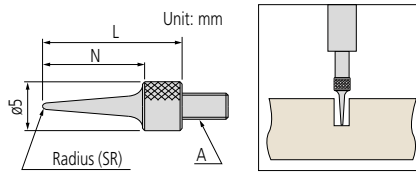
Suitable for use on perpendicular faces, such as those within mould cavities. Lever can be adjusted to the required angle.



Code No.	Price
A: M2.5x0.45	
<b>900391</b>	<b>£13.20</b>
A: 4-48UNF	
<b>900393</b>	<b>£19.60</b>

### Needle Point

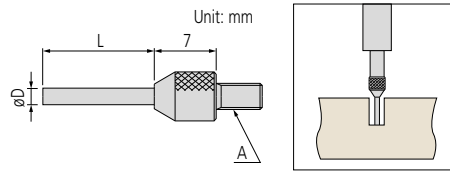
Suitable for probing the bottom of a groove or hole.



Code No.	N	L	SR	Price
A: M2.5x0.45				
<b>101121</b>	11	15	0.4	<b>£5.10</b>
<b>137413</b>	13	17	0.2	<b>£5.10</b>
<b>21AAA255</b>	21	25	0.4	<b>£5.90</b>
<b>21AAA256</b>	31	35	0.4	<b>£7.50</b>
A: 4-48UNF				
<b>21AAA030</b>	.27"	.6"	.016"	<b>£5.30</b>
<b>21AAA046</b>	.52"	1"	.016"	<b>£5.90</b>

### Needle Point (Carbide)

Suitable for probing the bottom of a groove or hole.



Code No.	D	L	Price
A: M2.5x0.45			
<b>120066</b>	0.45	3	<b>£31.40</b>
<b>21AAA329</b>	0.45	5	<b>£125.00</b>
<b>120065</b>	1	3	<b>£22.90</b>
<b>21AAA330</b>	1	5	<b>£88.00</b>
<b>21AAA331</b>	1	8	<b>£92.10</b>
<b>21AAA332</b>	1	10	<b>£101.00</b>
<b>21AAA335</b>	1.5	5	<b>£84.10</b>
<b>21AAA336</b>	1.5	10	<b>£125.00</b>
<b>120064</b>	1.5	13	<b>£24.80</b>
<b>21AAA337</b>	1.5	20	<b>£95.20</b>
<b>21AAA338</b>	1.5	40	<b>£113.00</b>
<b>137257</b>	2	8	<b>£36.30</b>
<b>21AAA257</b>	2	18	<b>£57.20</b>
<b>21AAA258</b>	2	28	<b>£49.80</b>
<b>21AAA339</b>	2	40	<b>£122.00</b>



120056



120043



137255



101121



137257

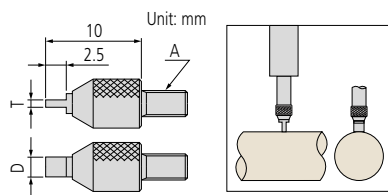


900391



### Blade Point (Carbide)

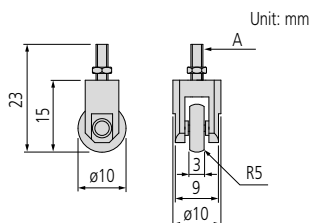
Suitable for use on convex surfaces, especially those with shallow grooves.



Code No.	T	W	Price
A: M2.5x0.45			
120061	0.4	2	£43.80
120062	0.6	2	£43.80
120063	1	4	£51.00

### Roller Point

Suitable for use on a moving workpiece surface, or where the workpiece needs to slide from the side.



Code No.	Price
A: M2.5x0.45	
901954	£36.30
A: 4-48UNF	
901991	£36.30

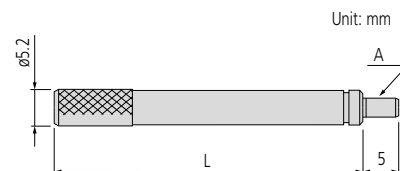
### Interchangeable Contact Point Set

This set consists of six types of popular contact point for extending the use of an indicator to many applications.

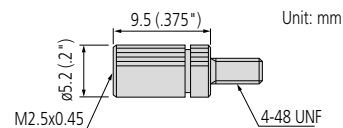


Code No.	Contact points included	Price
A: M2.5x0.45		
7822	Flat point (131365, ø5 mm)	£30.50
	Flat point (101117, ø10 mm)	
	Needle point (101121)	
	Spherical point (101119)	
	Shell type point (101118)	
	Shell type point (101387)	

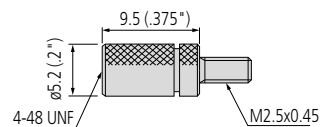
### Extension Rod



Code No.	L	Price
A: M2.5x0.45		
303611	10	£1.20
21AAA259A	15	£2.60
303612	20	£2.70
21AAA259B	25	£2.70
303613	30	£3.40
21AAA259C	35	£2.90
21AAA259F	50	£6.70
304146	60	£7.20
21AAA259J	70	£6.10
21AAA259L	75	£7.30
21AAA259M	80	£7.80
304147	90	£10.80
303614	100	£11.30
A: 4-48UNF		
139167	1/2"	£6.70
301655	1"	£3.00
301657	2"	£5.80
301659	4"	£11.30



Code No.	Price
21AAA011	£8.30



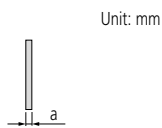
Code No.	Price
21AAA012	£9.20

# Optional Accessories

## Interchangeable Backs for Digimatic and Dial Indicators

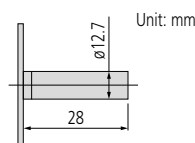
A dial or Digimatic indicator may be held in position by clamping on either the stem or the lug on the back of the indicator. The back of the indicator may need to be interchanged with another type for special applications. A wide variety of backs is available for Mitutoyo Digimatic and dial indicators.

### Flat Back

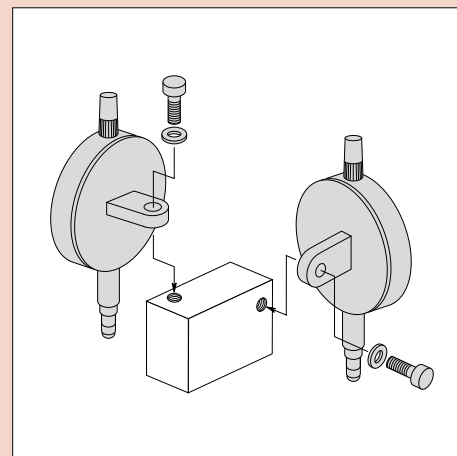


Code No.	Series	Remarks	Price
101211	1 (ø41 mm)	a = 2.2	£1.50
101039		a = 2.5	£1.50
192910	2 (ø57 mm)	(F type waterproof model)	£3.80
100836	3, 4 (ø78, 91 mm)	a = 3.0	£2.20

### Back with Post

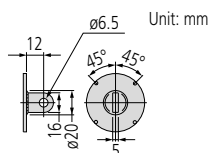


Code No.	Series	Remarks	Price
193172	1 (ø41 mm)	—	£24.20
101169	2 (ø57 mm)	—	£8.60
100839	3, 4 (ø78, 91 mm)	—	£43.40



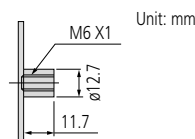
Alternative mounting arrangements for an indicator using the lug-on-centre back.

### Lug-On-Centre Back



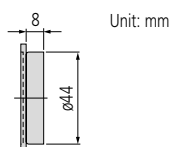
Code No.	Series	Remarks	Price
101210	1 (ø41 mm)	metric type	£4.40
101040		metric type	£4.40
101306	2 (ø57 mm)	inch type	£3.40
100691	3, 4	metric type	£5.80
100797	(ø78, 91 mm)	inch type	£5.80

### Back with Screw Mount



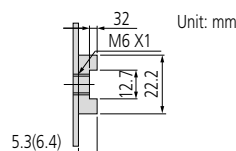
Code No.	Series	Remarks	Price
193173	1 (ø41 mm)	M6x1	£23.60
136023		M6x1	£8.60
101170	2 (ø57 mm)	1/4-28UNF	£8.60
136024	3, 4	M6x1	£43.40
100840	(ø78, 91 mm)	1/4-28UNF	£43.40

### Magnetic Back



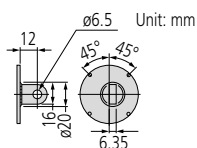
Code No.	Series	Remarks	Price
900928	2 (ø57 mm)	—	£27.10
900929	3, 4 (ø78, 91 mm)	—	£43.40

### Flat Adjustable Back



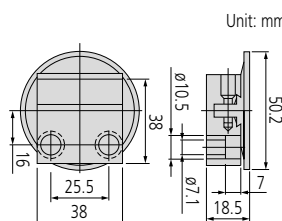
Code No.	Series	Remarks	Price
136025	1 (ø41 mm)	M6x1	£15.80
136026		M6x1	£8.60
101168	2 (ø57 mm)	1/4-20UNF	£8.60
136027	3, 4	M6x1	£43.40
100838	(ø78, 91 mm)	1/4-20UNF	£43.40

### Back with Offset Lug



Code No.	Series	Remarks	Price
101167	2 (ø57 mm)	—	£8.60
100837	3, 4 (ø78, 91 mm)	—	£43.40

### Back with Adjustable Bracket

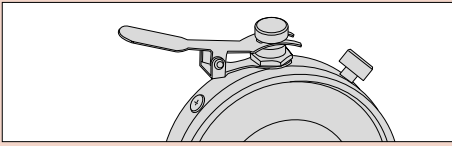
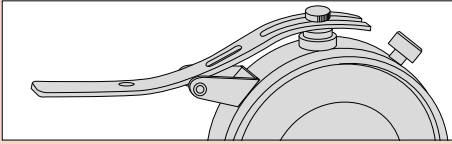


Code No.	Series	Remarks	Price
901963	2 (ø57 mm)	—	£51.00

## Plunger Lifting Aids for Digimatic and Dial Indicators

### Plunger Lifting Lever

The Plunger Lifting Lever is designed to enable smooth lifting of the plunger for operator convenience and contact point safety when using a dial indicator mounted on a stand.



Plunger lifting levers are available for attachment to the threaded fixing point provided or directly to the top plunger bearing.



902100



21AZB149



21AZB150



21BZA205  
(900527: Lever, 101171: Screw)



902011



903424  
(903307: Lever, 192686: Screw)

Code No.	Remarks	Price
902100	Use for S type Series 1 and F type Series 2 (up to 10 mm/.4" range) dial indicators.	£6.80
21AZB149	Use for S type Series 2, 3, and 4 dial indicators (up to 10 mm/.4").	£3.10
21AZB150	Use for S type Series 2 and 3 dial indicators (from 10 mm/.4" up to 20 mm/.8").	£3.60
21BZA205	Use for F type Series 1 dial indicators.	£5.50
902011	Use for F type Series 2 dial indicators (up to 10 mm/.4" range).	£3.40
903424	Use for F type Series 2 dial indicators (up to 20 mm/.8" range) and Series 3 and 4 dial indicators (up to 10 mm/.4" range).	£4.20

### Plunger Lifting Cable

With auto-stop function.



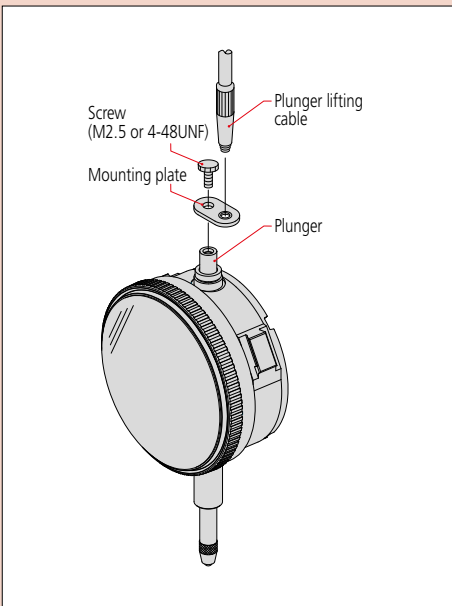
Code No.	Remarks	Price
901975	For Series 2 only	£15.20

### Plunger Lifting Knob

Suitable for 4.8 mm plunger diameter.



Code No.	Price
137693	£1.10



The plunger lifting cable is attached to the threaded top of the plunger by means of a mounting plate as shown.

# Optional Accessories

## Limit Stickers

- These are intended to be cut as appropriate and then are stuck onto the dial face or crystal of a Series 2 dial indicator (55.6 mm or 57 mm bezel diameter) to indicate dimensional tolerance limits.
- 10 pieces per set.



Code No.	Remarks	Price
136420	Red (10 sheets)	£6.80
136421	Green (10 sheets)	£6.80
136422	Yellow (10 sheets)	£6.80



Limit sticker indicating dimension tolerance limits of  $\pm 0.20$  mm. If the pointer comes to rest outside the red area during measurement then the dimension is judged to be within tolerance.

## Plunger Caps

- Plunger caps are available for dial indicators with a range of 10 mm or less.



Code No.	Remarks	Price
193051	Standard	£1.10
193595	Waterproof	£1.10

Note: This accessory is not applicable to 1003, 1911, 1913-10, and 2971 to 2973.

Plunger caps are useful for protecting the top of the plunger from dust and other contamination.

Note: When attaching to small dial indicators, the overall height will be 8 mm greater.

# Dial Test Indicators

## SERIES 513 – Lever Dial Test Indicators

### Feature Icons

Icon	Feature description
	With revolution counter type.
	Long stylus type.
	Jewelled bearing type.
	Double scale spacing type, easy-on-the-eyes.
	Dustproof type.
	Anti-magnetic type.

- Designed to probe surfaces that cannot be reached with a normal dial gauge. Useful both for alignment and for measurement purposes.
- Mitutoyo's proprietary design permits smooth pointer operation.
- Strong frame provides excellent rigidity and durability.
- Non-magnetic pointer and contact point permit reliable operation even in magnetic environments.
- Clear and concise wide dial face allows excellent visibility.
- Flat crystal makes graduations easy to read. Moreover, the O-ring sealing method used for the bezel prevents water or oil penetration. (Note that this type of indicator is NOT waterproof.)
- The surface of the crystal is hard-coated for excellent scratch resistance.
- Five types are available: horizontal, vertical, parallel, universal, and pocket, allowing users to select the model most suited to their needs. Each type is supplied as a set that includes several accessories and there is a choice of the set contents, which provides an opportunity for the user to match the indicator to the target application in a cost-effective manner.

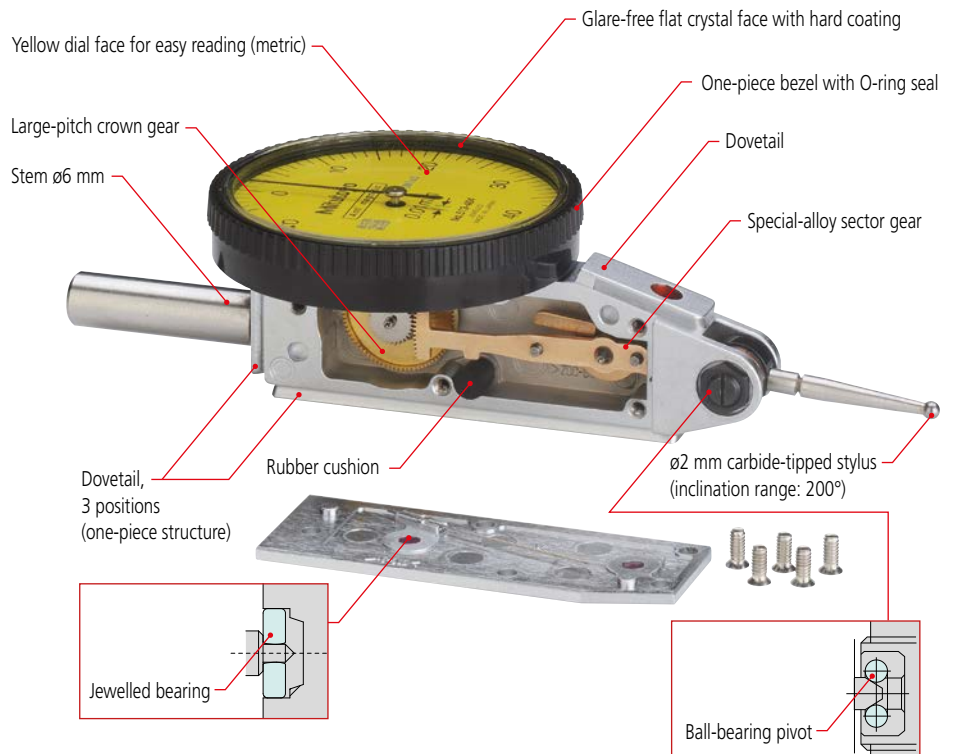
**Horizontal:** The standard configuration.

**Vertical:** Best suited for centering a hole under the spindle of a machine tool.

**Parallel:** The scale can be read from the front, with the stylus pivoting in a plane parallel to that of the dial face.

**Universal:** The direction of the stylus movement can be freely changed.

**Pocket:** Compact type.



### Features of Dial Test Indicators with a Ruby Contact Point

- Dial test indicators with a ruby contact point are available in the horizontal (standard) type.
- Benefits of ruby contact points:
  - Several times more resistant to wear than carbide.
  - Can be used on electrical discharge machines without special precautions.
  - Will not pick up ferrous swarf.



# Dial Test Indicators

## SERIES 513 – Horizontal Dial Test Indicator

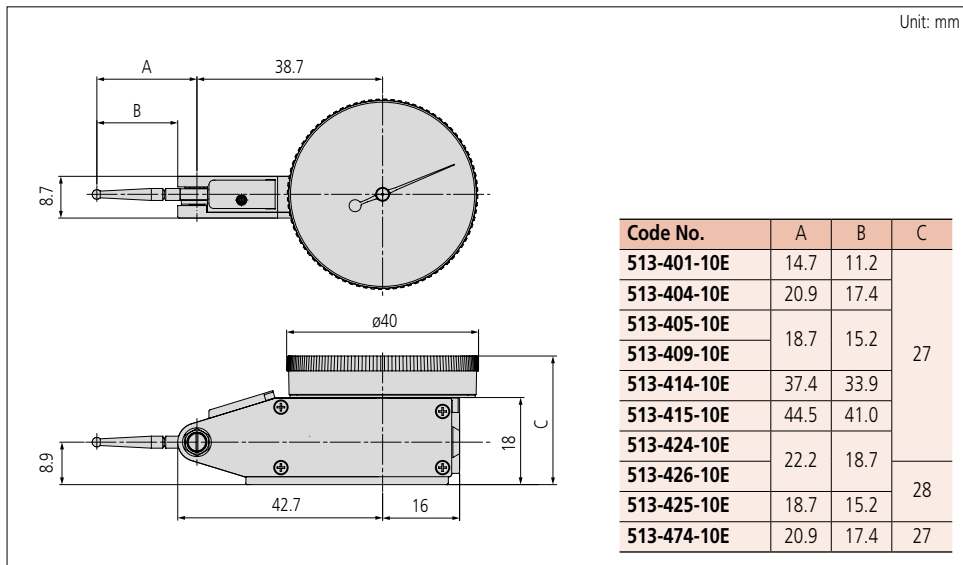
- Provides easy access to shrouded surfaces that cannot be reached with conventional dial indicators.
- No-clutch structure for automatic reversal of measuring direction.
- Resistant to water and dust thanks to the one piece bezel and O-ring seal for the crystal.
- The glare-free flat crystal face has a scratch resistant coating.
- High sensitivity and quick response due to low-friction jewelled bearings.

### 513-474-10E:

- Ruby contact point model.
- Higher resistance to wear.
- Non-magnetic, non-conductive tip allows use in EDM processes.



### Dimensions



### Features

Metric					
Code No.	Swivel clamp	Stem	Stylus	Crystal	Bezel
513-401-10E	✓	—	—	✓	—
513-404-10E	✓	—	—	✓	—
513-405-10E	✓	—	—	✓	—
513-414-10E	✓	✓	✓	✓	—
513-415-10E	✓	—	✓	✓	—
513-424-10E	✓	✓	—	✓	—
513-425-10E	✓	—	—	✓	✓
513-426-10E	✓	✓	—	✓	✓
513-474-10E	✓	—	—	✓	—

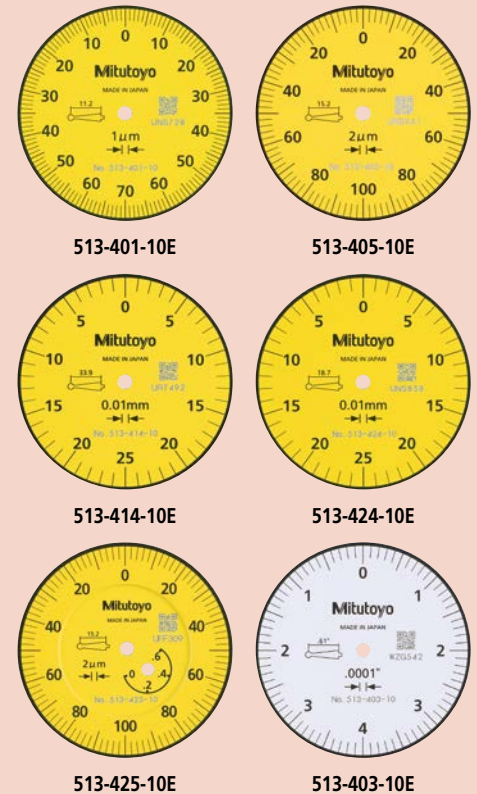
Inch					
Code No.	Swivel clamp	Stem	Stylus	Crystal	Bezel
513-402-10E	✓	—	—	✓	—
513-403-10E	✓	—	—	✓	—
513-412-10E	✓	—	✓	✓	—

Metric/inch					
Code No.	Swivel clamp	Stem	Stylus	Crystal	Bezel
513-409-10T	✓	—	—	✓	—

Inch/metric					
Code No.	Swivel clamp	Stem	Stylus	Crystal	Bezel
513-406-10T	✓	—	—	✓	—



### Optional Accessories

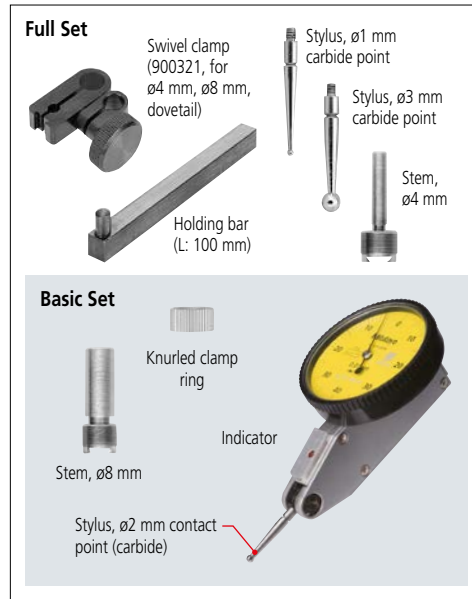
Swivel clamps, holding bars, stems and styli refer to pages F-51 to F-53 for details.



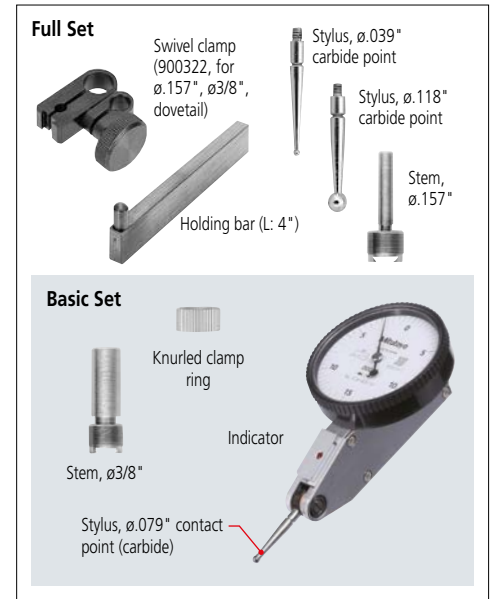
### Set Configuration: Metric



### Set Configuration: Metric and Metric/Inch



### Set Configuration: Inch and Inch/Metric



### Set Configuration: Inch



513-908-10E

### Specifications

Metric						
Code No.	Graduation	Range	Accuracy	Scale	Measuring force	Price
<b>Basic set</b>						
513-424-10E	0.01 mm	0.5 mm	5 µm	0-25-0	0.3 N or less	£95.90
513-414-10E			10 µm		0.2 N or less	£105.00
513-404-10E		0.8 mm	8 µm	0-40-0	0.3 N or less	£85.70
513-474-10E*			10 µm		0.2 N or less	£100.00
513-415-10E			10 µm		0.2 N or less	£107.00
513-426-10E	1.5 mm	8 µm	0-25-0	0.4 N or less	£98.70	
513-405-10E	0.002 mm	0.2 mm	3 µm	0-100-0	0.3 N or less	£105.00
513-425-10E		0.6 mm	6 µm		0.4 N or less	£122.00
513-401-10E	0.001 mm	0.14 mm	3 µm	0-70-0	0.3 N or less	£110.00
<b>Full set</b>						
513-424-10T	0.01 mm	0.5 mm	5 µm	0-25-0	0.3 N or less	£119.00
513-414-10T			10 µm		0.2 N or less	£139.00
513-404-10T		0.8 mm	8 µm	0-40-0	0.3 N or less	£105.00
513-415-10T			10 µm		0.2 N or less	£129.00
513-405-10T	0.002 mm	0.2 mm	3 µm	0-100-0	0.3 N or less	£126.00
<b>Special set</b>						
513-908-10E	0.01 mm	0.8 mm	8 µm	0-40-0	0.3 N or less	£150.00
<b>Inch</b>						
Code No.	Graduation	Range	Accuracy	Scale	Measuring force	Price
<b>Basic set</b>						
513-402-10E	.0005"	.03"	±.0005"	0-15-0	0.3 N or less	£93.00
513-412-10E					0.2 N or less	£124.00
513-403-10E	.0001"	.008"	±.0001"	0-4-0	0.3 N or less	£113.00
<b>Full set</b>						
513-402-10T	.0005"	.03"	±.0005"	0-15-0	0.3 N or less	£122.00
513-412-10T					0.2 N or less	£149.00
513-403-10T	.0001"	.008"	±.0001"	0-4-0	0.3 N or less	£149.00
<b>Special set</b>						
513-907-10E	.0005"	.03"	±.0005"	0-15-0	0.3 N or less	£150.00
<b>Metric/inch</b>						
Code No.	Graduation	Range	Accuracy	Scale	Measuring force	Price
<b>Full set</b>						
513-409-10T	0.002 mm / .0001"	0.2 mm / .0075"	3 µm	0-10-0/0-3.8-0	0.3 N or less	£149.00
<b>Inch/metric</b>						
Code No.	Graduation	Range	Accuracy	Scale	Measuring force	Price
<b>Full set</b>						
513-406-10T	.0005" / 0.01 mm	.03" / 0.7 mm	±.0005"	0-15-0/0-35-0	0.3 N or less	£129.00

\* Provided with a ø2 mm ruby contact point as a substitute for ø2 mm carbide contact point.

# Dial Test Indicators

## SERIES 513 – Vertical and Parallel Face Dial Test Indicators

- The vertical face indicator is useful for centering holes under a machine tool spindle using the universal holder mounted in the spindle chuck. (See page F-53.)
- The parallel face indicator is convenient to use when the application calls for stylus movement in a plane parallel to that of the dial face.



513-454-10E



513-452-10E



513-484-10E

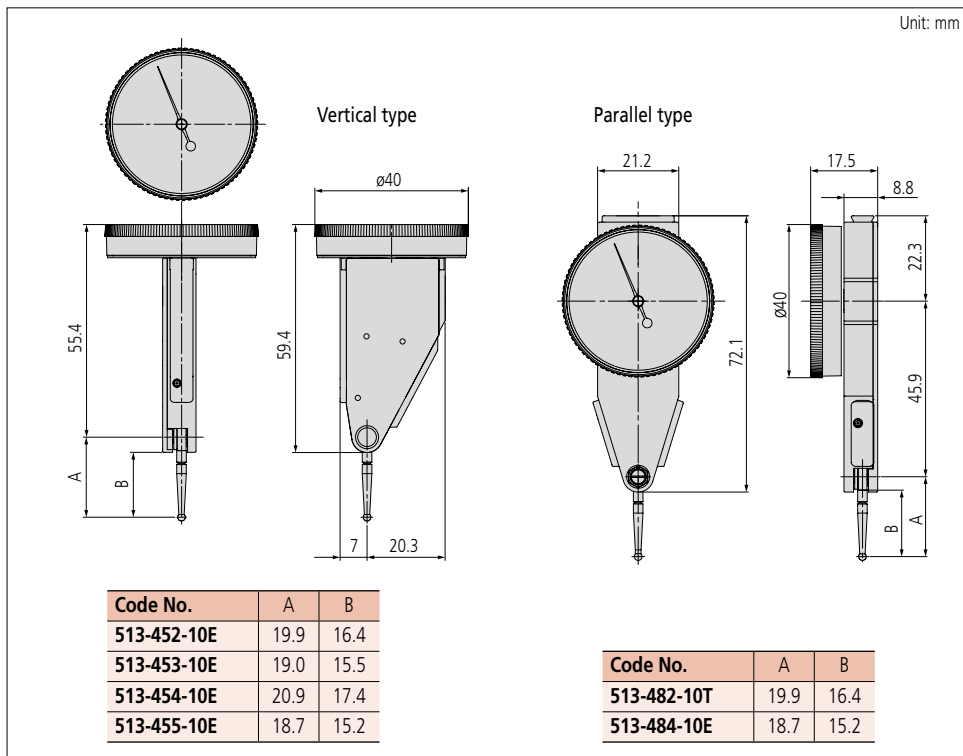
### Features

Metric		
Code No.		
513-454-10E	✓	✓
513-455-10E	✓	✓
513-484-10E	—	✓
Inch		
Code No.		
513-452-10E	✓	✓
513-453-10E	✓	✓
513-482-10E	—	✓

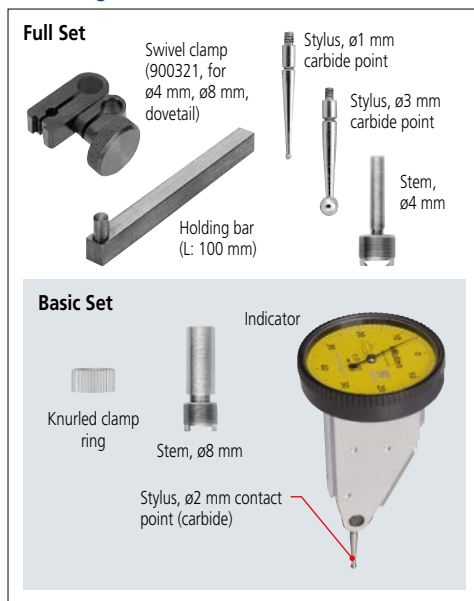
### Optional Accessories

Swivel clamps, holding bars, stems and styli refer to pages F-51 to F-53 for details.

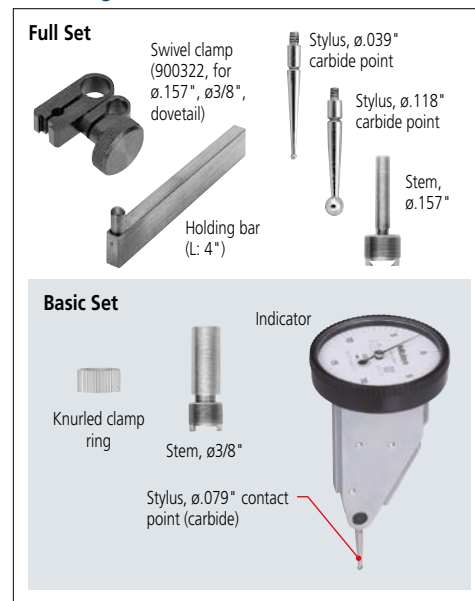
### Dimensions



### Set Configuration: Metric



### Set Configuration: Inch



### Specifications

Metric						
Code No.	Graduation	Range	Accuracy	Scale	Measuring force	Price
Vertical type, basic set						
513-454-10E	0.01 mm	0.8 mm	8 $\mu$ m	0-40-0	0.3 N or less	£88.70
513-455-10E	0.002 mm	0.2 mm	3 $\mu$ m	0-100-0		£140.00
Vertical type, full set						
513-454-10T	0.01 mm	0.8 mm	8 $\mu$ m	0-40-0	0.3 N or less	£139.00
513-455-10T	0.002 mm	0.2 mm	3 $\mu$ m	0-100-0		£150.00
Parallel type, basic set						
513-484-10E	0.01 mm	0.8 mm	8 $\mu$ m	0-40-0	0.3 N or less	£95.50
Parallel type, full set						
513-484-10T	0.01 mm	0.8 mm	8 $\mu$ m	0-40-0	0.3 N or less	£111.00
Inch						
Code No.	Graduation	Range	Accuracy	Scale	Measuring force	Price
Vertical type, basic set						
513-452-10E	.0005"	.03"	$\pm .0005''$	0-15-0	0.3 N or less	£103.00
513-453-10E	.0001"	.008"	$\pm .0001''$	0-4-0		£130.00
Vertical type, full set						
513-452-10T	.0005"	.03"	$\pm .0005''$	0-15-0	0.3 N or less	£111.00
513-453-10T	.0001"	.008"	$\pm .0001''$	0-4-0		£150.00
Parallel type, full set						
513-482-10T	.0005"	.03"	$\pm .0005''$	0-15-0	0.3 N or less	£125.00

# Dial Test Indicators

## SERIES 513 – Pocket Dial Test Indicator

- Jewelled bearings assure higher sensitivity and accuracy. Indicator can be mounted by clamping the stem or the body (except for 513-517WT).
- Reversible measuring direction.
- Two holding bars are supplied. (Full sets only.)
- Fully adjustable bezel/dial face.
- Stylus is adjustable within 220°.
- Bezel is sealed with an O-ring to keep out water and oil.

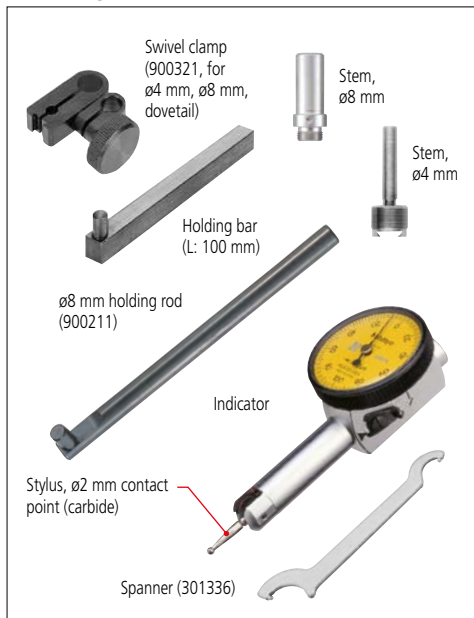


### Specifications

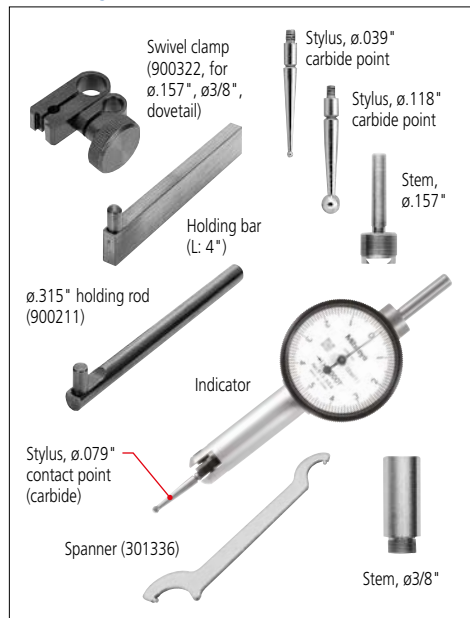
Metric						
Code No.	Graduation	Range	Accuracy	Scale	Measuring force	Price
Full set						
513-514T	0.01 mm	0.5 mm	10 µm	0-25-0	0.3 N or less	£135.00
513-517T		0.8 mm	8 µm	0-40-0		£115.00
513-517WT						£138.00
513-503T	0.002 mm	0.2 mm	3 µm	0-100-0	0.4 N or less	£138.00
513-501T	0.001 mm	0.14 mm		0-70-0		£156.00

Inch						
Code No.	Graduation	Range	Accuracy	Scale	Measuring force	Price
Full set						
513-518T	.001"	.04"	±.001"	0-20-0	0.3 N or less	£115.00
513-512T	.0005"	.02"	±.0005"	0-10-0		£135.00
513-504T	.0001"	.01"	±.0002"	0-5-0		£138.00

### Set Configuration: Metric



### Set Configuration: Inch



### Features

Metric			
Code No.	!	◆	□
513-501T	—	—	—
513-503T	—	✓	—
513-514T	✓	✓	—
513-517T	—	✓	—
513-517WT	—	✓	✓

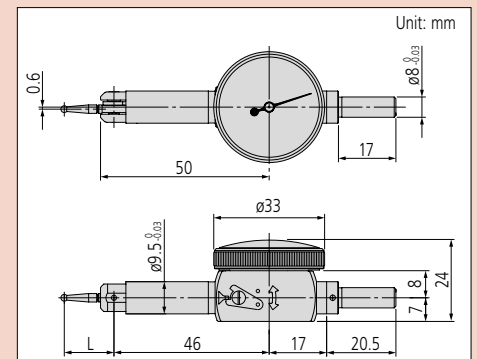
  

Inch			
Code No.	!	◆	□
513-504T	—	✓	—
513-512T	✓	✓	—
513-518T	—	✓	—

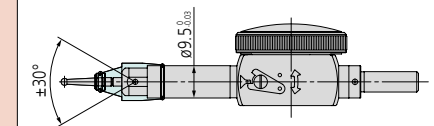
### Optional Accessories

Swivel clamps, holding bars, stems and styli refer to pages F-51 to F-53 for details.

### Dimensions



The rubber boot on 513-517WT restricts stylus movement to an inclination range of ±30°, and also prevents mounting this indicator by the body in a ø9.5 (ø3/8") clamping hole (as on the 900322 swivel clamp).



Code No.	L
513-501T	12.0
513-503T	14.7
513-514T	36.8
513-517T	20.9
513-517WT	20.9

## Features

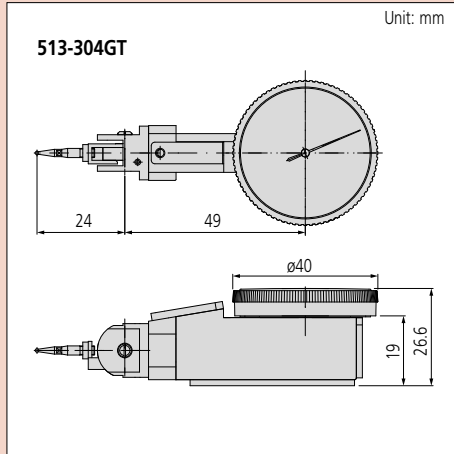
Metric	
Code No.	
513-304GT	✓
Inch	
Code No.	
513-302GT	✓

## Optional Accessories

Code No.	Description	Price
102824	Stylus, $\varnothing 1$ mm ball contact (carbide)	£5.10
102825	Stylus, $\varnothing 2$ mm ball contact (carbide)	£8.60
102826	Stylus, $\varnothing 3$ mm ball contact (carbide)	£5.10

Swivel clamps, holding bars, stems and styli refer to pages F-51 to F-53 for details.

## Dimensions

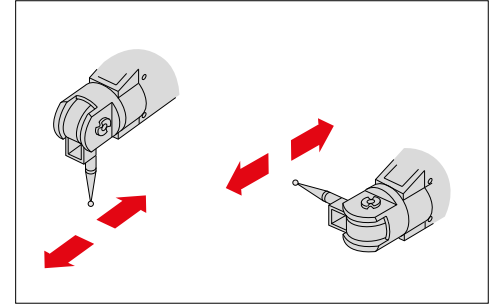


## SERIES 513 – Universal Dial Test Indicator

- Universal application to all directions. (Not only the direction of the contact point, but also the direction of measurement itself can be adjusted 360 degrees without moving the indicator.)



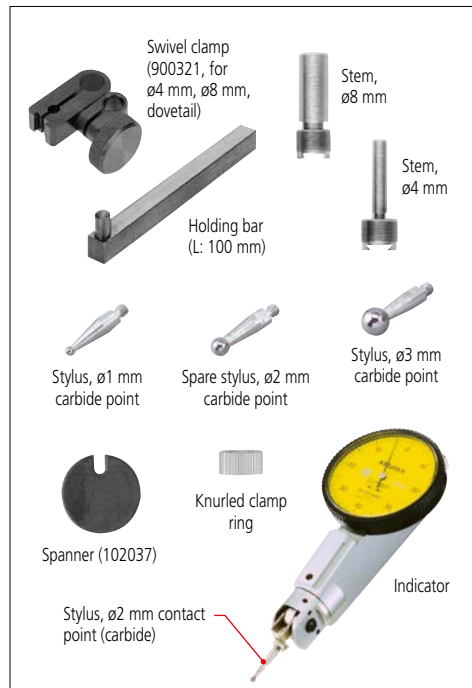
513-304GT



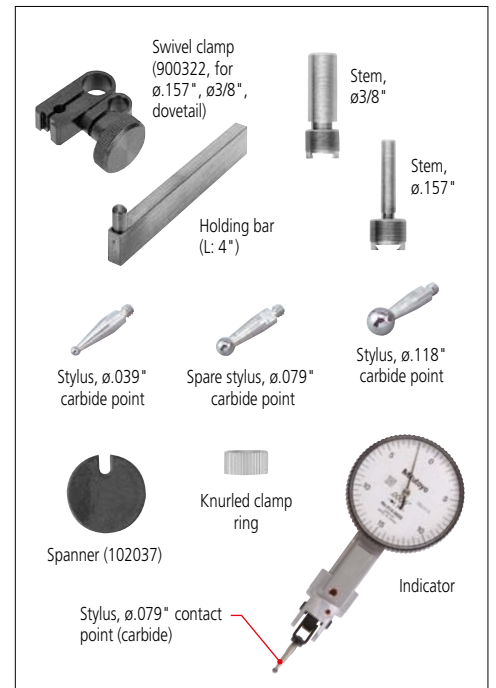
## Specifications

Metric						
Code No.	Graduation	Range	Accuracy	Scale	Measuring force	Price
Full set						
513-304GT	0.01 mm	0.8 mm	8 $\mu$ m	0-40-0	0.3 N or less	£358.00
Inch						
Code No.	Graduation	Range	Accuracy	Scale	Measuring force	Price
Full set						
513-302GT	.0005"	.03"	$\pm$ .0005"	0-15-0	0.3 N or less	£358.00

## Set Configuration: Metric



## Set Configuration: Inch

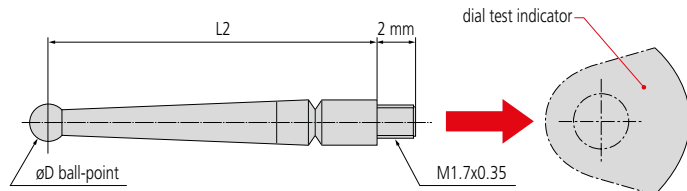


# Optional Accessories

## Styli for Dial Test Indicators\*

- Shoulder to ball centre dimension is critical for correct operation. Recent models having part numbers ending in -10 will show this dimension on the clock face. Please ensure the selected stylus has the same length as shown on your clock face. If your particular indicator does not show this dimension on the clock face or if you have any doubts then please call Mitutoyo with the gauge part number for advice before changing the contact point.

\* Excludes Universal type.



### Specifications

Metric		
Code No.	L2	Price
ø0.5 mm ball-point		
190547	11.2 mm	£15.80
190549	17.4 mm	£15.80
190654	18.7 mm	£10.70
190656	41.0 mm	£10.80
ø0.7 mm ball-point		
190548	11.2 mm	£13.70
190550	17.4 mm	£13.70
190653	18.7 mm	£10.80
190655	41.0 mm	£10.10
ø1 mm ball-point (carbide)		
103017	11.2 mm	£5.10
131314	15.2 mm	£5.80
103013	17.4 mm	£5.10
137558	18.7 mm	£5.10
131316	33.9 mm	£5.10
136235	41.0 mm	£3.40
ø2 mm ball-point (carbide)		
103010	11.2 mm	£8.60
103011	15.2 mm	£8.60
103006	17.4 mm	£8.60
137557	18.7 mm	£8.60
131324	33.9 mm	£5.10
136013	41.0 mm	£9.40
ø2 mm ball-point (ruby)		
21CZA209	11.2 mm	£12.50
21CZB068	15.2 mm	£14.50
21CZA201	17.4 mm	£18.90
21CZA210	18.7 mm	£12.50
21CZA211	41.0 mm	£13.00
ø3 mm ball-point (carbide)		
103018	11.2 mm	£5.10
131315	15.2 mm	£5.80
103014	17.4 mm	£5.10
137559	18.7 mm	£5.10
131317	33.9 mm	£5.10
136236	41.0 mm	£3.40

Inch		
Code No.	L2	Price
Ø0.04" ball point (carbide)		
21CZB065	15.5 mm	£1.80
133196	16.4 mm	£5.10
136291	30.4 mm	£3.40
Ø0.08" ball point (carbide)		
21CZB064	15.5 mm	£2.00
133195	16.4 mm	£8.60
136290	30.4 mm	£5.80
Ø0.08" ball point (ruby)		
21CZB112	15.5 mm	£12.30
21CZA204	16.4 mm	£13.50
21CZA214	30.4 mm	£13.50
Ø0.12" ball point (carbide)		
21CZB066	15.5 mm	£2.00
133197	16.4 mm	£5.10
136292	30.4 mm	£3.40



ø0.5 mm ball-point.



ø0.7 mm ball-point.



ø1 mm ball-point (carbide).



ø2 mm ball-point (carbide).



ø2 mm ball-point (ruby).



ø3 mm ball-point (carbide).

## Styli for Pocket Dial Test Indicators

- Stylus length can only be the same as that originally fitted.



ø0.5 mm ball-point.



ø0.7 mm ball-point.



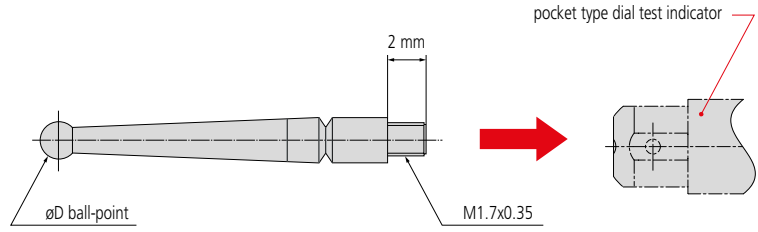
ø1 mm ball-point (carbide).



ø2 mm ball-point (carbide).



ø3 mm ball-point (carbide).



### Specifications

Code No.	Description	Price
For model 513-501E		
136756	ø1 mm ball-point (carbide)	£3.30
136104	ø2 mm ball-point (carbide)	£5.80
136758	ø3 mm ball-point (carbide)	£3.30
For models 513-503E and 513-527E		
190547	ø0.5 mm ball-point	£15.80
190548	ø0.7 mm ball-point	£13.70
103017	ø1 mm ball-point (carbide)	£5.10
103010	ø2 mm ball-point (carbide)	£8.60
103018	ø3 mm ball-point (carbide)	£5.10
For models 513-504 and 513-528		
131314	ø1 mm ball-point (carbide)	£5.80
103011	ø2 mm ball-point (carbide)	£8.60
131315	ø3 mm ball-point (carbide)	£5.80
For model 513-512		
131316	ø1 mm ball-point (carbide)	£5.10
131324	ø2 mm ball-point (carbide)	£5.10
131317	ø3 mm ball-point (carbide)	£5.10
For model 513-514E		
137746	ø1 mm ball-point (carbide)	£5.10
129949	ø2 mm ball-point (carbide)	£9.40
137747	ø3 mm ball-point (carbide)	£5.10

Code No.	Description	Price
For model 513-515T		
190656	ø0.5 mm ball-point	£10.80
190655	ø0.7 mm ball-point	£10.10
136235	ø1 mm ball-point (carbide)	£3.40
136013	ø2 mm ball-point (carbide)	£9.40
136236	ø3 mm ball-point (carbide)	£3.40
For model 513-517E		
190549	ø0.5 mm ball-point	£15.80
190550	ø0.7 mm ball-point	£13.70
103013	ø1 mm ball-point (carbide)	£5.10
103006	ø2 mm ball-point (carbide)	£8.60
103014	ø3 mm ball-point (carbide)	£5.10
For model 513-518		
103008	ø1 mm ball-point (carbide)	£5.10
103007	ø2 mm ball-point (carbide)	£5.10
103009	ø3 mm ball-point (carbide)	£5.10

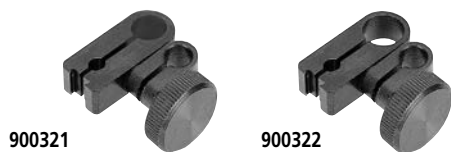
F

# Optional Accessories

## For Dial Test Indicators

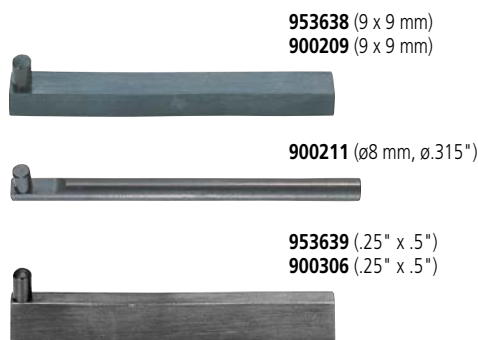
### Swivel Clamps

- Can be used with Holding Bars.



Code No.	Remarks	Price
900321	For $\varnothing 4$ mm stem, $\varnothing 8$ mm stem, and dovetail	£15.30
900322	For $\varnothing .157$ " stem, $\varnothing 3/8$ " stem (or body) and dovetail	£15.30

### Holding Bars



953638 (9 x 9 mm)  
900209 (9 x 9 mm)

900211 ( $\varnothing 8$  mm,  $\varnothing .315$ " )

953639 (.25" x .5")  
900306 (.25" x .5")

Code No.	Stem	Length	Price
953638	$\varnothing 6$ mm	50 mm	£11.30
900209		100 mm	£9.90
900211		115 mm	£9.90
953639	$\varnothing .236$ "	2"	£11.50
900306		4"	£9.90

### Stems with Knurled Clamp Ring



Code No.	Diameter	Price
902802	4 mm / .157"	£9.40
902804	8 mm	£8.20
902805	3/8"	£9.40

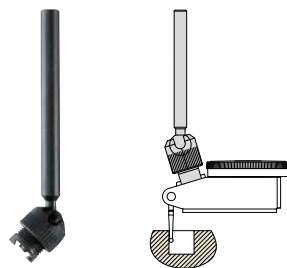
### Stems for Pocket Types



Code No.	Diameter	Price
102081	3/8"	£3.90
102389	4 mm / .157"	£3.40
102822	8 mm	£3.40

### Universal Holder

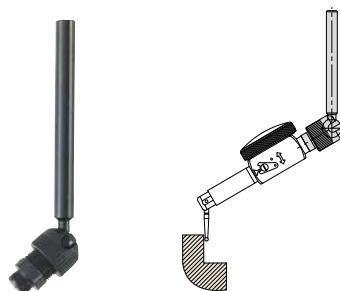
- Allows the indicator to be set at the desired attitude to the workpiece. (Not for Pocket type - see below.)



Code No.	Stem	Price
21CZA229	$\varnothing 6$ mm	£28.10
21CZA231	$\varnothing .25$ "	£28.10
21CZA233	$\varnothing 8$ mm	£24.50

### Universal Holder for Pocket Type

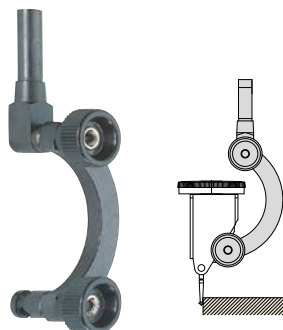
- Allows the indicator to be set at the desired attitude to the workpiece.



Code No.	Stem	Price
21CZA230	$\varnothing 6$ mm	£28.10
21CZA232	$\varnothing .25$ "	£28.10
21CZA234	$\varnothing 8$ mm	£38.40

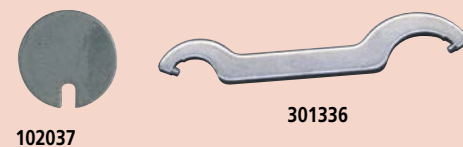
### Centering Holder

- Allows large diameter cylinders or holes to be centered on a machine tool.



Code No.	Stem	Price
901959	$\varnothing 8$ mm	£88.00
901997	$\varnothing .25$ "	£87.40

### Spanner



Code No.	Remarks	Price
102037	For Dial Test Indicators	£1.20
301336	For Pocket Dial Test Indicators	£1.60



# Instruments

## SERIES 170 – i-Checker IC2000

### Technical Data

Measuring range:	100 mm / 4"
Resolution:	0.01 μm
Accuracy (at 20°C)	
Vertical position:	$\pm(0.2+L/100) \mu\text{m}^{*1}$
Lateral position:	$\pm(0.3+2L/100) \mu\text{m}^{*1}$
Drive method:	Electric motor
Measuring unit:	Separate type linear encoder
Measurement method:	Automatic/semi-automatic <sup>*2</sup>
Operating temperature range:	20°C ± 0.5°C
Mass:	20 kg

\*1 L = arbitrary length (mm)

\*2 Consult your local Mitutoyo Sales Office for advice on your particular application.

### Optional Accessories

Code No.	Description	Price
902803	ø6 mm dovetail grooved stem	£8.20
902804	ø8 mm dovetail grooved stem	£8.20
937179T	Footswitch	£46.70
02ASJ856	Stem bush ø8 mm	£165.00
02ASK000	Test indicator attachment set (ø6 mm stem)	£1270.00
02ASK040	Stem bush ø6 mm	£164.00
02ASK050	Bush ø9.5 (requires 02ASK070)	£98.00
02ASK060	Stem bush ø12 mm	£165.00
02ASK070	Stem bush ø15 mm	£165.00
02ASK080	Stem bush ø20 mm	£165.00
02ASK090	Stem bush 3/8"	£165.00
02ASK130	Stem bush case	£165.00
02ASK150	Stem bush ø8 mm, short	£165.00
02ASK180	Test indicator attachment set (ø8 mm stem)	£1270.00
02ASK370	Test indicator holder (ø6 mm stem)	£280.00
02ASK380	Test indicator holder (ø8 mm stem)	£280.00
02ASK710	Stem bush ø28 mm	£146.00
02ASK730	Reflector	£109.00
02ASL150	Stem bush ø10 mm, short	£146.00

### Application Examples



- The i-Checker is specially designed to calibrate all types of indicators and electronic gauges.
- Indication accuracy  $(0.1+0.4L/100)^{*3} \mu\text{m}$ , the highest level in the world, is achieved.
- Directly inspects an indicator with a stroke of up to 100 mm (4"). Dial test indicators, bore gauges and lever-type inductive heads can be inspected with optional accessories, such as the test indicator attachment set (02ASK000).
- Digital indicators equipped with data output function are checked very efficiently due to spindle positioning at the inspection points and recording of measurement results being under fully automatic control.
- Adjustment of the measurement position is very easily accomplished because of semi-automatic measurement and fully automatic measurement functions.
- Creates and prints out a simple inspection certificate.
- Saves inspection results as a CSV file for analysis by software.

\*3 L = indicator stroke (mm)

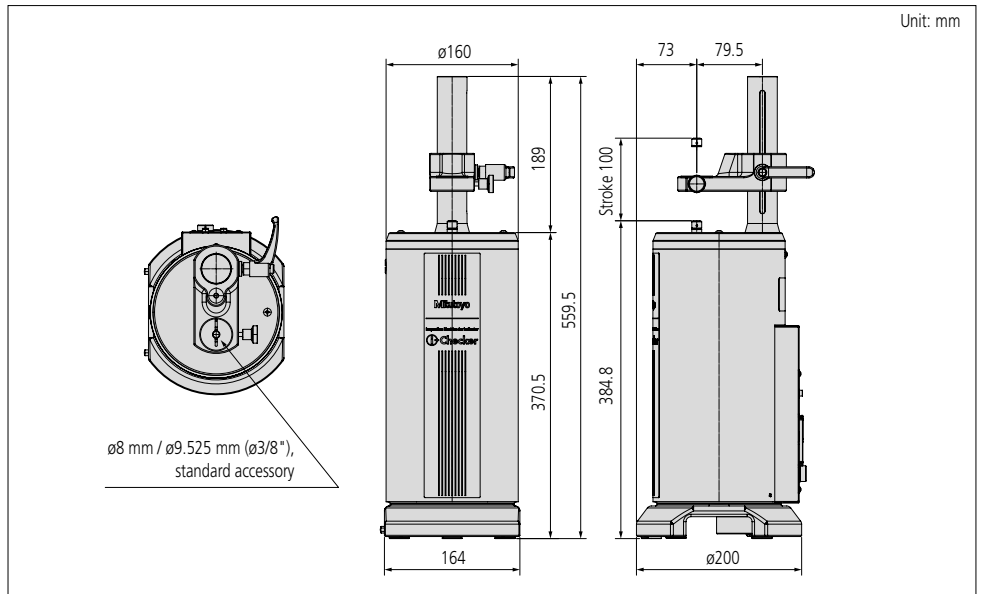


**IC2000**  
(indicator, connecting cable and laptop not included.)

### Specifications

Code No.	Remarks	Price
170-402	With ø8 mm bush	£11950.00
170-403	With ø3/8" bush	£11950.00

### Dimensions



# Instruments

## SERIES 170 – UDT-2 Dial Indicator Tester

- UDT-2 is an accuracy tester for 0.01 mm resolution dial indicators, dial test indicators and bore gauges.
- Accepts  $\varnothing 6$  mm,  $\varnothing 8$  mm, 1/4" and 3/8" indicator stems.



170-102-12

### Specifications

#### Metric

Code No.	Range	Graduation	Accuracy	Price
170-102-12	0-25 mm	0.001 mm	$\pm 2 \mu\text{m}$	£1300.00

#### Inch

Code No.	Range	Graduation	Accuracy	Price
170-101-10	0-1"	.0001"	$\pm .0001$ "	£1300.00



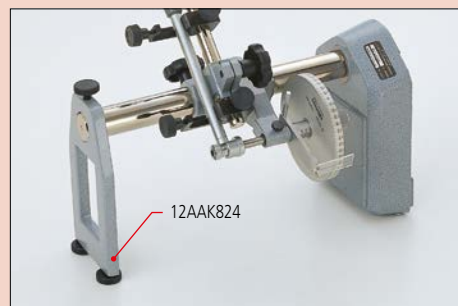
Calibrating a bore gauge.



Calibrating a lever indicator.

### Optional Accessory

Code No.	Description	Price
12AAK824	Stand for bore gauge inspection	£185.00



Can be used for the inspection of bore gauges 511 series standard type and micrometer heads up to 400 mm.

## SERIES 521 – Calibration Tester

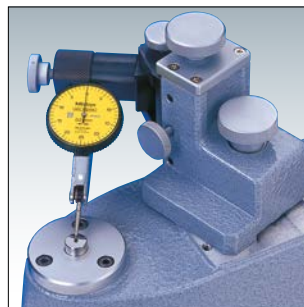
- The Calibration Tester is specially designed to calibrate short range dial indicators, dial test indicators, and electronic gauge heads.
- Universal bracket accepts any dial indicator, dial test indicator or electronic gauge without any additional accessory.
- Clamping capacity:  $\varnothing 4$  mm to  $\varnothing 10$  mm.



521-105

### Specifications

Metric				
Code No.	Range	Graduation	Accuracy	Price
521-103	0 - 1 mm	0.0002 mm	$\pm 0.2 \mu\text{m}$	£3880.00
521-105	0 - 5 mm		$\pm 0.8 \mu\text{m}$	£4110.00
Inch				
Code No.	Range	Graduation	Accuracy	Price
521-104	0 - .05"	.00001"	$\pm .00001$ "	£3880.00
521-106	0 - .2"		$\pm .00003$ "	£4110.00



Calibrating a lever indicator (dial test indicator).



Calibrating a probe head.



Calibrating a lever probe head.

# Instruments

## SERIES 547 – ABSOLUTE Digimatic Thickness Gauges

- Dial thickness gauges can quickly measure the thickness of thin products such as paper and felt.
- Integrated moulding of the bezel and crystal ensures protection against water and oil penetration via the front face.
- Data output port that enables incorporation into measurement networking and statistical process control systems.

### Tube thickness measurement type

- Pipe wall thickness and the thickness of curved boards can be measured.

### Lens thickness measurement type

- Thickness of concave-convex lenses and surfaces can be measured.
- Anvils and contact points are interchangeable to enable concave surfaces to be measured.
- Provided with a ball point.

### Groove depth measurement type

- Suitable for measuring narrow grooves.
- Measuring face of the contact point and anvil are blade-shaped (thickness: 1 mm).

**MeasurLink** ENABLED  
Data Management Software by Mitutoyo

**ABSOLUTE**



547-300S



547-320S



547-400S



547-361S



547-312S



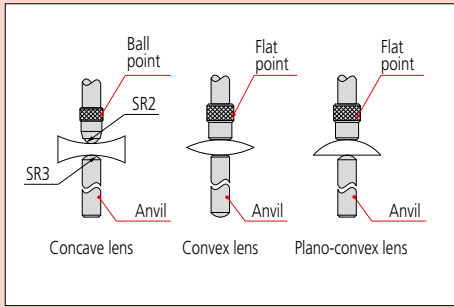
547-316S

### Optional Accessories

Code No.	Description	Price
264-505E	DP-1VA LOGGER Digimatic Mini-Processor	£406.00
905338	SPC data cable (1 m)	£33.90
905409	SPC data cable (2 m)	£38.00
02AZD790F	U-WAVE-T data cable (160 mm)	£62.00
02AZE140F	U-WAVE-T data cable with footswitch connection (160/500 mm)	£127.00
06AFM380F	USB input tool direct USB-ITN-F (2 m)	£109.00

Convenient Interface Input Tools which enable the conversion of measurement data to keyboard signals and directly input them to cells in off-the-shelf spreadsheet software such as Excel are also available.\*

\* Consult your local Mitutoyo Sales Office for advice on your particular application.

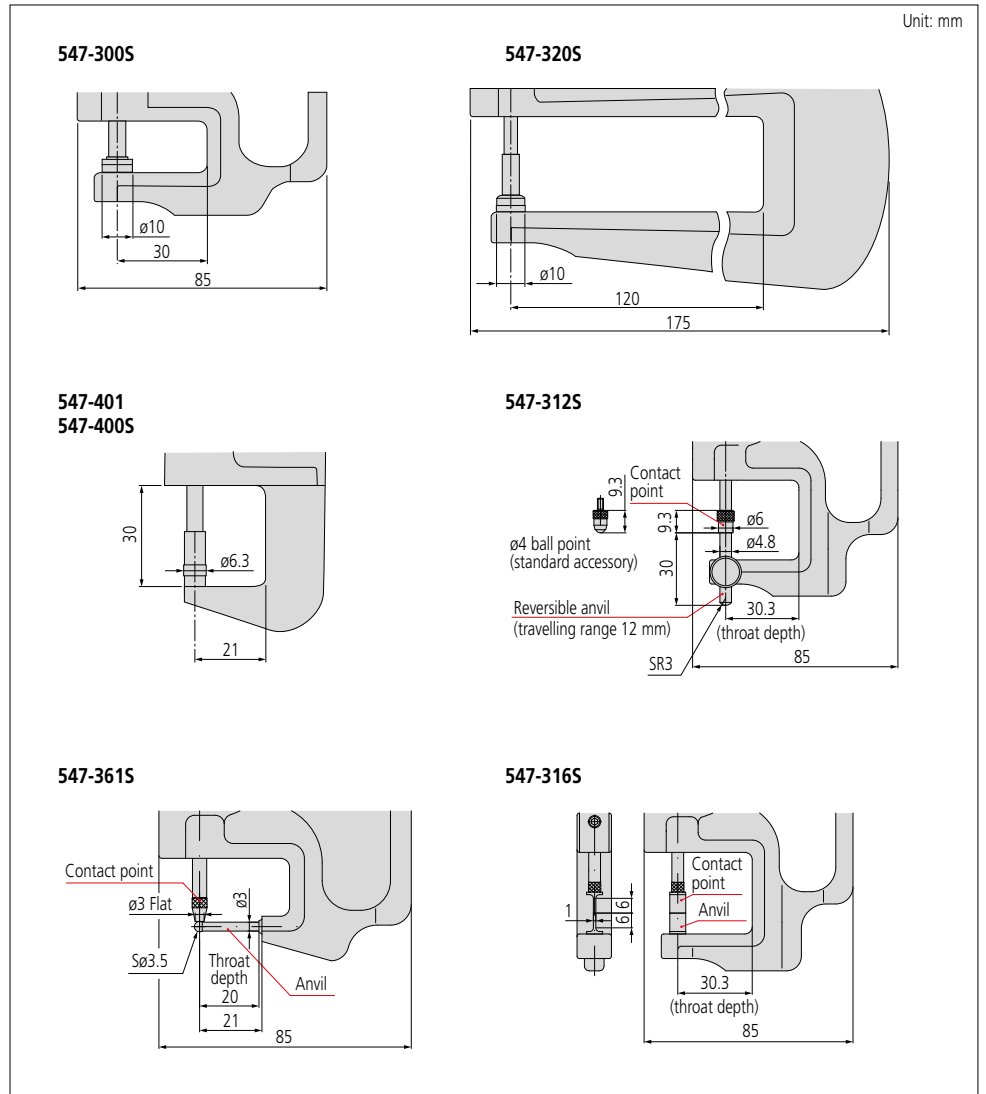


Lens thickness measurement application examples.  
Note: Parallelism between the flat point and anvil is 10 µm.

## Specifications

Metric					
Code No.	Range	Resolution	Accuracy	Measuring force	Price
High accuracy, carbide plunger/anvil					
<b>547-401</b>	0 - 12 mm	0.001 mm	±3 µm	3.5 N or less	<b>£615.00</b>
Inch/Metric					
Code No.	Range	Resolution	Accuracy	Measuring force	Price
High accuracy, carbide plunger/anvil					
<b>547-400S</b>	0 - 12 mm / 0 - .47"	.00005" / 0.001 mm	±.0001" / ±3 µm	3.5 N or less	<b>£615.00</b>
Standard, ceramic plunger/anvil					
<b>547-300S</b>	0 - 10 mm / 0 - .4"	.0005" / 0.01 mm	±.001" / ±20 µm	1.5 N or less	<b>£389.00</b>
Deep throat, ceramic plunger/anvil					
<b>547-320S</b>	0 - 10 mm / 0 - .4"	.0005" / 0.01 mm	±.001" / ±20 µm	1.5 N or less	<b>£320.00</b>
Lens thickness					
<b>547-312S</b>	0 - 10 mm / 0 - .4"	.0005" / 0.01 mm	±.001" / ±20 µm	1.5 N or less	<b>£389.00</b>
Groove depth					
<b>547-316S</b>	0 - 10 mm / 0 - .4"	.0005" / 0.01 mm	±.001" / ±20 µm	1.5 N or less	<b>£399.00</b>
Tube thickness					
<b>547-361S</b>	0 - 10 mm / 0 - .4"	.0005" / 0.01 mm	±.001" / ±20 µm	1.5 N or less	<b>£369.00</b>

## Dimensions



# Instruments

## SERIES 7 – Dial Thickness Gauges

- Dial thickness gauges can quickly measure the thickness of thin products such as paper and felt.
- Integrated moulding of the bezel and crystal ensures protection against water and oil penetration via the front face.

### Tube thickness measurement type

- Pipe wall thickness and the thickness of curved boards can be measured.

### Lens thickness measurement type

- Thickness of concave-convex lenses and surfaces can be measured.
- Anvils and contact points are interchangeable to enable concave surfaces to be measured.
- Provided with a ball point.

### Groove depth measurement type

- Suitable for measuring narrow grooves.
- Measuring face of the contact point and anvil are blade-shaped (thickness: 1 mm).



7301



7321



7360



73265



7313



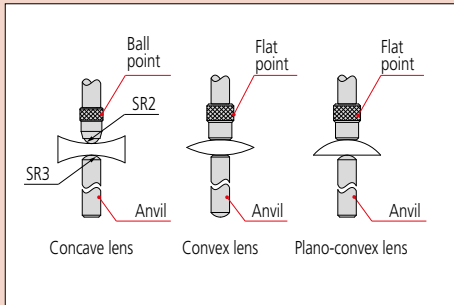
7315



Measuring paper thickness.



Measuring thickness of a human hair.

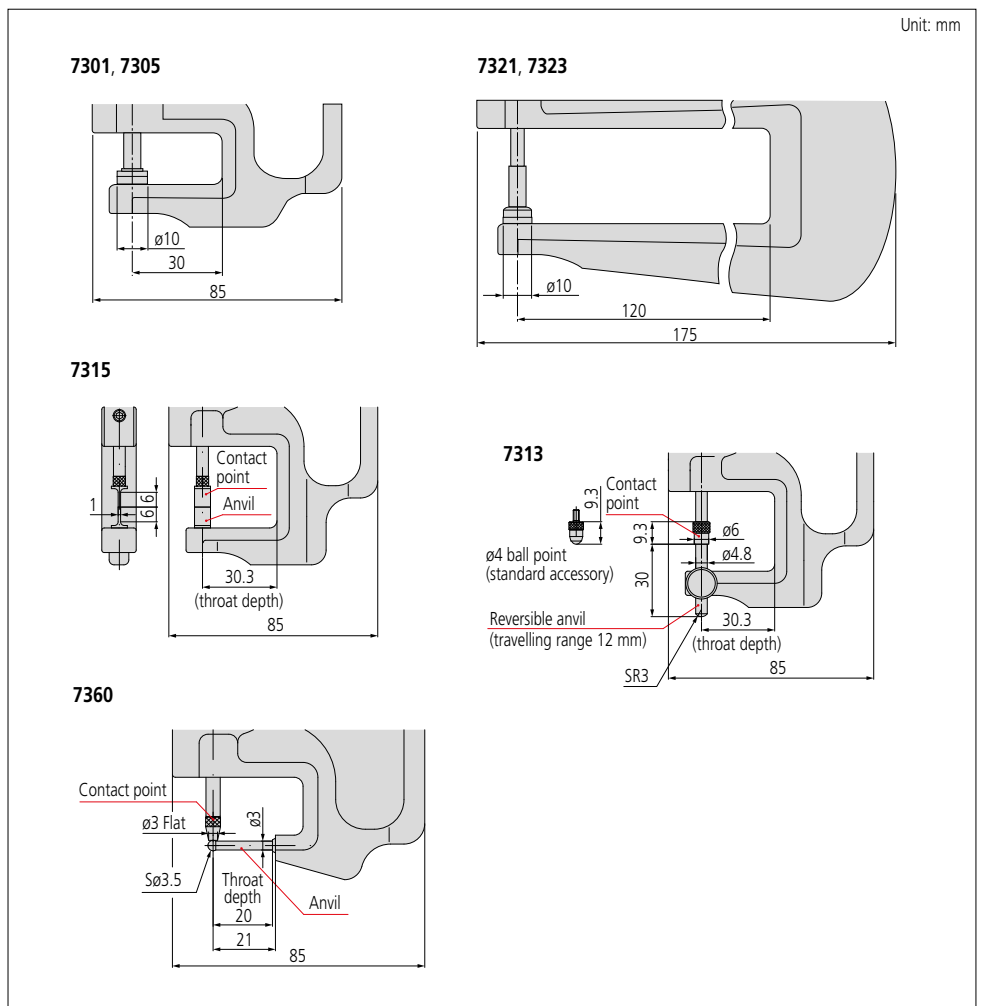


Lens thickness measurement application examples.  
Note: Parallelism between the flat point and anvil is 5 µm.

## Specifications

Metric					
Code No.	Range	Graduation	Accuracy	Measuring force	Price
Standard, ceramic plunger/anvil					
7301	0 - 10 mm	0.01 mm	±15 µm	1.4 N or less	£92.50
7305	0 - 20 mm		±20 µm	2.0 N or less	£115.00
Deep throat, ceramic plunger/anvil					
7321	0 - 10 mm	0.01 mm	±15 µm	1.4 N or less	£120.00
7323	0 - 20 mm		±22 µm	2.0 N or less	£130.00
Lens thickness					
7313	0 - 10 mm	0.01 mm	±15 µm	1.4 N or less	£110.00
Groove depth					
7315	0 - 10 mm	0.01 mm	±15 µm	1.4 N or less	£135.00
Tube thickness					
7360	0 - 10 mm	0.01 mm	±15 µm	1.4 N or less	£95.00
Inch					
Code No.	Range	Graduation	Accuracy	Measuring force	Price
Fine dial reading, ceramic plunger/anvil					
7326S	0 - .05"	.0001"	±.0002"	1.4 N or less	£140.00
Standard, ceramic plunger/anvil					
7300S	0 - .5"	.001"	±.001"	1.4 N or less	£99.00
7304S	0 - 1"		±.002"	2.0 N or less	£115.00
Deep throat, ceramic plunger/anvil					
7322S	0 - 1"	.001"	±.002"	2.0 N or less	£130.00
Groove depth					
7316S	0 - .5"	.001"	±.001"	1.4 N or less	£135.00
Tube thickness					
7361S	0 - .5"	.001"	±.001"	1.4 N or less	£133.00

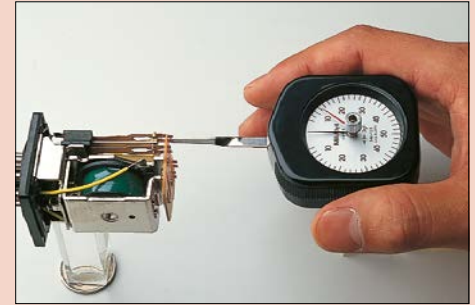
## Dimensions



# Instruments

## SERIES 546 – Contact Force Gauge

- Contact force gauges are widely used to determine the measuring force applied by an instrument to a workpiece, as well as contact forces of electrical relays, micro-switches, valves and precision springs.
- Thanks to the miniature anti-friction bearing in the fulcrum, stable measurement is guaranteed.
- Two types are available: standard and peak hold.



Measuring contact force on a relay.



546-114

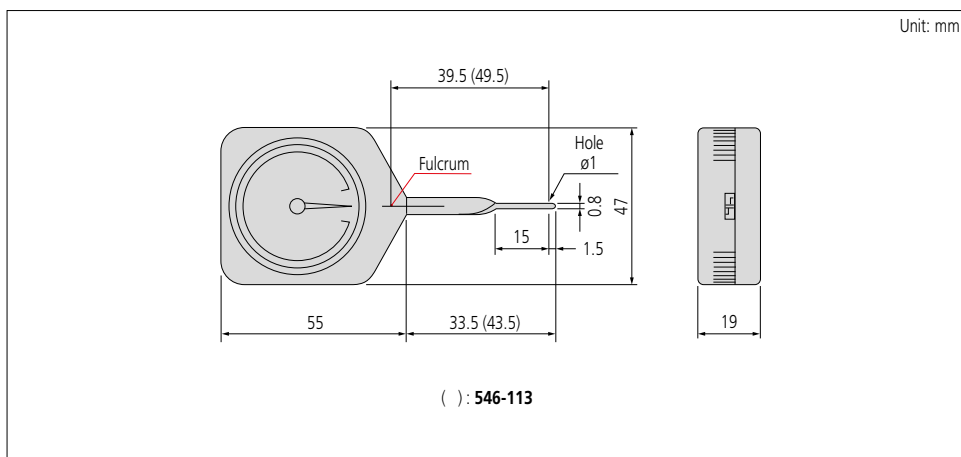


546-138

### Specifications

Code No.	Graduation	Range	Accuracy	Price
Standard type				
546-113	5 mN	10 mN - 100 mN	±0.5 (division)	£122.00
546-114	10 mN	30 mN - 300 mN		£117.00
546-118	0.1 N	0.3 N - 3 N		£108.00
Peak hold type				
546-138	0.1 N	0.3 N - 3 N	±0.5 (division)	£179.00

### Dimensions



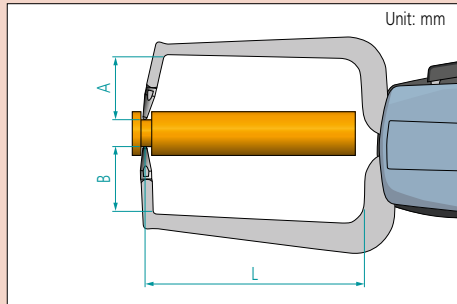


## Functions

Mode key, SET key, DATA key, ON/OFF/0-preset, max. reading, min. reading, ABS/INC switchable, display hold, data output, direction switching, tolerance LED (green/red), tolerance judgement.

## Optional Accessories

Code No.	Description	Price
011551	Interface adaptor	£98.40
937387	SPC data cable (1 m)	£39.10
965013	SPC data cable (2 m)	£49.80
02AZD790E	U-WAVE-T data cable (160 mm)	£62.00
02AZE140E	U-WAVE-T data cable with footswitch connection (160/500 mm)	£127.00
06AFM380E	USB input tool direct USB-ITN-E (2 m)	£119.00



L : Maximum reach of contact arms over workpiece.  
A : Maximum penetration depth of upper contact.  
B : Maximum penetration depth of lower contact.

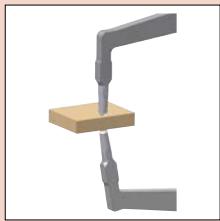


Figure 1.

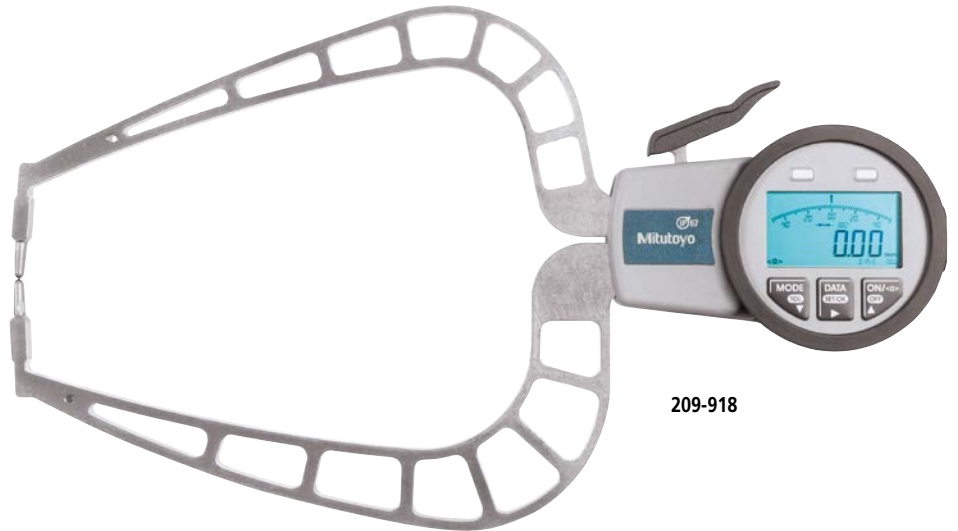
## SERIES 209 – Digimatic Coolant Proof Outside Caliper Gauge

- Versatile gauge with a choice of arm configurations suitable for measuring grooves and other hard-to-measure features in addition to rapid measurement of flat stock at some distance from an edge.
- IP67 rating provides maximum confidence for use in adverse environments where the gauge is subject to splashing by cutting fluid or coolant.
- Bargraph provides a quick analogue view of the result of measurement.
- GO/NO-GO judgement function: an in-tolerance judgement result is indicated by the green LED and an out-of-tolerance judgement by the red.
- Data output port that enables incorporation into measurement networking and statistical process control systems.

IP67



209-572



209-918

## Specifications

Inch/Metric										
Code No.	Range	Measuring force	Resolution	Accuracy	A	B	L	Type	Price	
Measuring contacts: carbide ball ø1.5 mm										
209-572	0-20 mm	1.1/1.6N	0.01 mm	0.03 mm	24.7	24.6	85	Fig. 1	£652.00	
Measuring contacts: carbide ball ø5 mm										
209-918	0-50 mm	0.8/1.7N	0.02 mm	0.06 mm	30	30	167	Fig. 1	£818.00	

F

# Instruments

## SERIES 209 – Coolant Proof Outside Dial Caliper Gauge

- Versatile gauge with a choice of arm configurations suitable for measuring external groove diameter and other hard-to-measure features in addition to rapid measurement of flat stock thickness at some distance from an edge.
- IP65 rating provides good protection in adverse environments where the gauge is subject to splashing by cutting fluid or coolant.



209-402



209-406



209-405

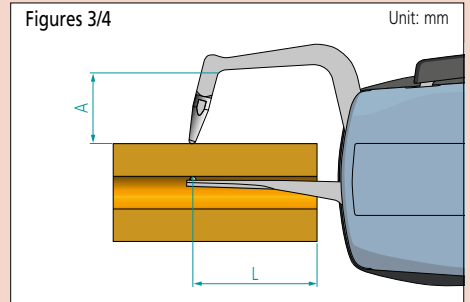
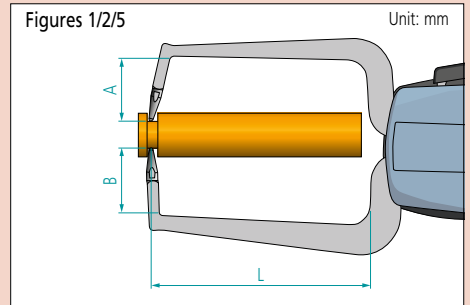
### Specifications

#### Metric

Code No.	Range	Measuring force	Graduation	Accuracy	A	B	L	Contact radii	Type	Price
Measuring contacts: carbide bevel										
209-405	0-20 mm	1.1/1.6 N	0.01 mm	0.03 mm	24.7	24.6	81	0.4/0.4 mm	Fig. 1	£610.00
Measuring contacts: carbide ball ø1.5/2 mm										
209-402	0-10 mm	0.8/1.2 N	0.005 mm	0.015 mm	19.1	18.6	35	0.75/0.75 mm	Fig. 2	£610.00
209-404	0-20 mm	1.1/1.6 N	0.01 mm	0.03 mm	24.7	24.6	85			£610.00
209-911	0-50 mm	0.8/1.7 N	0.05 mm	0.05 mm	30	30	167	3/3 mm	Fig. 2	£733.00
209-407	0-20 mm	1.1/1.6 N	0.01 mm	0.03 mm	24.7	—	85	0.75/0.75 mm		Fig. 4
Measuring contacts: carbide ball/bevel										
209-406	0-20 mm	1.1/1.6 N	0.01 mm	0.03 mm	24.7	—	80	0.4/0.75 mm	Fig. 3	£610.00
Measuring contacts: carbide ball ø2 mm										
209-843	0-10 mm	0.3/1.3 N	0.1 mm	0.1 mm	5	5	35	2/2 mm	Fig. 5	£170.00

#### Inch

Code No.	Range	Measuring force	Graduation	Accuracy	A	B	L	Contact radii	Type	Price
Measuring contacts: carbide bevel										
209-454	0-8"	1.1/1.6 N	.0005"	.0015"	24.7	24.6	81	.02/.02"	Fig. 1	£610.00
Measuring contacts: carbide ball ø.059"										
209-456	0-8"	1.1/1.6 N	.0005"	.0015"	24.7	—	84	.06/.06"	Fig. 3	£610.00
209-450	0-4"	1.2/1.6 N	.0002"	.0008"	8.9	19	35		Fig. 2	£610.00
209-455	0-8"	1.1/1.6 N	.0005"	.0015"	24.7	24.6	81		£610.00	
Measuring contacts: carbide ball ø.118"										
209-916	0-2"	0.8/1.7 N	.001"	.002"	30	30	167	.118/.118"	Fig. 2	£733.00
209-917					—	169	Fig. 4		£733.00	



L : Maximum reach of contact arms over workpiece.  
 A : Maximum penetration depth of upper contact.  
 B : Maximum penetration depth of lower contact.

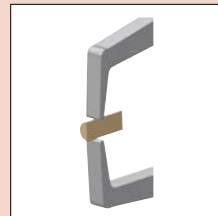


Figure 1.

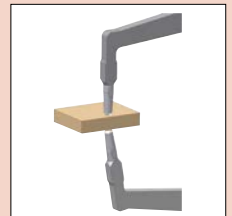


Figure 2.

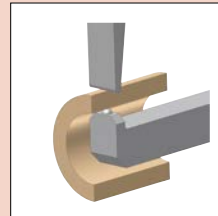


Figure 3.

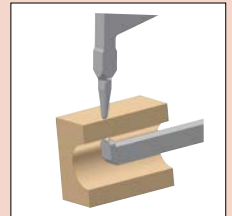


Figure 4.

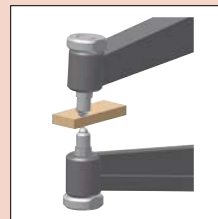


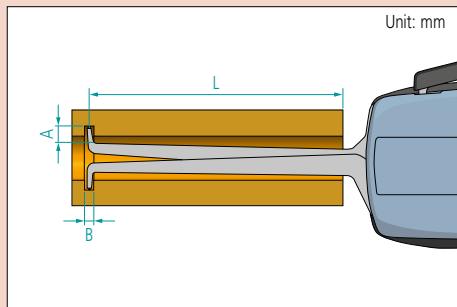
Figure 5.

## Functions

Mode key, SET key, DATA key, ON/OFF/0-preset, max. reading, min. reading, ABS/INC switchable, display hold, data output, direction switching, tolerance LED (green/red), tolerance judgement.

## Optional Accessories

Code No.	Description	Price
011551	Interface adaptor	£98.40
937387	SPC data cable (1 m)	£39.10
965013	SPC data cable (2 m)	£49.80
02AZD790E	U-WAVE-T data cable (160 mm)	£62.00
02AZE140E	U-WAVE-T data cable with footswitch connection (160/500 mm)	£127.00
06AFM380E	USB input tool direct USB-ITN-E (2 m)	£119.00



L : Maximum reach of contact arms inside workpiece.  
A : Maximum groove depth.  
B : Minimum groove width.

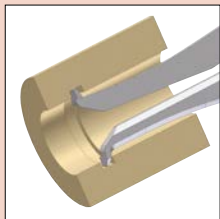


Figure 1.

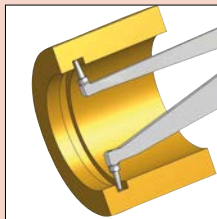


Figure 2.

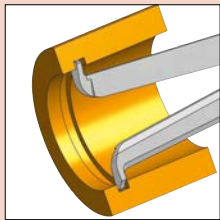


Figure 3.

## SERIES 209 – Digimatic Coolant Proof Inside Caliper Gauge

- Versatile gauge for measuring internal groove diameter.
- IP67 rating provides maximum confidence for use in adverse environments where the gauge is subject to splashing by cutting fluid or coolant.
- Bargraph provides a quick analogue view of the result of measurement.
- GO/NO-GO judgement function: an in-tolerance judgement result is indicated by the green LED and an out-of-tolerance judgement by the red.
- Data output port that enables incorporation into measurement networking and statistical process control systems.

IP67



209-551



209-558

## Specifications

Inch/Metric

Code No.	Range	Measuring force	Resolution	Accuracy	A	B	L	Type	Price
Measuring contacts: carbide ball $\phi 0.6$ mm									
209-551	5 - 15 mm	0.8/1.2 N	0.005 mm	0.015 mm	2.3	0.8	35	Fig. 3	£652.00
Measuring contacts: carbide ball $\phi 1$ mm									
209-552	10 - 30 mm	1.1/1.6 N	0.01 mm	0.03 mm	5.2	1.2	85	Fig. 3	£652.00
209-904	13 - 43 mm	1.2/1.7 N	0.02 mm	0.04 mm	5.9	5.9	127	Fig. 1	£652.00
209-556	50 - 70 mm	1.1/1.6 N	0.01 mm	0.03 mm	8.3	1.2	85	Fig. 2	£652.00
209-558	70 - 90 mm								£652.00

# Instruments

## SERIES 209 – Coolant Proof Inside Dial Caliper Gauge

- Versatile gauge for measuring internal groove diameter.
- IP65 rating provides good protection in adverse environments where the gauge is subject to splashing by cutting fluid or coolant.



209-300



209-305

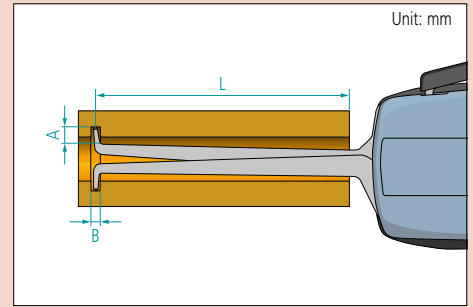
### Specifications

#### Metric

Code No.	Range	Measuring force	Graduation	Accuracy	A	B	L	Type	Price
Measuring contacts: carbide bevel									
209-300	2.5 - 12.5 mm	0.8/1.2 N	0.005 mm	0.015 mm	0.7	0.4	12	Fig. 1	£610.00
Measuring contacts: carbide ball $\phi 0.6$ mm									
209-301	5 - 15 mm	0.8/1.2 N	0.005 mm	0.015 mm	2.3	0.8	35	Fig. 4	£610.00
Measuring contacts: carbide ball $\phi 1$ mm									
209-302	10 - 30 mm	1.1/1.6 N	0.01 mm	0.03 mm	5.2	1.2	85	Fig. 4	£610.00
209-303	20 - 40 mm				7			Fig. 2	£610.00
209-304	30 - 50 mm				8.3			Fig. 3	£610.00
209-305	40 - 60 mm								£610.00
209-306	50 - 70 mm								£610.00
209-307	60 - 80 mm								£610.00
209-308	70 - 90 mm								£610.00
209-309	80 - 100 mm								£610.00

#### Inch

Code No.	Range	Measuring force	Graduation	Accuracy	A	B	L	Type	Price
Measuring contacts: carbide bevel									
209-350	.1 - .5"	0.8/1.2 N	.0002"	.0008"	0.9	0.5	35	Fig. 1	£610.00
209-351	.2 - .6"				4.6	0.8			£610.00
Measuring contacts: carbide ball $\phi 0.0394$ "									
209-352	.4 - 1.2"	1.1/1.6 N	.0005"	.0015"	5.3	1.8	84	Fig. 1	£610.00
209-354	.8 - 1.6"				7.4	3.3		Fig. 2	£610.00
209-356	1.6 - 2.4"				12.2	1.8		Fig. 3	£610.00



L : Maximum reach of contact arms inside workpiece.  
 A : Maximum groove depth.  
 B : Minimum groove width.

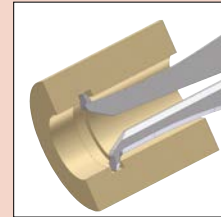


Figure 1.

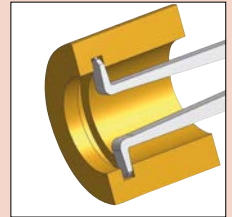


Figure 2.

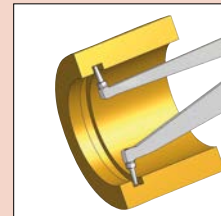


Figure 3.

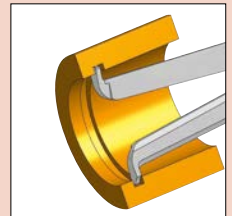
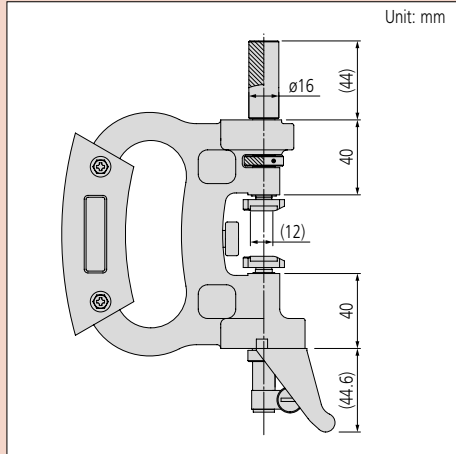


Figure 4.

### Optional Accessories

Code No.	Description	Price
2046SB	Dial indicator (graduation: 0.01 mm)	£37.50
2109SB-10	Dial indicator (graduation: 0.001 mm)	£80.10
2803SB-10	Dial indicator (graduation: .0001")	£111.00
21DZA000	Dial protection cover	£9.00

### Dimensions



### SERIES 201 – Dial Snap Gauges

- Designed for quick GO/NO-GO judgement of diameters of cylinders and shafts in machining processes.
- Wide (13.5 x 12 mm / 1.53 x 47"), flat carbide anvils.
- Indicator-anvil retraction stroke: 2 mm / .080".
- Anvil positioning range: 25 mm / 1".
- Adjustment nut: adjusts the setting anvil to the nominal size required within the measuring range.
- Clamp: clamps the setting anvil at the required position.
- Flatness of measuring face: 1 µm.
- Repeatability of indication: 2 µm or less (repeatability of indicators is not included).
- The dial indicator and protection cover are optional. Also, some dial indicators and protection covers cannot be used with the dial snap gauge. Consult Mitutoyo before using dial indicators which are not recommended.



201-101

Note: The dial indicator and protection cover are optional.

### Specifications

Metric					
Code No.	Range	Parallelism	Measuring force	Recommended dial indicator (optional)	Price
201-101	0-25 mm	5 µm	15 N ±3 N	2046SB (0.01 mm reading), 2109SB-10 (0.001 mm reading)	£339.00
201-102	25-50 mm				£351.00
201-103	50-75 mm				£367.00
201-104	75-100 mm				£377.00
201-105	100-125 mm				£394.00
201-106	125-150 mm				£410.00
201-107	150-175 mm				£432.00
201-108	175-200 mm				£449.00
201-109	200-225 mm				£472.00
201-110	225-250 mm				£495.00
201-111	250-275 mm				£506.00
201-112	275-300 mm				£528.00

Inch					
Code No.	Range	Parallelism	Measuring force	Recommended dial indicator (optional)	Price
201-151	0-1"	.0002"	15 N ±3 N	2803SB-10 (.0001" reading)	£339.00
201-152	1-2"				£351.00
201-153	2-3"				£367.00
201-154	3-4"				£377.00
201-155	4-5"				£394.00
201-156	5-6"				£410.00
201-157	6-7"				£432.00
201-158	7-8"				£449.00
201-159	8-9"				£472.00
201-160	9-10"				£495.00
201-161	10-11"				£506.00
201-162	11-12"				£528.00

# Stands

## SERIES 7 – Magnetic Stands

- Mitutoyo's magnetic stands clamp to iron or steel surfaces with a strong force and are indispensable for temporarily mounting a dial test indicator (or dial indicator) onto a machine tool or fixture for general alignment applications.
- A V-grooved base on most models allows the stand to mount securely on cylindrical as well as flat surfaces.
- The magnetic clamping effect is conveniently switched on or off by a quarter turn of a lever (not available on 7014-10).



7010SN



7011SN



7012-10



7014-10



7033B

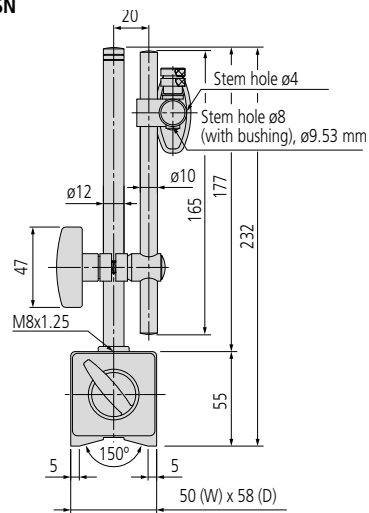
### Specifications

Code No.	Description	Acceptable stem sizes	Dovetail groove	Remarks	Price
7010SN	Magnetic stand	ø4 mm, ø8 mm, ø9.53 mm (3/8")	—	—	£60.30
7011SN				With fine adjustment	£72.70
7012-10	Flexible column stand	ø6 mm, ø8 mm, ø9.53 mm (3/8")	Provided	—	£149.00
7014-10	Mini magnetic stand	ø6 mm, ø8 mm	Provided	Without magnet ON/OFF	£63.50
7033B	Universal magnetic stand	ø6 mm, ø8 mm, ø9.53 mm (3/8")	Provided	With mechanical locking system	£170.00

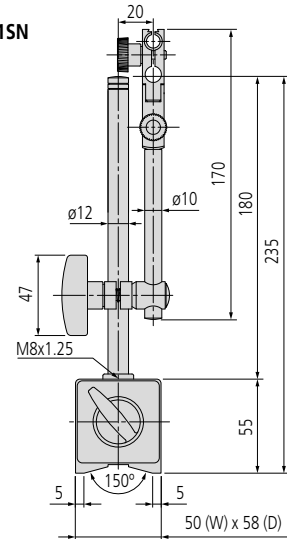
## Dimensions

Unit: mm

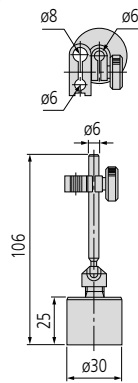
7010SN



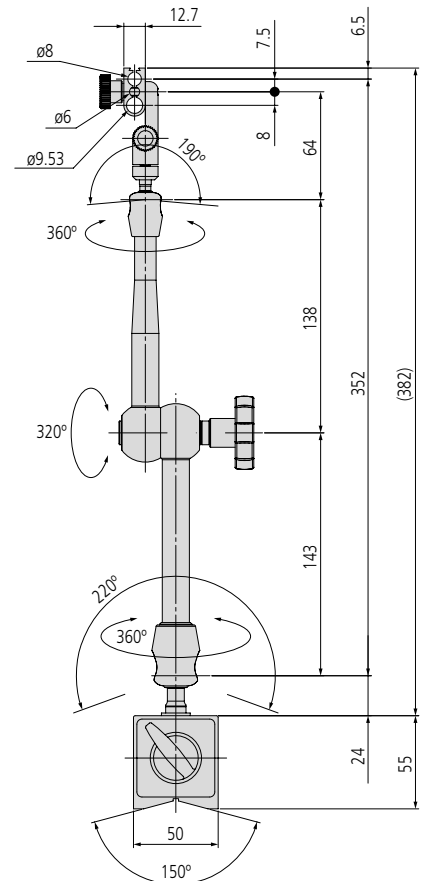
7011SN



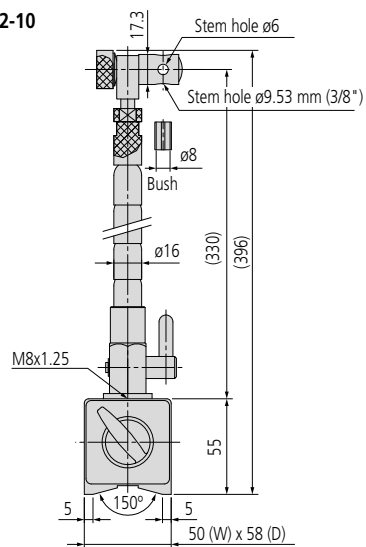
7014-10



7033B



7012-10



# Stands

## SERIES 7 – Dial Gauge Stands

- Dial gauge stands are designed for comparison measurements of size using a dial indicator or Digimatic indicator.
- Vertical fine adjustment is available with one-touch control thanks to the parallel spring suspension.



7001-10

7002-10

7007-10

### Specifications

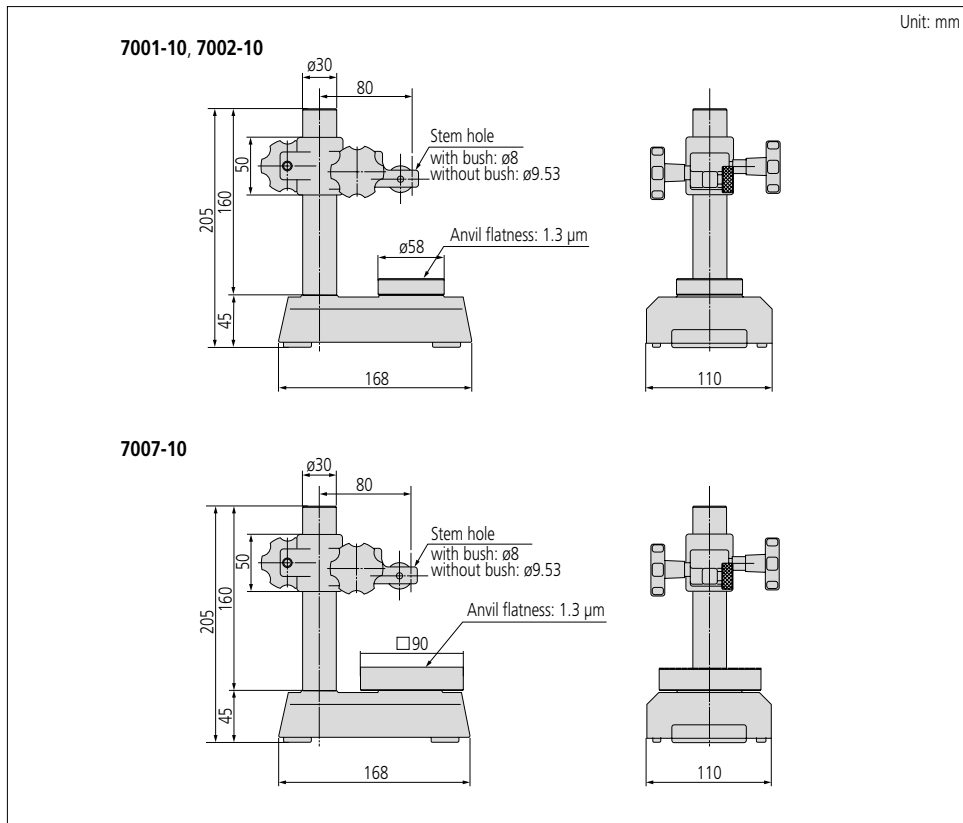
#### Metric

Code No.	Column travel	Acceptable stem sizes	Remarks	Price
7001-10	0 - 95 mm	ø8 mm, ø9.53 mm	With ø58 mm serrated anvil	£462.00
7002-10			With ø58 mm flat anvil	£432.00
7007-10	0 - 90 mm		With 90 mm square anvil	£473.00

Note: perpendicularity of the mounting hole to the anvil: less than 0.4 mm/100 mm.

Consult us when mounting Mitutoyo's linear gauge on this stand. We will check the operation of the stand and linear gauge before shipment (made-to-order).

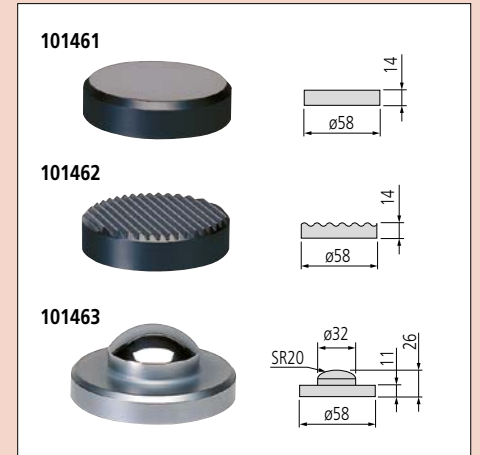
### Dimensions



### Optional Accessories

Code No.	Description	Price
101461	Hardened steel flat anvil	£45.50
101462	Hardened steel serrated anvil	£49.70
101463	Hardened steel domed anvil*	£69.70

\* Not available for 7007-10.





### Optional Accessories

Code No.	Description	Price
21JAA329	ø8 mm bush*	£25.00
21JAA330	ø9.53 mm (3/8") bush*	£25.00
21JAA331	ø15 mm bush*	£28.10

\* Only available for 215-505-10.



### SERIES 215 – Comparator Stands

- Comparator stands have a very stable, cast iron base which enables precise measurement.
- The partially serrated anvil prevents very flat workpieces from wringing to it and the 2.3 µm flatness (or better) promotes accurate measurement.
- The 215-505-10 model has a threaded column which enables easy and precise coarse adjustment.
- Serrated anvils 110 x 110 mm are supplied with 215-405-10, and 150 x 150 mm with 215-505-10 models.



215-405-10



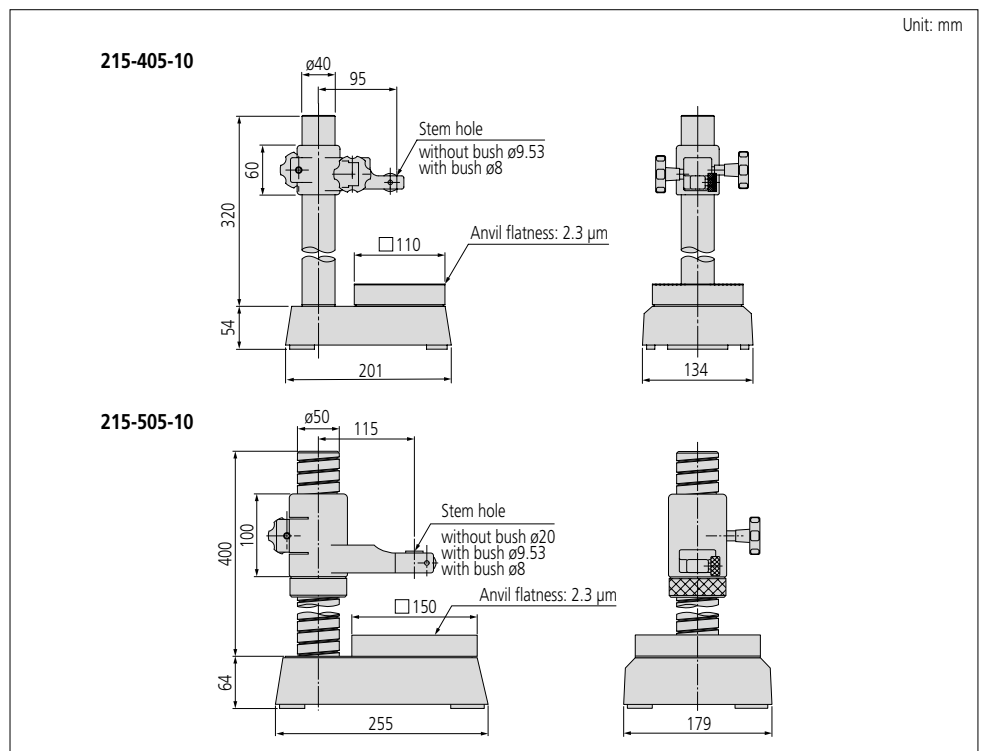
215-505-10

### Specifications

Code No.	Column travel	Acceptable stem sizes	Remarks	Price
215-405-10	0 - 235 mm	ø8 mm, ø9.53 mm	With fine adjustment of 1 mm range	£593.00
215-505-10	0 - 275 mm	ø8 mm, ø9.53 mm, ø20 mm	With fine adjustment over the entire travel	£778.00

Note: perpendicularity of the mounting hole to the anvil: less than 0.4/100 mm.

### Dimensions



# Stands

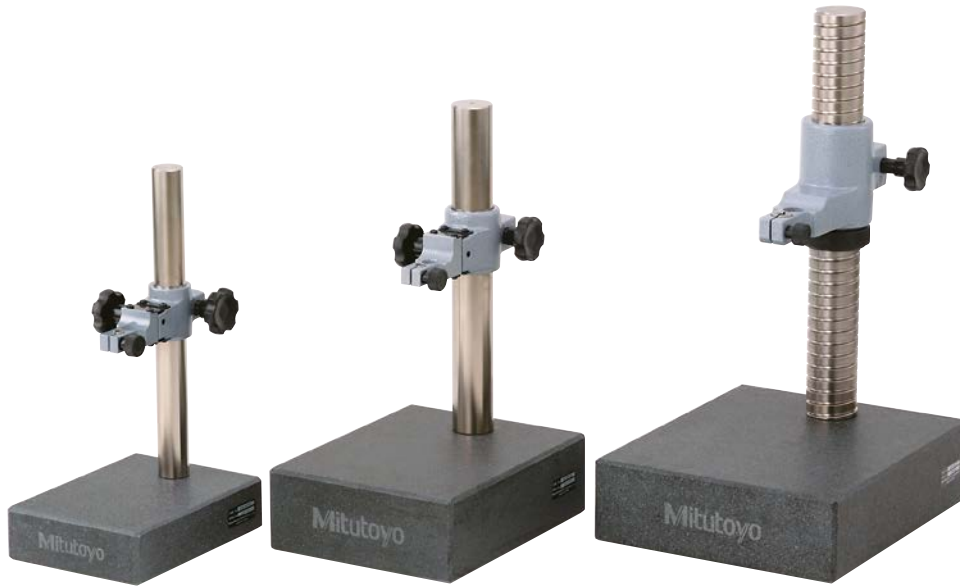
## SERIES 215 – Granite Comparator Stands

- The rigid granite base is free from burrs, pileups, rust and deterioration over time.
- The 215-156-10 model has a threaded column which enables easy and precise coarse adjustment.

### Optional Accessories

Code No.	Description	Price
21JAA329	ø8 mm bush*	£25.00
21JAA330	ø9.53 mm (3/8") bush*	£25.00
21JAA331	ø15 mm bush*	£28.10

\* Only available for 215-156-10.



215-151-10

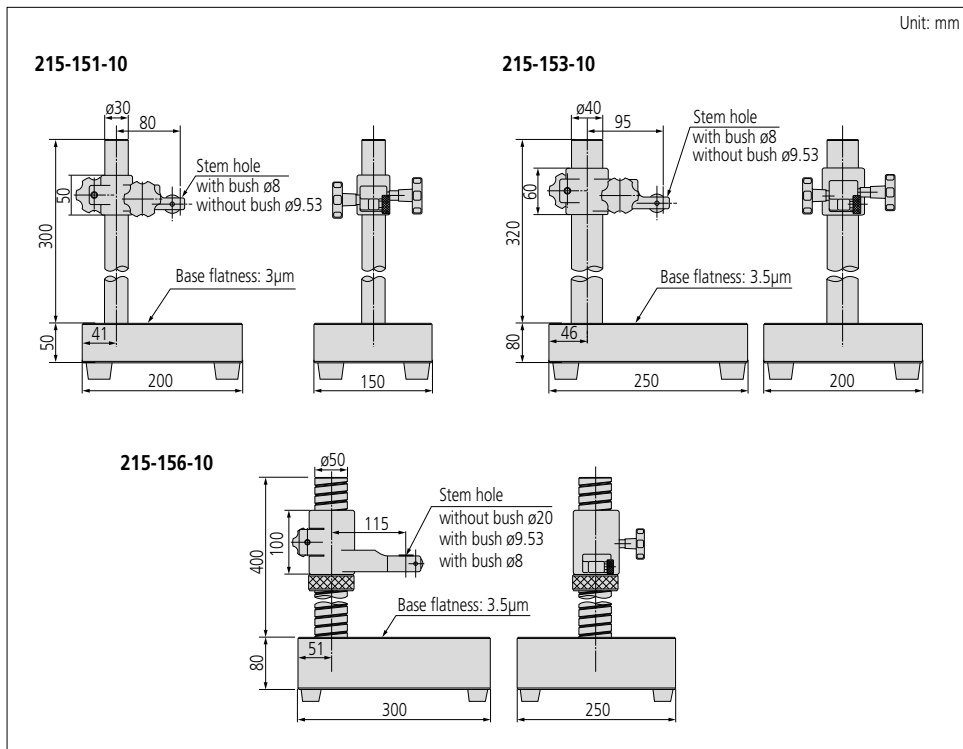
215-153-10

215-156-10

### Specifications

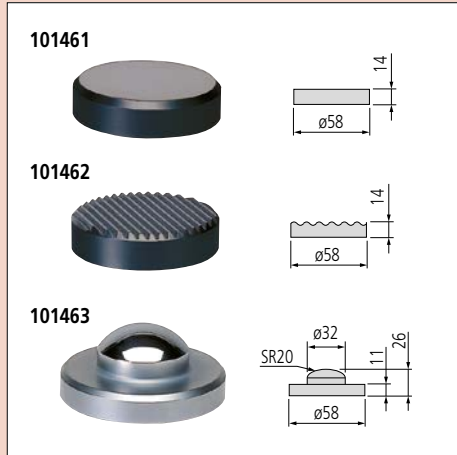
Code No.	Column travel	Acceptable stem sizes	Remarks	Price
215-151-10	0 - 250 mm	ø8 mm, ø9.53 mm	With fine adjustment of 1 mm range	£490.00
215-153-10	0 - 260 mm			£532.00
215-156-10	0 - 275 mm	ø8 mm, ø9.53 mm, ø20 mm	With fine adjustment over the entire travel	£659.00

### Dimensions



### Optional Accessories

Code No.	Description	Price
101461	Hardened steel flat anvil	£45.50
101462	Hardened steel serrated anvil	£49.70
101463	Hardened steel domed anvil	£69.70



### SERIES 519 – Transfer Stand

- Transfer Stands are designed for comparison measurements of size using a dial indicator or Digimatic indicator.



519-109-10  
(with a serrated anvil)

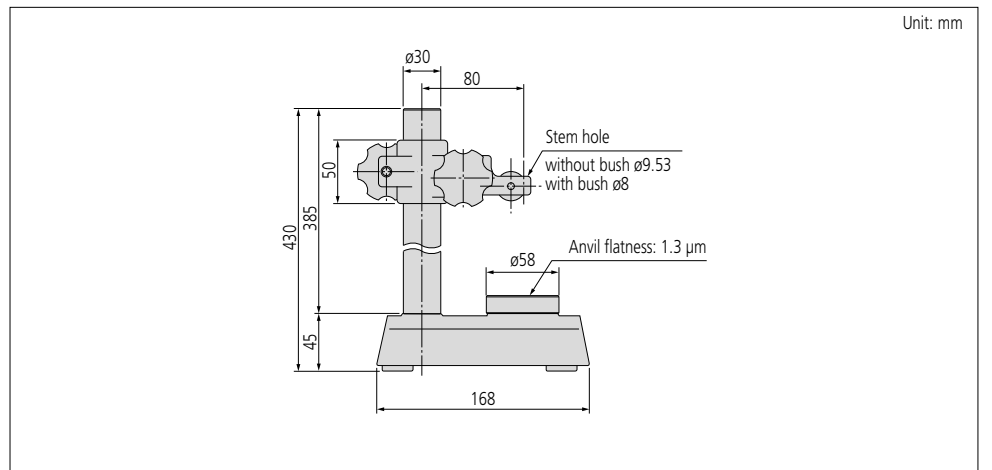
### Specifications

#### Metric

Code No.	Column travel	Acceptable stem sizes	Remarks	Price
519-109-10	0 - 320 mm	ø8 mm, ø9.53 mm	With serrated anvil	£607.00

Note: perpendicularity of the mounting hole to the anvil: less than 0.4 mm / 100 mm.

### Dimensions

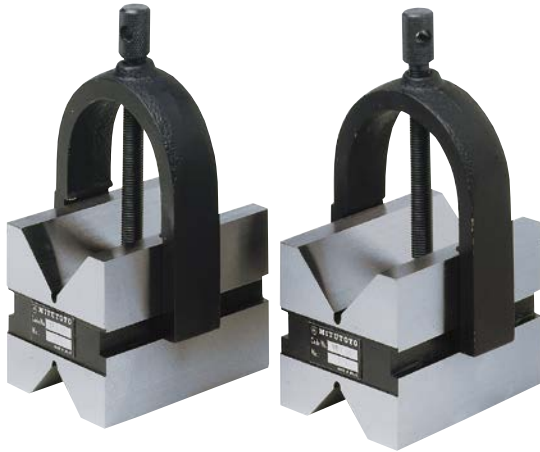


Unit: mm

# Stands

## SERIES 181 – V-Block Set

- Made of hardened steel.
- Two V-blocks per set.
- Feature V-angle 90° clamping brackets.
- Contact faces are ground and lapped.
- Designed as a fixture to enable you to check cylindrical precision machined parts.



181-902-10

## Accuracy

	Mitutoyo	Reference JIS B 7540 Grade 1, 100 mm or less
Bottom-surface flatness	2 $\mu$ m or less	10 $\mu$ m or less
V-surface flatness		
Parallelism between the bottom-surface and the cylinder on the V-surface	7.5 $\mu$ m or less	
Inclination of the V-anvil against the bottom-surface	10 $\mu$ m or less	
Parallelism between the side surface and the cylinder on the V-surface	7.5 $\mu$ m or less	20 $\mu$ m or less
Difference in the height of a pair of V-blocks	9 $\mu$ m or less	10 $\mu$ m or less



## Specifications

### Metric

Code No.	Max. workpiece diameter	Remarks	Price
181-902-10	25 mm	With clamp	£165.00

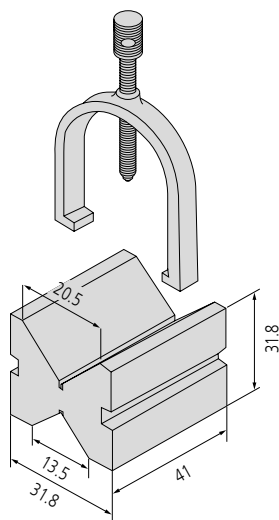
### Inch

Code No.	Max. workpiece diameter	Remarks	Price
181-901-10	1"	With clamp	£165.00

Note: Larger sizes available please contact Mitutoyo for details.

## Dimensions

Unit: mm



## SERIES 181 – Magnetic V-Block

- Contact faces are ground and lapped.
- Two sizes of 90° V-grooves are provided.
- Used for holding ferromagnetic cylindrical parts for scribing, adjusting, testing etc.



181-246

### Specifications

Metric				
Code No.	Max. workpiece diameter	Dimensions (LxWxH)	Magnetic force	Price
181-146	50 mm	64 x 58 x 76 mm	500 N	£171.00
181-246		95 x 70 x 95 mm	1000 N	£415.00

# LINEAR GAUGES LASER SCAN MICROMETERS

G



## Linear Gauges



## Laser Scan Micrometers



## Contents

**Linear Gauges**

LGF Economical Design Coolant Proof Linear Gauge	G-03
LGB Extra-Slim Linear Gauge	G-04
LGS ABSOLUTE Coolant Proof Linear Gauge	G-05
Low-Cost EC Counter	G-06
Panel Mount EB Counter	G-07
Multi-Function EH Counter	G-08
Multi-Gauge EV Counter	G-09
D-EV Display Unit	G-10
SENSORPAK Control and Analysis Software	G-11
Litematic High Resolution Measuring Unit	G-12

**Laser Scan Micrometers**

LSM-500S	G-13
LSM-501S	G-14
LSM-503S	G-15
LSM-506S	G-16
LSM-512S	G-17
LSM-516S	G-18
LSM-902H-6900	G-19
LSM-9506 Integrated Benchtop	G-20
LSM-6200 Display Unit	G-21
Optional Accessories	G-22

# Linear Gauges

## SERIES 542 – LGF Economical Design Coolant Proof Linear Gauge

- A compact linear probe for measuring displacements up to 50 mm / 2".
- Wide range of application: due to its slim design this series can easily be integrated into measuring systems and automated machines.
- Long service life due to the linear ball bearing in the plunger assembly.
- Coolant proofed to IP66 level protection for operation under severe conditions.

IP66



542-163

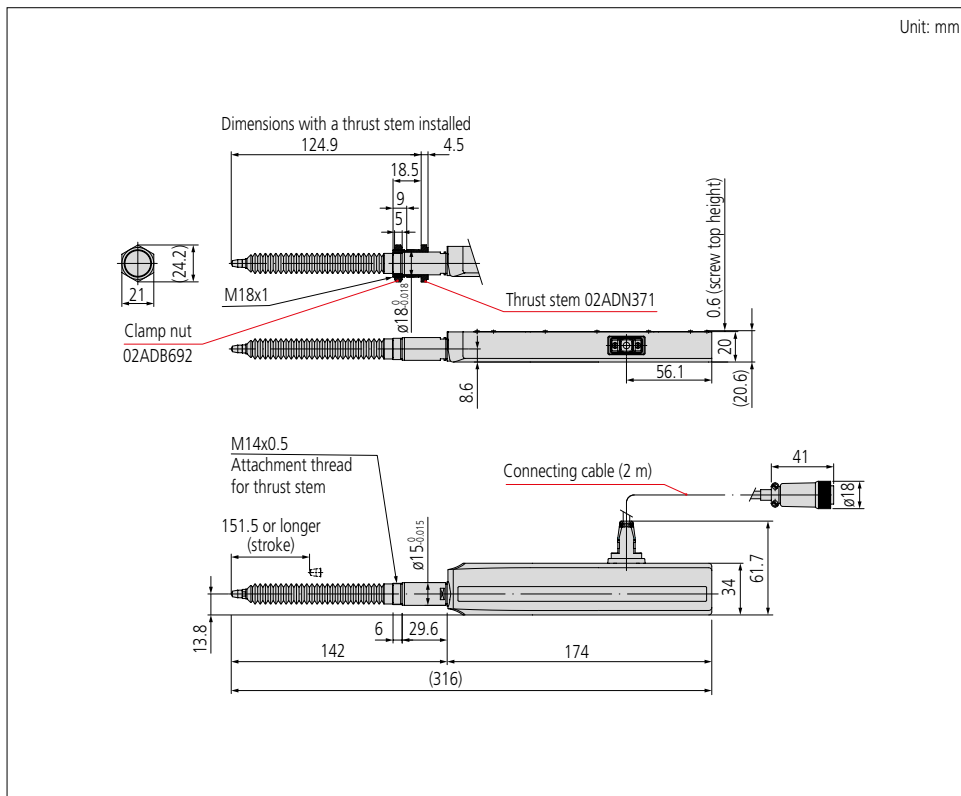
### Specifications

Code No.	Range	Resolution	Accuracy*1	Measuring force*2	Stem	Price
542-163	50 mm (2")	0.001 mm	(1.5+L/50) µm	5.7/5.3/4.9 N	ø15 mm	£858.00
542-613		0.005 mm	(7.5+L/50) µm			£640.00

\*1 L = Effective range (mm).

\*2 Orientation of gauge: Spindle down / horizontal / up.

### Dimensions



### Technical Data

Accuracy:	Refer to the list of specifications (excluding quantizing error)
Resolution:	5 µm or 1 µm
Scale type:	Photoelectric linear encoder
Max. response speed:	1500 mm/s
Contact point:	ø3 mm carbide
Stem:	ø15 mm
Bearing type:	Linear ball bearing
Measuring force:	Refer to the list of specifications
Output signal:	90° phase difference, differential square wave (RS-422A equivalent)
Signal pitch:	20 µm (542-613), 4 µm (542-163)
Dust/water protection level:	IP66

### Standard Accessory

210187: Wrench for contact point

### Optional Accessories

Code No.	Description	Price
902432	Extension cable (20 m)	£303.00
902433	Extension cable (10 m)	£212.00
902434	Extension cable (5 m)	£156.00
962505	Rubber boot	£24.70
02ADB693	Thrust stem wrench	£7.40
02ADN370	Thrust stem set	£16.10



## Technical Data

Accuracy:	Refer to the list of specifications (excluding quantizing error)
Resolution:	1 $\mu$ m
Scale type:	Photoelectric linear encoder
Max. response speed:	900 mm/s
Contact point:	$\varnothing$ 3 mm carbide
Stem:	$\varnothing$ 8 mm
Bearing type:	Linear ball bearing
Measuring force:	Refer to the list of specifications
Output signal:	90° phase difference, differential square wave (RS-422A equivalent)
Signal pitch:	4 $\mu$ m
Dust/water protection level:	IP54

## Standard Accessory

**538610:** Wrench for contact point

## Optional Accessories

Code No.	Description	Price
<b>238772</b>	Rubber boot for 10 mm LGB (spare)	<b>£6.00</b>
<b>238773</b>	Rubber boot for 5 mm LGB (spare)	<b>£6.00</b>
<b>902432</b>	Extension cable (20 m)	<b>£303.00</b>
<b>902433</b>	Extension cable (10 m)	<b>£212.00</b>
<b>902434</b>	Extension cable (5 m)	<b>£156.00</b>

## SERIES 542 – LGB Extra-Slim Linear Gauge

- Extremely compact design. Available with an outside diameter as small as 8 mm.
- The small photoelectric linear encoder assures high precision over the entire stroke range.
- Linear ball bearings in the spindle unit ensure superb durability.



542-204



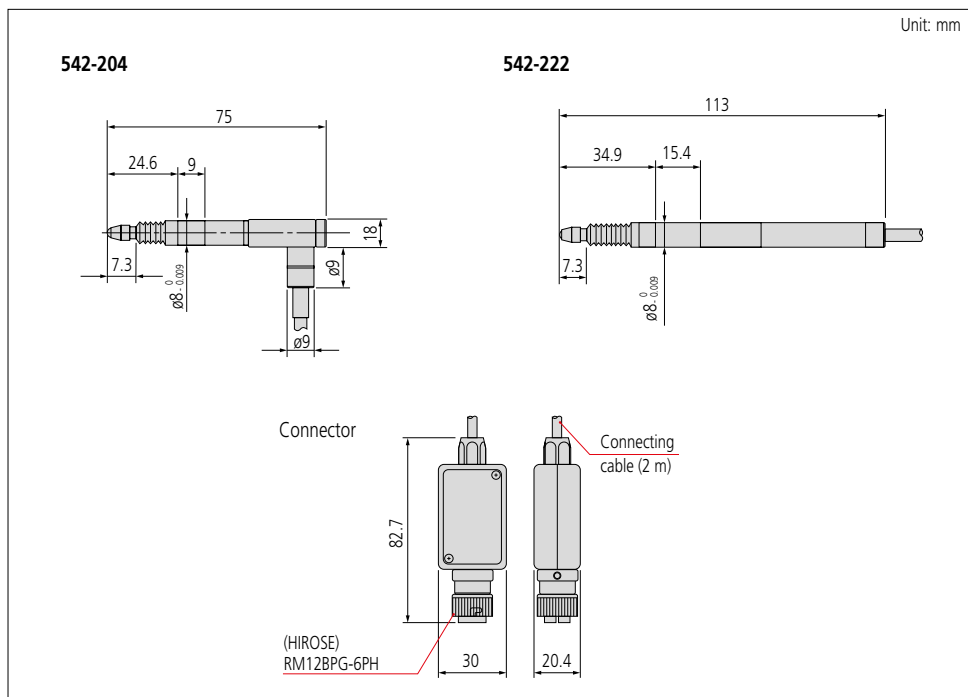
542-222

## Specifications

Code No.	Range	Resolution	Accuracy	Measuring force*	Stem	Price
<b>542-204</b>	5 mm (.2")	0.001 mm	2 $\mu$ m	0.65/0.6/0.55 N	$\varnothing$ 8 mm	<b>£984.00</b>
<b>542-222</b>	10 mm (.4")			0.8/0.75/0.7 N		<b>£844.00</b>

\* Orientation of gauge: Spindle down / horizontal / up

## Dimensions



# Linear Gauges

## SERIES 575 – LGS ABSOLUTE Coolant Proof Linear Gauge

- Compact length measuring instrument with built-in capacitance-type measuring system.
- Dust and splash proof: suitable for installation in machines, measuring devices and multi-position measurement applications.
- Zero-setting via external display unit possible.
- Data output is in Digimatic format to enable processing and documentation of measurement values as well as statistical evaluation via connected Digimatic data processing units or PCs.

**ABSOLUTE** IP66



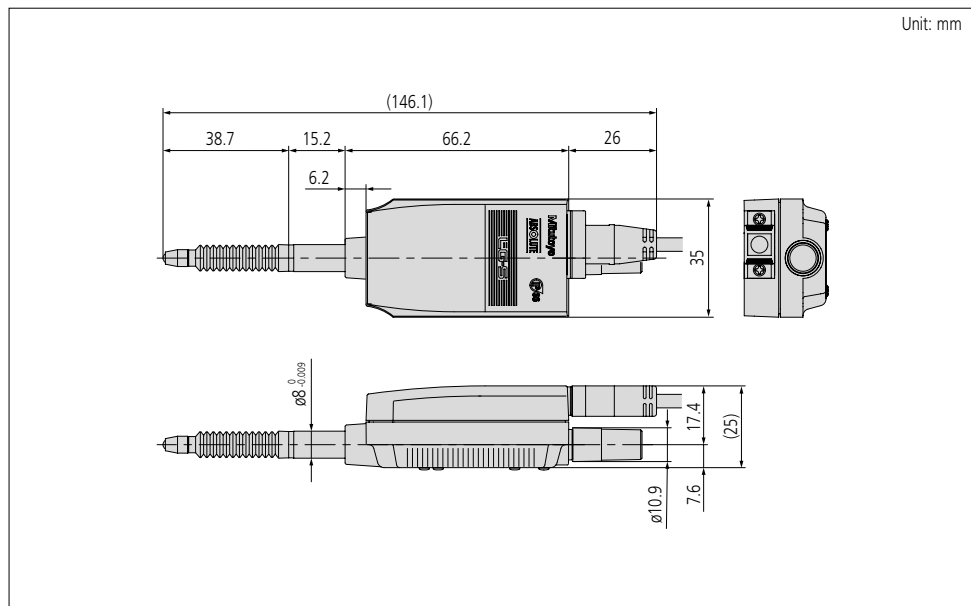
575-303

### Specifications

Code No.	Range	Resolution	Accuracy	Measuring force*	Stem	Reverse reading	Price
575-303	12.7 mm (.5")	0.01 mm	0.015 mm	2.0/1.8/1.6 N	ø8 mm	—	£186.00
575-304						✓	£186.00

\* Orientation of gauge: Spindle down/horizontal/up.

### Dimensions



### Technical Data

Accuracy:	Refer to the list of specifications (excluding quantizing error)
Resolution:	0.01 mm
Scale type:	Capacitance-type ABSOLUTE linear encoder
Max. response speed:	Unlimited
Contact point:	ø3 mm carbide
Stem:	ø8 mm
Bearing type:	Slide bearing
Measuring force:	Refer to the list of specifications
Output signal:	Digimatic output
Dust/water protection level:	IP66

### Optional Accessories

Code No.	Description	Price
238774	Rubber boot	£14.20
903594	Air drive unit (metric)	£126.00
903598	Air drive unit (inch)	£109.00
936937	SPC data cable (1 m)	£33.90
965014	SPC data cable (2 m)	£49.80
02ADD950	Extension cable (0.5 m)	£67.00
02ADF640	SPC cable extension adapter	£46.90

# EC Counter

## SERIES 542 – Low-Cost Modular Display Unit for LGS Gauges

- Employs DIN size (96 x 48 mm) panel-mount configuration to facilitate system integration.
- Able to produce tolerance judgement and Digimatic measurement data output.

### Functions

Preset, GO/±NG judgement

### Output (selectable)

Tolerance judgement: -NG, OK, +NG (open collector)  
Data: Digimatic code

### External Control Signal Input

Preset, data hold

### Power Supply

Via AC adapter

### Optional Accessories

Code No.	Description	Price
214938	DC plug PJ-2	£4.80
936937	SPC data cable (1 m)	£33.90
965014	SPC data cable (2 m)	£49.80
C162-155	I/O cable	£46.40



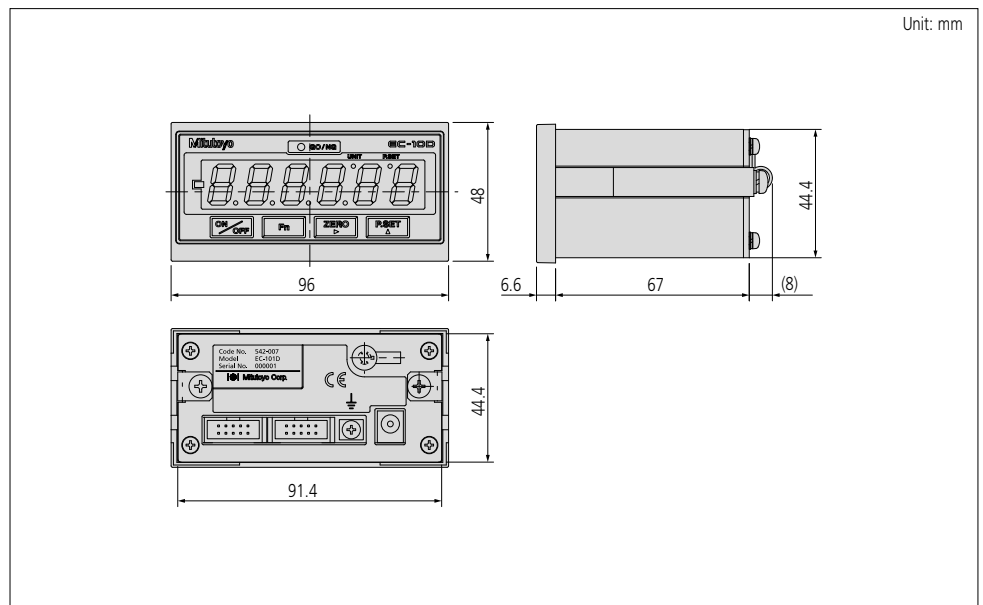
542-007E



### Specifications

<b>Code No.</b>	<b>542-007E</b>
Applicable input	Digimatic code (SPC)
Applicable gauge	LGS
Number of gauge inputs	1
Resolution	0.01, 0.001 mm (automatically set depending on the gauge)
Display	6-digit and a negative [-] sign LED (amber, green, red)
<b>Price</b>	<b>£280.00</b>

### Dimensions



# EB Counter

## SERIES 542 – Panel Mount Display Unit with Multiple Limit Setting

- Able to produce 3-step/5-step X 7 kinds of tolerance output and limit value output independently for each of 7 channels.
- Comes with serial BCD output capability for connection to a programmable controller or personal computer, etc., when the minimum cabling requirement is met.
- Dynamic measurement possible with simplified analogue output.
- Employs DIN size (96 x 48 mm) and panel-mount configuration to facilitate system integration.

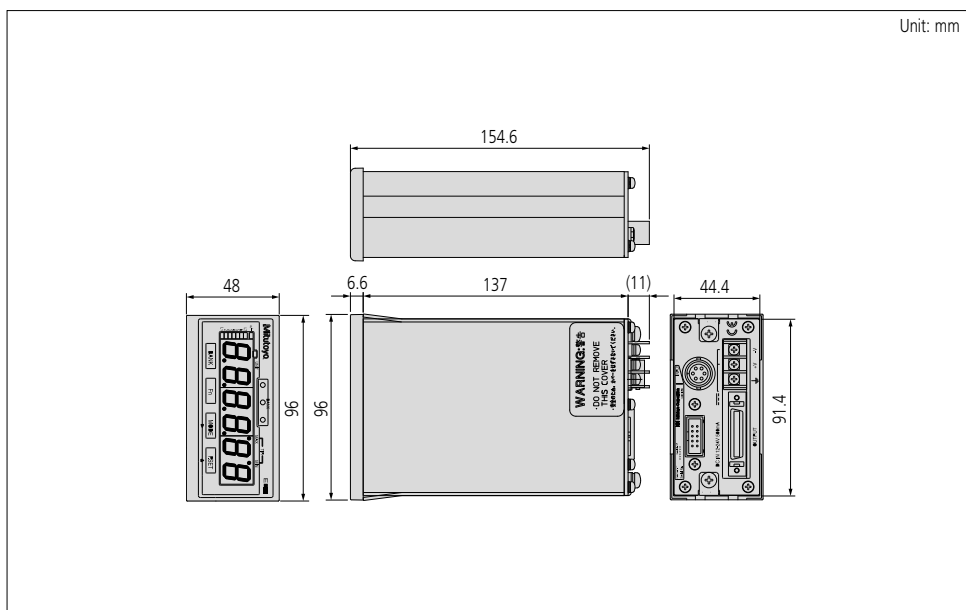


542-092-2

### Specifications

<b>Code No.</b>	<b>542-092-2</b>
Applicable input	Differential square wave
Applicable gauges	LGF, LGB
Number of gauge inputs	1
Resolution	0.01, 0.005, 0.001, 0.0005, 0.0001 mm
Display	LED display (3 steps: amber, green, red / 5 steps: amber, amber flashing, green, red flashing, red)
<b>Price</b>	<b>£618.00</b>

### Dimensions



### Functions

Preset, tolerance judgement output (3/5-step X 7 kinds), limit value output (2 kinds independently for each of the 7 channels), peak (maximum, minimum, runout) measurement, diverse data output (serial BCD, simplified analogue)

### Output

Tolerance judgement: L1 to L5, open collector  
Control: Normal operation signal (NORMAL), open collector

### External Control Signal Input

Preset, display hold, peak value clear, tolerance judgement BANK switch, open collector or no-voltage contact signal (with/without contact point)

### Interface

Serial BCD: Bit-serial format, open collector  
Analogue output : 2.5V + counting value X voltage resolution (25mV/2.5mV): full-scale 0 to 5V

Digimatic input/output:

- Connecting to the external switch box (No. 02ADF180) makes it easy to enter tolerance limits and preset values. Note: This cannot be used when the gauge is connected to a Mitutoyo DP-1VA LOGGER Digimatic Mini-Processor.
- Can connect to a Mitutoyo DP-1VA LOGGER Digimatic Mini-Processor.
- Number of tolerance steps can be expanded by assembling a set of EB-D counters.

### Maximum Input Frequency

1.25 MHz (the response speed depends on the gauge being used.)

### Power Supply

12-24VDC

### Power Consumption

6W (500mA) or less (power supply to be capable of supplying at least 1A for each unit.)

### Optional Accessories

Code No.	Description	Price
<b>936937</b>	SPC data cable (1 m)	<b>£33.90</b>
<b>965014</b>	SPC data cable (2 m)	<b>£49.80</b>
<b>02ADB440</b>	I/O output connector	<b>£21.40</b>
<b>02ADD930</b>	Terminal connecting cable	<b>£21.60</b>
<b>02ADF180</b>	10-key unit	<b>£200.00</b>
<b>02ADN460</b>	AC adapter	<b>£57.50</b>
<b>02ZAA030</b>	AC cable	<b>£8.90</b>



AC adapter and AC cable.

# EH Counter

## SERIES 542 – Multi-Function Display Unit

### Functions

Zeraset, preset, limit setting (3 or 5-step), GO/±NG judgement, GO/±NG signal output, MAX/MIN/TIR (runout) measurement, counting direction switching, double reading, mm/inch switching, sum/difference calculation of 2 gauges, output mode selection

### Output

I/O: Tolerance judgement output (3/5 stages), normal operation output  
RS-232C, USB or Digimatic code (selectable); various measurement data (USB used only with SENSORPAK)

### External Control

I/O: Preset, data hold and error clear  
RS-232C: Displayed value output, MAX/MIN/TIR switching, zero set, peak value clear, preset value input, tolerance value input and error clear

### RS Link

Up to six EH counters may be connected via one RS-232C or USB port (daisy chained). (USB used only with SENSORPAK.)

### Error Display/Output

Power-supply voltage error, overspeed error, overflow error, gauge error, communication error, and tolerance setting error

### Maximum Input Frequency

2.5MHz (differential square wave)

### Power Supply

Via AC adapter (12-24VDC, 700mA (max))

- Employs DIN size (144x72 mm) and panel-mount configuration to facilitate system integration.
- Counter can be used on a desktop mounted on a display stand (included).
- The standard RS-232C and USB interface allows easy communication with an external PC. (USB used only with SENSORPAK.)
- A multi-point measuring system can easily be created with the RS Link built-in networking function. (Maximum 12 points.)
- The 2-gauge input type can perform 2-axis display and make addition or subtraction calculations between 2 gauges.

542-075E



542-071E



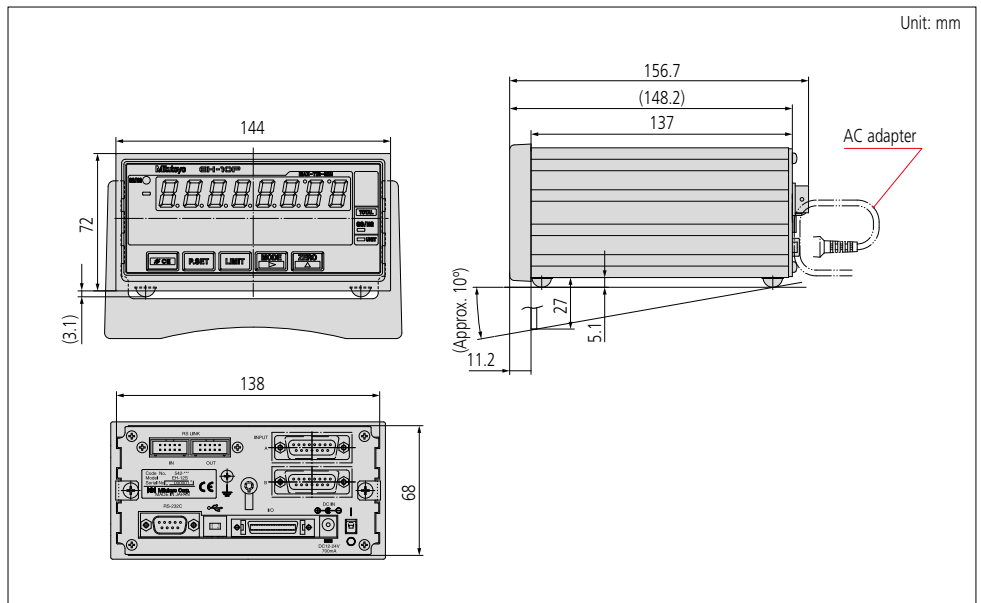
542-072E



### Specifications

Code No.	542-075E	542-071E	542-072E
Applicable input	Differential square wave		Digimatic code output
Applicable gauges	LGB, LGF		LGS, ID-C
Number of gauge inputs	1		2
Resolution	0.01, 0.005, 0.001, 0.0005, 0.0001 mm		Depends on the gauge head connected
Tolerance judgement display	LED display (3 steps: amber, green, red / 5 steps: amber, amber flashing, green, red flashing, red)		
Price	£770.00	£950.00	£950.00

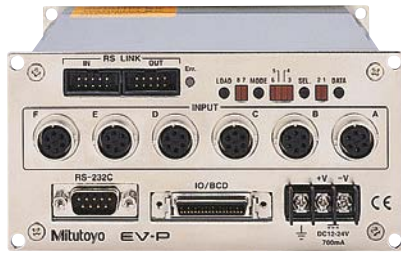
### Dimensions



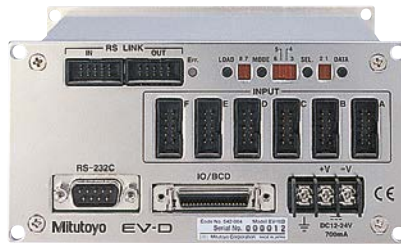
# EV Counter

## SERIES 542 – For Multi-Gauge System

- Up to six gauges can be connected to one unit.
- Up to 10 EV counters can be connected to one personal computer using the RS Link function to facilitate the configuration of a multi-point measurement system comprising a maximum of 60 gauges.
- A range of output modes are available: I/O output for tolerance judgement and segment output, BCD data output and RS-232C.
- Peak-hold measurements are possible for maximum value, minimum value, runout (TIR), etc.
- Able to display the sum, average, maximum, minimum, maximum difference, etc., between gauges connected to the same unit.



542-063



542-064E

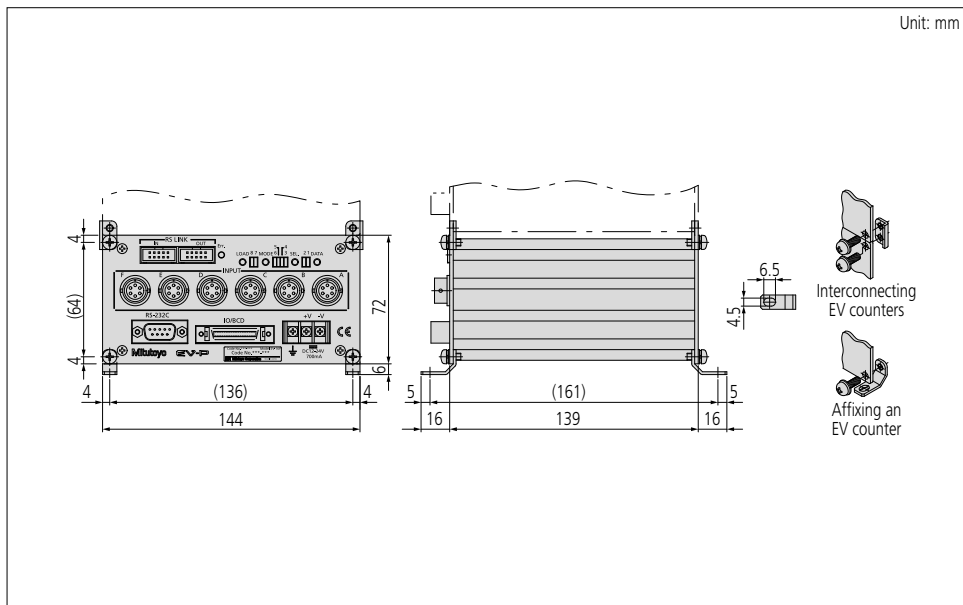
### Specifications

Code No.	542-063	542-064E
Applicable input	Differential square wave	Digimatic code (SPC)
Applicable gauge	LGB (ex. 0.0001 mm resolution), LGF	LGS
Number of gauge inputs	6	
Resolution	0.0001*2, 0.0005, 0.001, 0.005, 0.01 mm (.000005", .00005", .0005")	0.001*1, 0.01 mm (.00005"*1, .0005")
Price	£1170.00	£1110.00

\*1 Will not be indicated when combined with an LG gauge.

\*2 D-EV is required when the resolution is 0.0001 mm.

### Dimensions



### Functions

GO/±NG judgement, GO/±NG signal output, MAX/MIN/TIR (runout) measurement, counting direction switching, mm/inch switching, calculation of sum, average, maximum, minimum and maximum difference between specified axes, and output-mode selection

### Output

I/O: Normal operation output and GO/±NG signal (three steps), measurement data (BCD code), or 21-stage segment output (selectable)

RS-232C: Various measurement data

### External Control

I/O: Axis designation, preset, data hold, and error clear

RS-232C: Displayed value output command, MAX/MIN/TIR switching and peak value clear, zero set, preset value input, tolerance value input, error clear, and command to output calculated value between specified axes

### RS Link

Up to 10 EV counters may be connected via a single RS-232C port (daisy chained). EV and EF counters can be mixed (in which case a total of six counters can be connected)

### Error Display/Output

Power-supply voltage error, overspeed error, overflow error, gauge error, communication error, and tolerance setting error

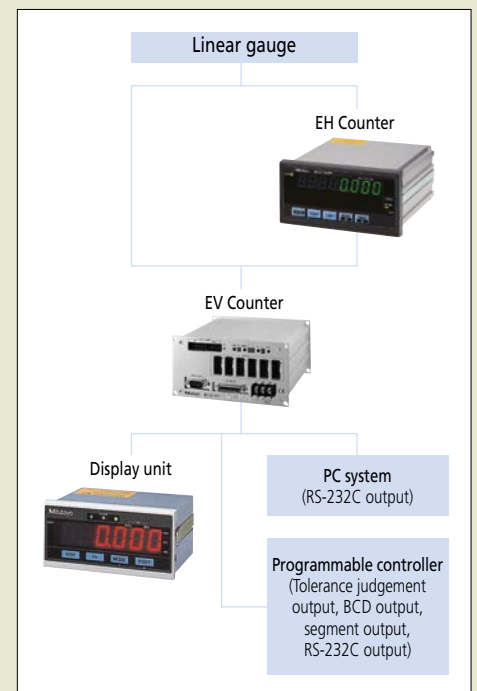
### Maximum Input Frequency

1.25MHz (differential square wave): max counting speed: 5MHz

### Power Supply

Terminal block (M3 screws), 12-24VDC, 700mA (max.)

### System Diagram



# D-EV Display Unit

## Optional accessory for the EV Counter

- Allows set-up of the EV counter without a personal computer or other equipment.
- Able to display each axis measurement value and GO/NO-GO judgement result, total GO/NO-GO judgement result for all axes, setting details, and errors.
- DIN compatible compact panel-mounting-cutout dimensions 45 x 92 mm.

### Technical Data

No. of connectable units:	One display unit allows external display and setting for one EV counter
Displayed digits:	Uses a single sign plus six digits (EV counter operates on eight-digit data internally but displays only the last six digits)
LED display:	Channel display (also for display of judgement result): 3 (three-colour LED) measurement mode display (current, maximum, minimum, runout): 2 status display: 1 (two-colour)
Operating switches:	4
Switches and their functions:	Channel switching, measurement mode switching (current value, maximum value, minimum value and runout), parameter setting, preset, and tolerance setting
Input/output:	RS Link connectors: 1 in and 1 out.
Error display:	Overspeed, gauge error and others.
Power supply:	Terminal block (M3 screws), 12-24VDC, 200mA

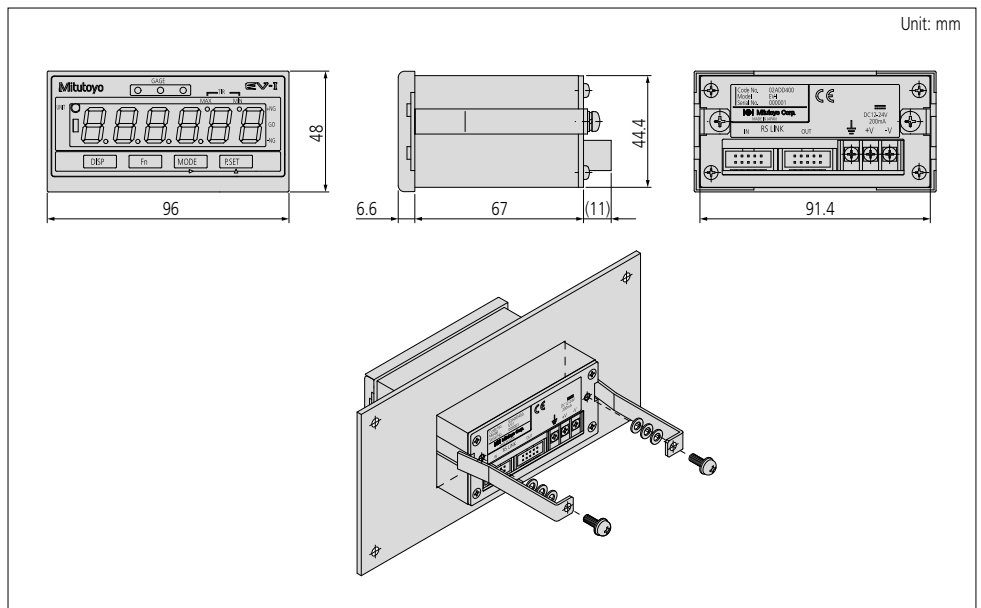


02ADD400

### Specifications

Code No.	02ADD400
Price	£295.00

### Dimensions



# Software

## SENSORPAK – Control and Analysis Software

- Allows dynamic display of readings and calculation results for Linear Gauges.
- Arithmetical calculation and maximum width calculation using measurement data.
- Capable of exporting measurement data into MS-Excel, MeasurLink, etc.
- Maximum 60 channels of measuring points can be processed.
- Various graphic displays (numeric value, meter, bargraph, overall judgement).
- Can store up to 60,000 measurement data records with 6 gauges connected.



Measurement screen.

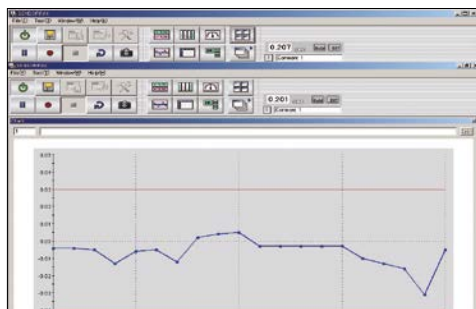
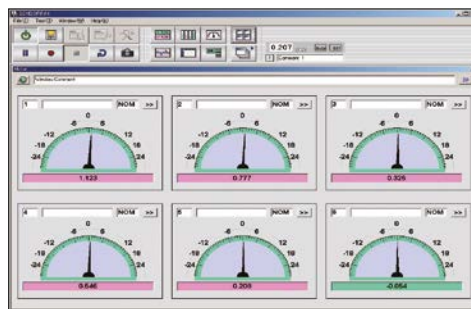


Chart screen.



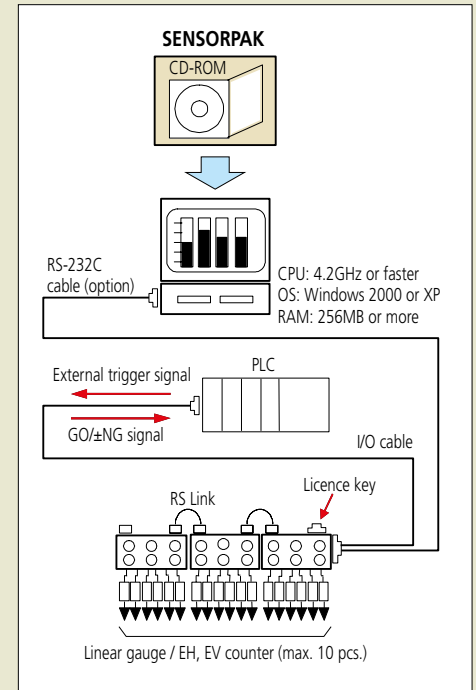
Meter screen.

**MiCAT**

Mitutoyo Intelligent Computer Aided Technology

the standard in world  
metrology software  
**SENSOR**

### System Diagram



### Specifications

Code No.	02NGB030	02NGB040
	Software only	Software plus I/O cable
Display function	Display type: Counter, bar graph, meter, chart (capable of simultaneous display) Tolerance judgement result: Colour display (green/red) Connectable gauges: Max. 60 gauges Digimatic code (SPC)	
Calculation function	Calculation items: Sum, difference, total, average, maximum, minimum, range (maximum–minimum), calculation with a constant Connectable gauges: Max. 30 calculation items (between gauges)	
Total tolerance judgement	GO/±NG judgement (by specifying gauges to be used for total tolerance judgement) GO/±NG signal output with optional I/O cable	
Input function	Trigger function: by means of key, timer or external TRG (with optional I/O cable) Data input storage capacity: Max. 9000 records (with 60 gauges connected) to 60000 records (with 6 gauges connected)	
Output function	Direct output to Excel spreadsheet, CSV file output (compatible with MeasurLink)	
Connectable items	Various Mitutoyo counters (those compatible with RS Link)	
Processing requirement	Recommendation: PC/AT compatible machine; CPU: Pentium 4.2GHz or higher; Memory: 256MB or more; Disk: 100MB or more; OS: Windows ME, 2000, XP	
Price	<b>£633.00</b>	<b>£794.00</b>

Currently supported languages: English, French, German, Spanish  
User's manual: English



# Litematic

## SERIES 318 – High Resolution Measuring Unit

- The Litematic is designed for measuring easily deformed workpieces and high-precision parts such as pin gauges, thin-wall bearings, plastic parts, and springs.
- Extra-low measuring force of 0.01 N (1 gf).
- Ceramic anvil is free from corrosion concerns, hard wearing and easy to maintain.
- Data output is in Digimatic format to enable processing and documentation of measurement values as well as statistical evaluation via connected Digimatic data processing units or PCs.

### Technical Data

Accuracy:	Refer to the list of specifications (excluding quantizing error)
Resolution:	Refer to the list of specifications
Repeatability:	$\sigma = 0.05 \mu\text{m}$
Display unit:	8 digits and 14 mm character height
Stroke:	51.2 mm (using standard contact point)
Measuring force:	0.01N
Spindle feed speed:	2 mm/s, 4 mm/s, 8 mm/s
Length standard:	Photoelectric linear encoder
Contact point:	$\varnothing 3 \text{ mm}$ carbide ball
Power supply:	240VAC $\pm 10\%$

### Optional Accessories

Code No.	Description	Price
936937	SPC data cable (1 m)	£33.90
965014	SPC data cable (2 m)	£49.80
937179T	Footswitch	£46.70
264-016-10	USB input tool	£220.00
264-505E	DP-1VA LOGGER Digimatic Mini-Processor	£406.00
02ADN460	AC adapter	£57.50
02ADM270-2	SENSORPAK (data capture software including I/O cable)	£587.00

Code No.	Description	Measuring force	Price
101118	Contact point, shell	0.02 N	£5.10
120059	Contact point, $\varnothing 7.0 \text{ mm}$ spherical (carbide)	0.03 N	£57.90
120060	Contact point, $\varnothing 10.5 \text{ mm}$ spherical (carbide)	0.06 N	£69.30
120066	Contact point, $\varnothing 0.45 \text{ mm}$ needle (carbide)	0.01 N	£31.40



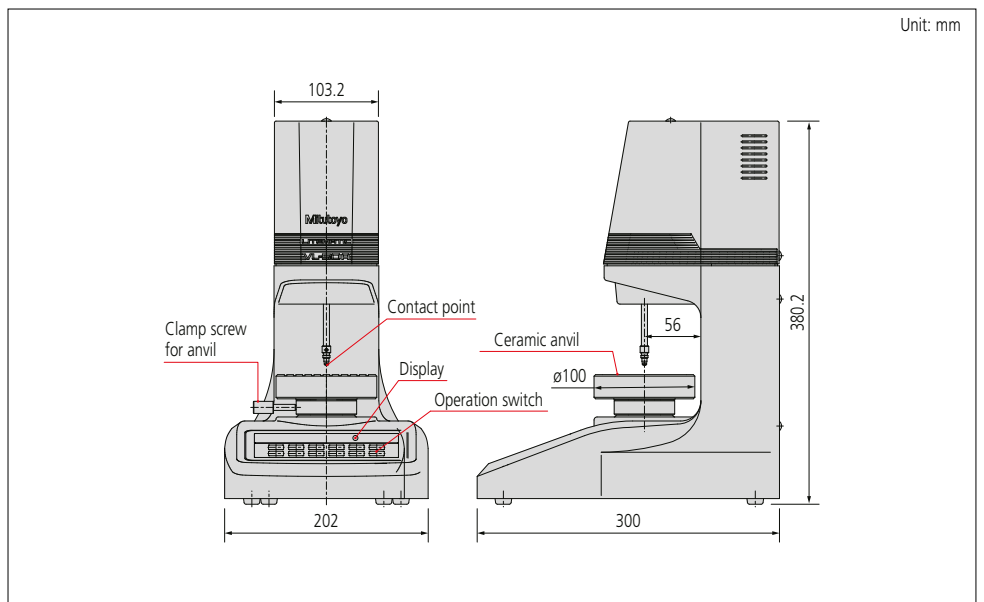
318-221E

### Specifications

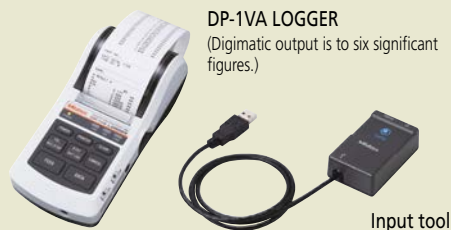
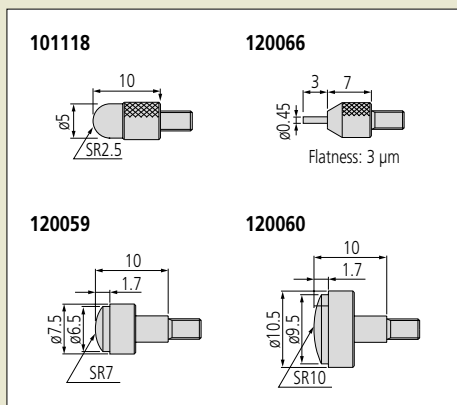
Code No.	Range	Resolution (switchable)	Accuracy (at 20°C $\pm 1^\circ\text{C}$ )	Remarks	Price
318-221E	0-50 mm	0.01/0.1/1 $\mu\text{m}$ , 0.5/5/50 $\mu\text{inch}$	(0.5+L/100) $\mu\text{m}^*$	Including $\varnothing 100 \text{ mm}$ grooved ceramic anvil	£5520.00

\* L = measured length (mm).

### Dimensions



Unit: mm



### DP-1VA LOGGER

(Digimatic output is to six significant figures.)

Input tool

# Laser Scan Micrometers

## SERIES 544 – LSM-500S Ultra-High Accuracy Non-Contact Measuring System

- Permits measurements starting from  $\varnothing 5 \mu\text{m}$ .
- Provides ultra-high accuracy of  $\pm 0.3 \mu\text{m}$  over the entire measuring range (5  $\mu\text{m}$  to 2 mm).
- Ultra-high repeatability of 0.03  $\mu\text{m}$ .



544-532

### Technical Data

Accuracy at 20°C*1:	$\pm 0.3 \mu\text{m}$
Repeatability (2 $\sigma$ ):	0.03 $\mu\text{m}$
Positional error*2:	$\pm 0.4 \mu\text{m}$
Measuring region:	1 x 2 mm
Laser wavelength:	650 nm, visible
Scanning rate:	3200 scans/s
Laser scanning speed:	76 m/s
Protection standard:	IEC, FDA

\*1 At the centre of the measuring region.

\*2 Potential measurement error due to variation in workpiece position within the measuring region.

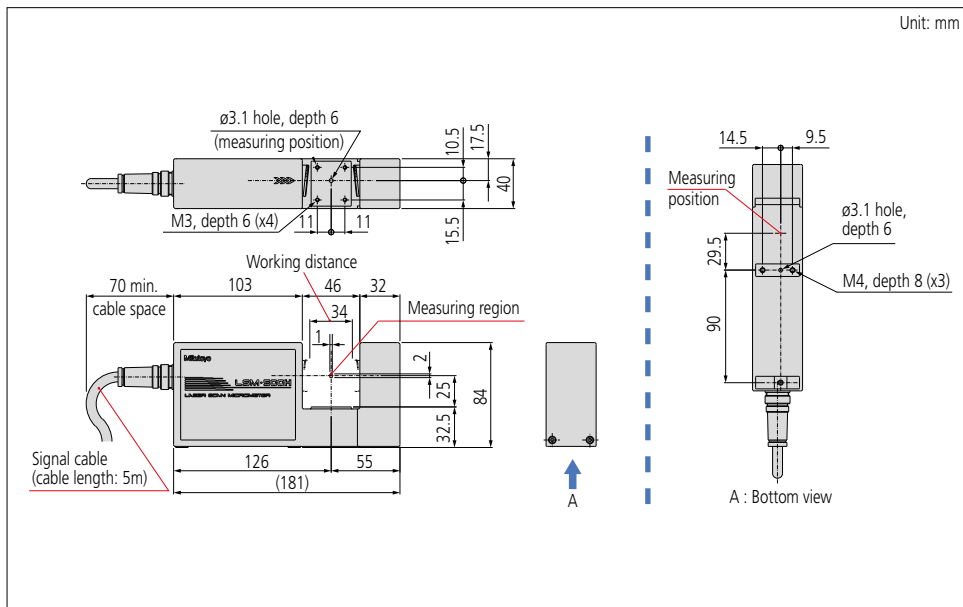
### Optional Accessories

Code No.	Description	Price
957608	Air cleaner for air shield	£748.00
02AGD110	Calibration gauge set ( $\varnothing 0.1 \text{ mm}$ , $\varnothing 2.0 \text{ mm}$ )	£380.00
02AGD200	Wire guiding pulley	£303.00
02AGD220	Air shield	£627.00
02AGN780A	Extension signal cable (5 m)	£136.00
02AGN780B	Extension signal cable (10 m)	£180.00
02AGN780C	Extension signal cable (15 m)	£218.00

### Specifications

Code No.	Range	Resolution (selectable)	Price
544-532	0.005 - 2 mm (.0002 - .08")	0.00001 - 0.01 mm (.000001 - .0005")	£5210.00

### Dimensions



## Technical Data

Accuracy at 20°C\*1

Entire range: ±0.5 µm  
 Narrow range: ±(0.3+0.1ΔD) µm  
 Repeatability (2σ): 0.04 µm  
 Positional error\*2: ±0.5 µm  
 Measuring region: 2 x 10 mm (ø0.05 - ø0.1 mm)  
 4 x 10 mm (ø0.1 - ø10 mm)

Laser wavelength: 650 nm, visible

Scanning rate: 3200 scans/s

Laser scanning speed: 113 m/s

Protection standard: IEC, FDA

\*1 At the centre of the measuring region. ΔD = Difference in diameter between the master gauge and workpiece (mm).

\*2 Potential measurement error due to variation in workpiece position within the measuring region.

## Optional Accessories

Code No.	Description	Price
957608	Air cleaner for air shield	£748.00
02AGC150A	Extension relay cable (1 m)	£84.00
02AGD120	Calibration gauge set (ø0.1 mm, ø10 mm)	£380.00
02AGD210	Wire guiding pulley	£320.00
02AGD230	Air shield	£372.00
02AGD400	Adjustable workstage	£1390.00
02AGD440	Centre support*3	£454.00
02AGD450	Adjustable V-block*3	£560.00
02AGN780A	Extension signal cable (5 m)	£136.00
02AGN780B	Extension signal cable (10 m)	£180.00
02AGN780C	Extension signal cable (15 m)	£218.00

\*3 Use with an adjustable workstage.

## SERIES 544 – LSM-501S Ultra-High Accuracy Non-Contact Measuring System

- Provides ultra-high accuracy of ±0.5 µm over the entire measuring range (0.05 mm to 10 mm) and even better in the narrow range.
- Ultra-high repeatability of 0.04 µm.

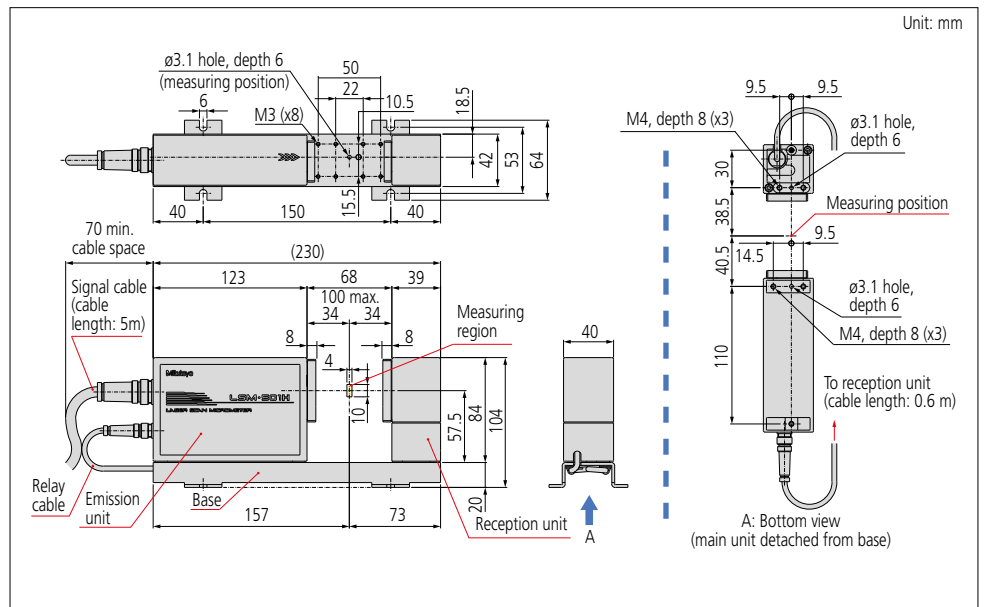


544-534

## Specifications

Code No.	Range	Resolution (selectable)	Price
544-534	0.05 - 10 mm (.002 - .04")	0.00001 - 0.01 mm (.000001 - .0005")	£4520.00

## Dimensions



# Laser Scan Micrometers

## SERIES 544 – LSM-503S Ultra-High Accuracy Non-Contact Measuring System

- General-purpose type with a measuring range of 0.3 mm to 30 mm.
- Provides ultra-high accuracy of  $\pm 1.0 \mu\text{m}$  over the entire measuring range and even better in the narrow range.
- Excellent repeatability of  $0.11 \mu\text{m}$ .



544-536

### Specifications

Code No.	Range	Resolution (selectable)	Price
544-536	0.3 - 30 mm (.012 - 1.18")	0.00002 - 0.1 mm (.000001 - .005")	£4750.00

### Technical Data

Accuracy at 20°C \*1

Entire range:	$\pm 1.0 \mu\text{m}$
Narrow range:	$\pm(0.6+0.1\Delta D) \mu\text{m}$
Repeatability ( $2\sigma$ ):	$0.11 \mu\text{m}$
Positional error*2:	$\pm 1.5 \mu\text{m}$
Measuring region:	10x30 mm
Laser wavelength:	650 nm, visible
Scanning rate:	3200 scans/s
Laser scanning speed:	226 m/s
Protection standard:	IEC, FDA

\*1 At the centre of the measuring region.  $\Delta D$  = Difference in diameter between the master gauge and workpiece (mm).

\*2 Potential measurement error due to variation in workpiece position within the measuring region.

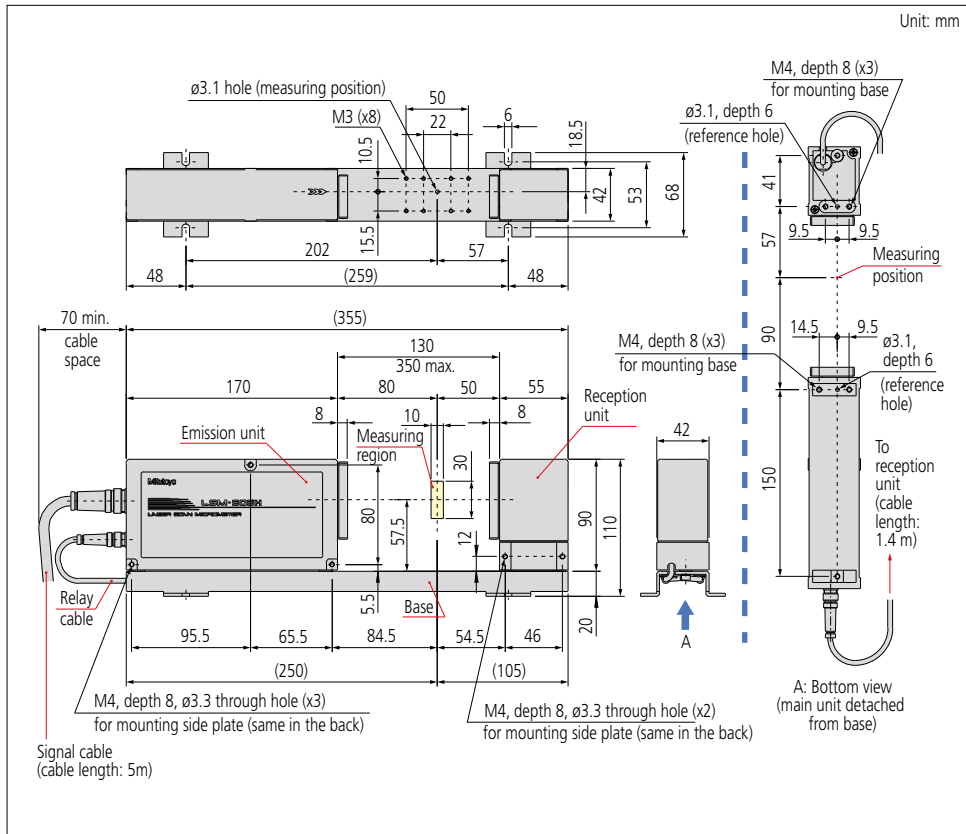
### Optional Accessories

Code No.	Description	Price
957608	Air cleaner for air shield	£748.00
02AGC150A	Extension relay cable (1 m)	£84.00
02AGC150B	Extension relay cable (3 m)	£89.50
02AGC150C	Extension relay cable (5 m)	£95.20
02AGD130	Calibration gauge set ( $\varnothing 1 \text{ mm}$ , $\varnothing 30 \text{ mm}$ )	£421.00
02AGD240	Air shield	£627.00
02AGD440	Centre support*3	£454.00
02AGD450	Adjustable V-block*3	£560.00
02AGD490	Adjustable workstage	£1920.00
02AGN780A	Extension signal cable (5 m)	£136.00
02AGN780B	Extension signal cable (10 m)	£180.00
02AGN780C	Extension signal cable (15 m)	£218.00
02AGN780D	Extension signal cable (20 m)	£307.00

XY Laser Micrometer, see page G-22 for details.

\*3 Use with an adjustable workstage.

### Dimensions



## Technical Data

Accuracy at 20°C\*1

Entire range:	±3 μm
Narrow range:	±(1.5+0.5ΔD) μm
Repeatability (2σ):	0.36 μm
Positional error*2:	±4 μm
Measuring region:	20 x 60 mm
Laser wavelength:	650 nm, visible
Scanning rate:	3200 scans/s
Laser scanning speed:	452 m/s
Protection standard:	IEC, FDA

\*1 At the centre of the measuring region. ΔD = Difference in diameter between the master gauge and workpiece (mm).

\*2 Potential measurement error due to variation in workpiece position within the measuring region.

## Optional Accessories

Code No.	Description	Price
957608	Air cleaner for air shield	£748.00
02AGC150A	Extension relay cable (1 m)	£84.00
02AGC150B	Extension relay cable (3 m)	£89.50
02AGC150C	Extension relay cable (5 m)	£95.20
02AGD140	Calibration gauge set (ø1 mm, ø60 mm)	£464.00
02AGD250	Air shield	£864.00
02AGD520	Adjustable workstage	£3390.00
02AGD580	Centre support*3	£590.00
02AGD590	Adjustable V-block*3	£618.00
02AGN780A	Extension signal cable (5 m)	£136.00
02AGN780B	Extension signal cable (10 m)	£180.00
02AGN780C	Extension signal cable (15 m)	£218.00
02AGN780D	Extension signal cable (20 m)	£307.00

XY Laser Micrometer, see page G-22 for details.

\* 3 Use with an adjustable workstage.

## SERIES 544 – LSM-506S High Accuracy Non-Contact Measuring System

- General-purpose type with a measuring range of 1 mm to 60 mm.
- Provides high accuracy of ±3.0 μm over the entire measuring range and even better in the narrow range.
- Excellent repeatability of 0.36 μm.

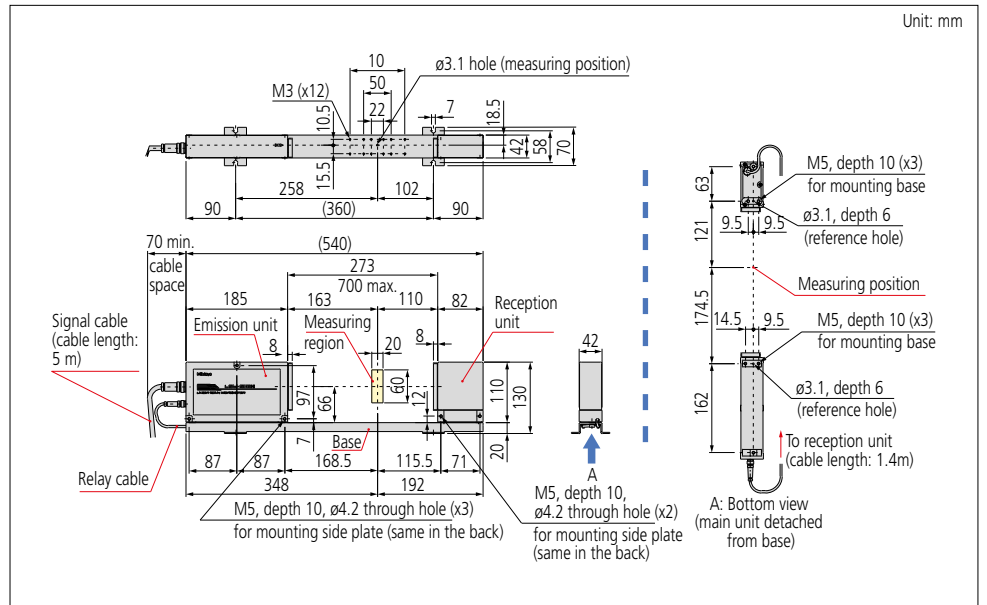


544-538

## Specifications

Code No.	Range	Resolution (selectable)	Price
544-538	1 - 60 mm (.04 - 2.36")	0.00005 - 0.1 mm (.000002 - .005")	£6460.00

## Dimensions



# Laser Scan Micrometers

## SERIES 544 – LSM-512S High Accuracy Non-Contact Measuring System

- General-purpose type with a measuring range of 1 mm to 120 mm.
- Provides high accuracy of  $\pm 6.0 \mu\text{m}$  over the entire measuring range and even better in the narrow range.
- Excellent repeatability of  $0.8 \mu\text{m}$ .

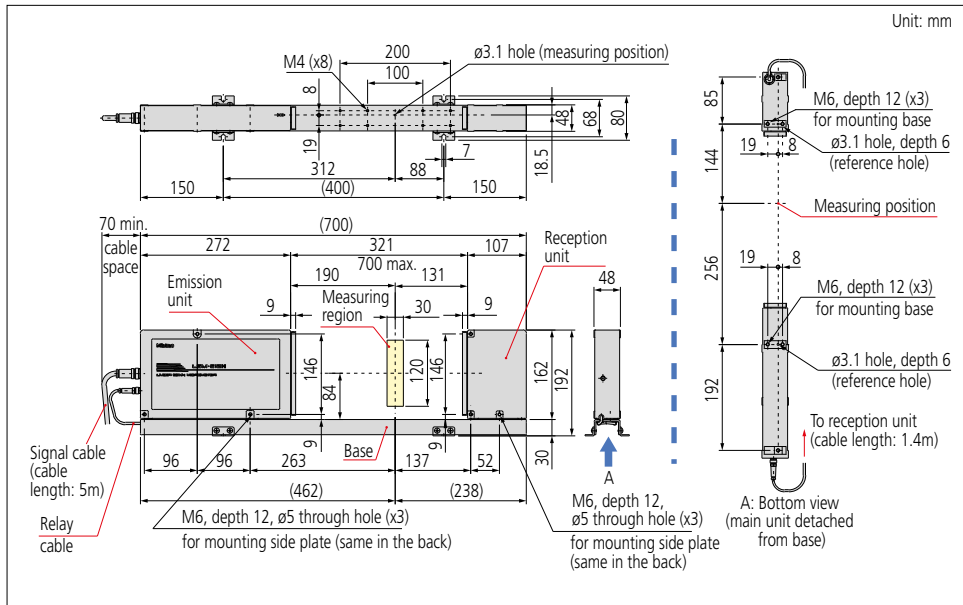


544-540

### Specifications

Code No.	Range	Resolution (selectable)	Price
544-540	1 - 120 mm (.04 - 4.72")	0.0001 - 0.1 mm (.000005 - .005")	£8850.00

### Dimensions



### Technical Data

Accuracy at 20°C\*1

Entire range:	$\pm 6 \mu\text{m}$
Narrow range:	$\pm(4.0+0.5\Delta D) \mu\text{m}$
Repeatability (2 $\sigma$ ):	$0.8 \mu\text{m}$
Positional error*2:	$\pm 8 \mu\text{m}$
Measuring region:	30 x 120 mm
Laser wavelength:	650 nm, visible
Scanning rate:	3200 scans/s
Laser scanning speed:	904 m/s
Protection standard:	IEC, FDA

\*1 At the centre of the measuring region.  $\Delta D$  = Difference in diameter between the master gauge and workpiece (mm).

\*2 Potential measurement error due to variation in workpiece position within the measuring region.

### Optional Accessories

Code No.	Description	Price
957608	Air cleaner for air shield	£748.00
02AGC150A	Extension relay cable (1 m)	£84.00
02AGC150B	Extension relay cable (3 m)	£89.50
02AGC150C	Extension relay cable (5 m)	£95.20
02AGD150	Calibration gauge set (ø20 mm, ø120 mm)	£1040.00
02AGD260	Air shield	£984.00
02AGN780A	Extension signal cable (5 m)	£136.00
02AGN780B	Extension signal cable (10 m)	£180.00
02AGN780C	Extension signal cable (15 m)	£218.00
02AGN780D	Extension signal cable (20 m)	£307.00

XY Laser Micrometer, see page G-22 for details.

## Technical Data

Accuracy at 20°C\*1

Entire range:	±7 µm
Narrow range:	±(4.0+2.0ΔD) µm
Repeatability (2σ):	1.4 µm
Positional error*2:	±8 µm
Measuring region:	40 x 160 mm
Laser wavelength:	650 nm, visible
Scanning rate:	3200 scans/s
Laser scanning speed:	1206 m/s
Protection standard:	IEC, FDA

\*1 At the centre of the measuring region. ΔD = Difference in diameter between the master gauge and workpiece (mm).

\*2 Potential measurement error due to variation in workpiece position within the measuring region.

## Optional Accessories

Code No.	Description	Price
02AGC150A	Extension relay cable (1 m)	£84.00
02AGC150B	Extension relay cable (3 m)	£89.50
02AGC150C	Extension relay cable (5 m)	£95.20
02AGM300	Calibration gauge set (ø20 mm, ø160 mm)	£1340.00
02AGN780A	Extension signal cable (5 m)	£136.00
02AGN780B	Extension signal cable (10 m)	£180.00
02AGN780C	Extension signal cable (15 m)	£218.00
02AGN780D	Extension signal cable (20 m)	£307.00

XY Laser Micrometer, see page G-22 for details.

## SERIES 544 – LSM-516S High Accuracy Non-Contact Measuring System

- General-purpose type with a measuring range of 1 mm to 160 mm.
- Provides high accuracy of ±7.0 µm over the entire measuring range and even better in the narrow range.
- Excellent repeatability of 1.4 µm.

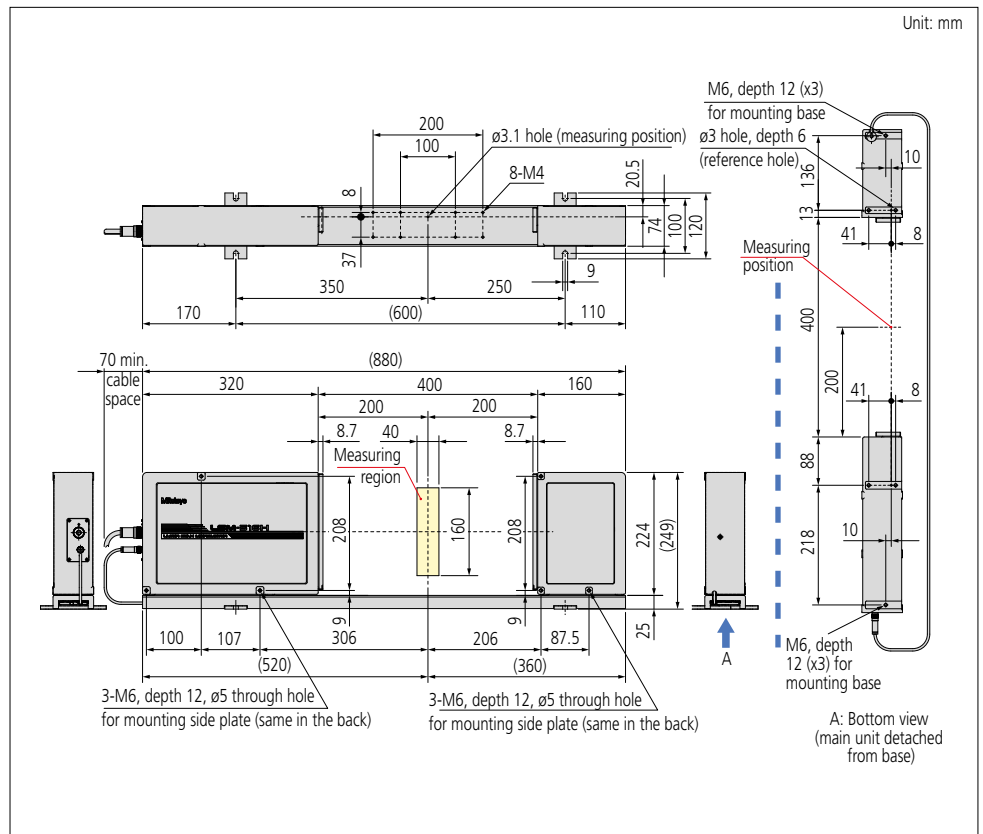


544-542

## Specifications

Code No.	Range	Resolution (selectable)	Price
544-542	1 - 160 mm (.04 - 6.3")	0.0001 - 0.1 mm (.000005 - .005")	£12650.00

## Dimensions



# Laser Scan Micrometers

## SERIES 544 – LSM-902H-6900 Ultra-High Accuracy Non-Contact Measuring System

- Suitable for pin and plug gauge measurements.
- Wide measuring range of  $\varnothing 0.1$  to  $\varnothing 25$  mm.
- Provides ultra-high accuracy of  $\pm 0.5 \mu\text{m}$  over the entire measuring range and even better in the narrow range.
- Ultra-high repeatability of  $0.045 \mu\text{m}$ .

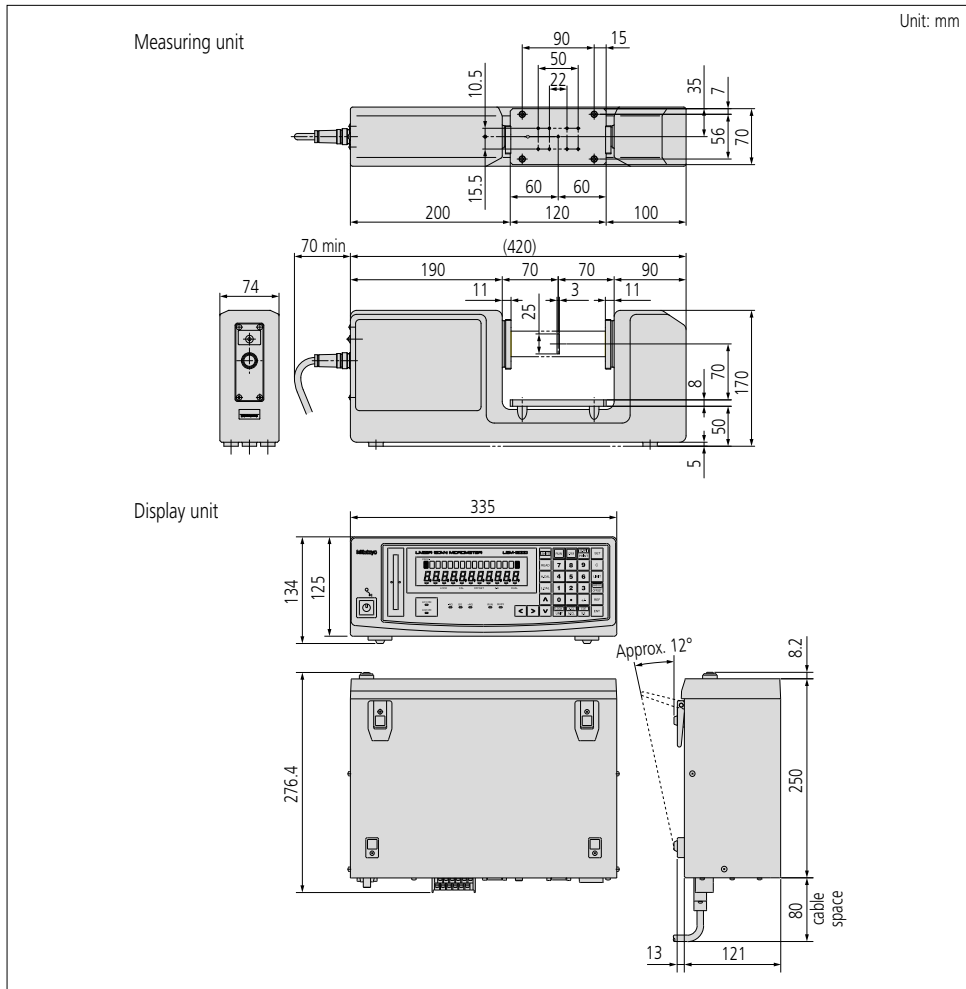


544-496E

### Specifications

Code No.	Range	Resolution (selectable)	Price
544-496E	0.1 - 25 mm (.004 - 1")	0.00001 - 0.01 mm (.000001 - .0005")	£8120.00

### Dimensions



### Technical Data

Accuracy at 20°C\*1

Entire range:	$\pm 0.5 \mu\text{m}$
Narrow range:	$\pm(0.3+0.1\Delta D) \mu\text{m}$
Repeatability (2 $\sigma$ ):	$0.045 \mu\text{m}$
Positional error*2:	$\pm 0.5 \mu\text{m}$
Measuring region:	3 x 25 mm
Laser wavelength:	650 nm, visible
Scanning rate:	1600 scans/s
Laser scanning speed:	56 m/s
Protection standard:	IEC
Main display:	16-digit fluorescent tube
Interface units equipped:	RS-232C, analogue, I/O, footswitch
Power supply:	240VAC $\pm 10\%$ , 40VA, 50/60Hz

\*1 At the centre of the measuring region.  $\Delta D$  = Difference in diameter between the master gauge and workpiece (mm).

\*2 Potential measurement error due to variation in workpiece position within the measuring region.

### Display Unit Functions

Zero-setting, preset, GO/±NG judgement, multi-limit judgement, offset value setting, sample measurement, statistical calculation, group judgement, data output, workpiece position display, mm/inch switching, dual-gauge calibration, transparent object measurement, dual-unit measurement (optional), automatic measurement, abnormal data elimination.

### Optional Accessories

Code No.	Description	Price
02AGD180	Calibration gauge set	£466.00
02AGD270	Workstage	£590.00
02AGD280	Adjustable workstage	£1360.00



## Technical Data

Accuracy at 20°C*1:	±2.5 µm
Repeatability (2σ):	0.6 µm
Positional error*2:	±2.5 µm
Measuring region:	10x60 mm
Laser wavelength:	650 nm, visible
Scanning rate:	1600 scans/s
Laser scanning speed:	226 m/s
Protection standard:	IEC
Main display:	16-digit fluorescent tube
Interface units equipped:	RS-232C, SPC, footswitch
Power supply:	240VAC ±10%, 40VA, 50/60Hz

\*1 At the centre of the measuring region.

\*2 Potential measurement error due to variation in workpiece position within the measuring region.

## Functions

Zero-setting, preset, GO/±NG judgement, multi-limit judgement, offset value setting, sample measurement, statistical calculation, group judgement, data output, workpiece position display, mm/inch switching, dual-gauge calibration, transparent object measurement, automatic measurement, abnormal data elimination.

## SERIES 544 – LSM-9506 High Accuracy Benchtop Non-Contact Measuring System

- Measurement system and display integrated into a single unit for easy bench-top inspection.
- Provides high accuracy of ±2.5 µm over the entire measuring range.
- Excellent repeatability of 0.6 µm.
- A statistical calculation function is provided.
- RS-232C interface and SPC output interface included as standard.

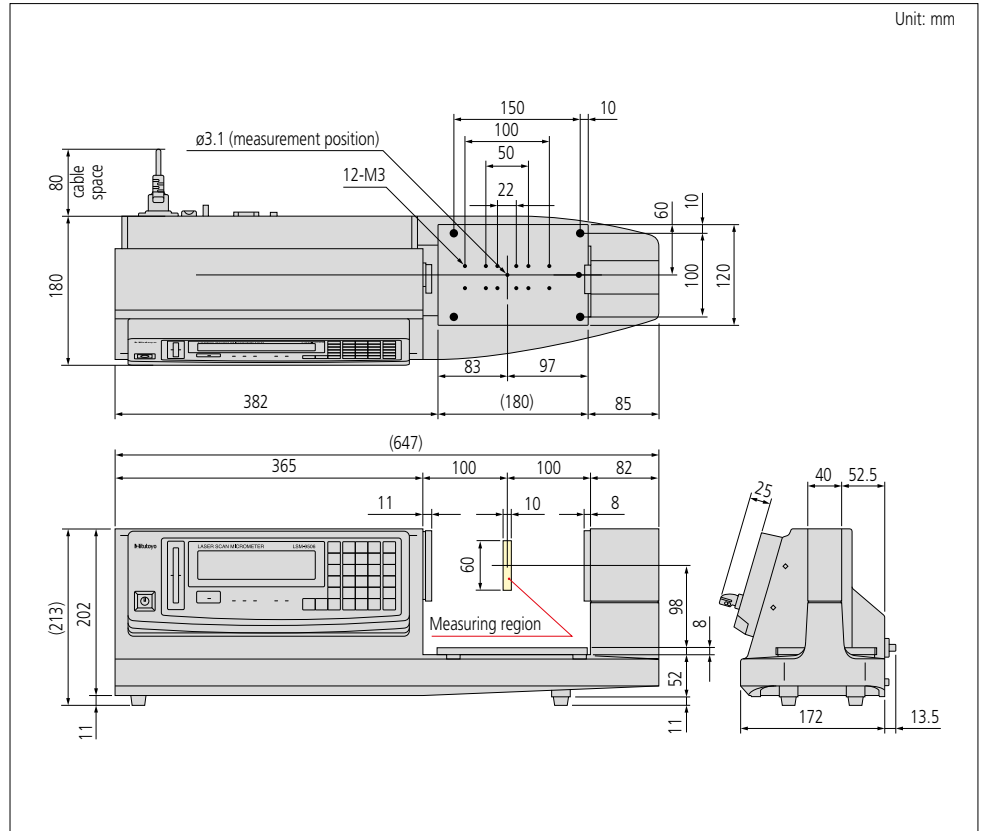


544-116E

## Specifications

Code No.	Range	Resolution (selectable)	Price
544-116E	0.5-60 mm (.02-2.36")	0.00005-0.1 mm (.000002-.005")	£7750.00

## Dimensions



# Laser Scan Micrometers

## SERIES 544 – LSM-6200 Standard Display Unit for Laser Scan Micrometer

- Setup values can be continuously monitored with this dual-display design. Simultaneous display of two measurement values is also possible.
- Either the segment measurement (7 segments maximum) or edge measurement (1 to 255 edges) can be selected.
- Includes RS-232C and I/O and analogue interface capabilities.
- Includes statistical calculation and abnormal data elimination functions.

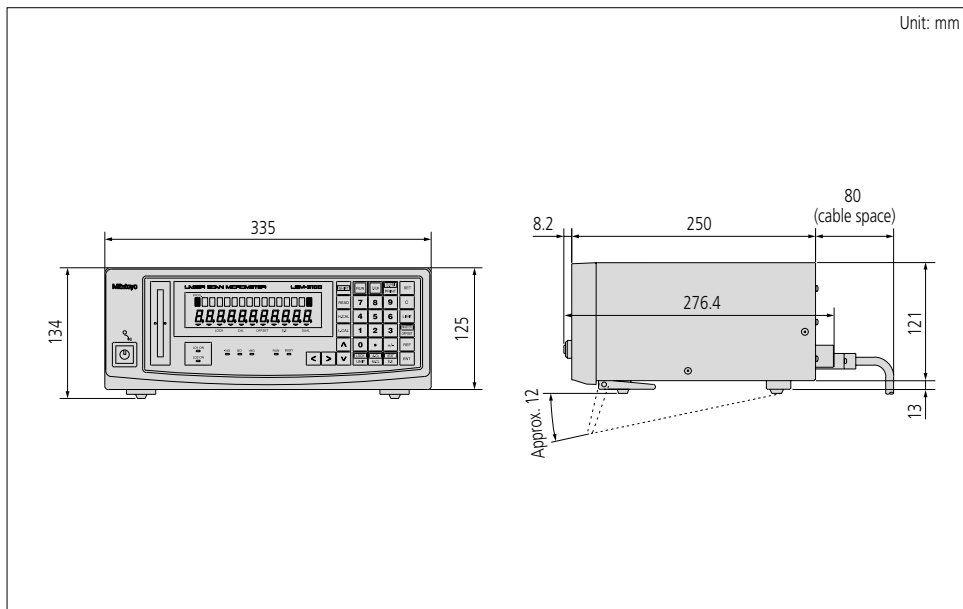


544-072E

### Specifications

Code No.	544-072E
Price	£2040.00

### Dimensions



### Technical Data

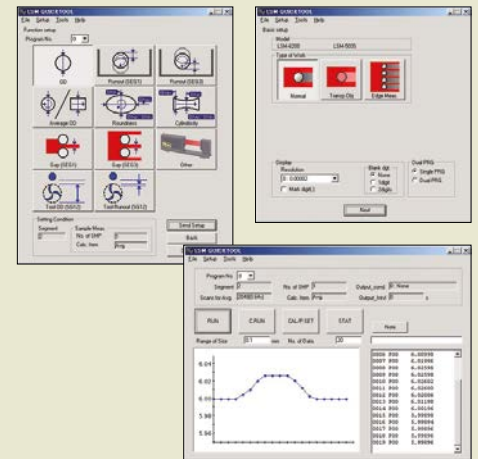
Main display: 16-digit fluorescent tube  
 Interface units equipped: RS-232C, analogue, I/O, footswitch  
 Power supply: 240VAC  $\pm$ 10%, 40VA, 50/60Hz

### Functions

Zero-setting, preset, GO/NG judgement, multi-limit judgement, offset value setting, sample measurement, statistical calculation, group judgement, data output, workpiece position display, mm/inch switching, dual-gauge calibration, transparent object measurement, dual-unit measurement (optional), automatic measurement, abnormal data elimination.

### QUICKTOOL

QUICKTOOL is a free software tool that makes LSM-5200 key-operated settings simple and easy. Please contact your local Mitutoyo office for details. Note that QUICKTOOL for LSM-6200 and QUICKTOOL for LSM-5200 are incompatible.



# Optional Accessories

## For Laser Scan Micrometers

### Specifications

Code No.	Description	Application	Price
957608	Air cleaner	Any model of LSM	£748.00
936937	SPC data cable (1 m)	LSM-6200/6900/9506	£33.90
937179T	Footswitch	LSM-6200/6900/9506	£46.70
02AGC150A	Extension relay cable (1 m)	Any model of LSM*2	£84.00
02AGC150B	Extension relay cable (3 m)	Any model of LSM*2	£89.50
02AGC150C	Extension relay cable (5 m)	Any model of LSM*2	£95.20
02AGC840	Digimatic (SPC) code out unit	LSM-6200/6900	£70.00
02AGC880	2nd I/O and analogue interface unit	LSM-6200/6900	£560.00
02AGC910	BCD interface unit	LSM-6200/6900	£394.00
02AGC940	GP-IB interface unit	LSM-6200/6900	£575.00
02AGD110	Calibration gauge set	LSM-500S	£380.00
02AGD120	Calibration gauge set	LSM-501S	£380.00
02AGD130	Calibration gauge set	LSM-503S	£421.00
02AGD140	Calibration gauge set	LSM-506S	£464.00
02AGD150	Calibration gauge set	LSM-512S	£1040.00
02AGD170	Calibration gauge set	LSM-9506	£478.00
02AGD180	Calibration gauge set	LSM-902H-6900	£466.00
02AGD200	Wire guiding pulley	LSM-500S	£303.00
02AGD210	Wire guiding pulley	LSM-501S	£320.00
02AGD220	Air shield	LSM-500S	£627.00
02AGD230	Air shield	LSM-501S	£372.00
02AGD240	Air shield	LSM-503S	£627.00
02AGD250	Air shield	LSM-506S	£864.00
02AGD260	Air shield	LSM-512S	£984.00
02AGD270	Workstage	LSM-501S/503S/902H-6900	£590.00
02AGD280	Adjustable workstage	LSM-902H-6900	£1360.00
02AGD370	Adjustable workstage	LSM-9506	£1570.00
02AGD400	Adjustable workstage	LSM-501S	£1390.00
02AGD440	Centre support	LSM-501S/503S/902H-6900	£454.00
02AGD450	Adjustable V-block	LSM-501S/503S/902H-6900	£560.00
02AGD490	Adjustable workstage	LSM-503S	£1920.00
02AGD520	Adjustable workstage	LSM-506S	£3390.00
02AGD580	Centre support	LSM-506S/9506	£590.00
02AGD590	Adjustable V-block	LSM-506S/9506	£618.00
02AGD600C	Thermal printer (240VAC ±10%)	Any model of LSM	£703.00
02AGD680	Adjustable workstage	LSM-9506	£3100.00
02AGM300	Calibration gauge set	LSM-516S	£1340.00
02AGN780A	Extension signal cable (5 m)	Any model of LSM*1	£136.00
02AGN780B	Extension signal cable (10 m)	Any model of LSM*1	£180.00
02AGN780C	Extension signal cable (15 m)	Any model of LSM*1	£218.00
02AGN780D	Extension signal cable (20 m)	Any model of LSM*1	£307.00
02AGP150	Dual-type add-on unit	LSM-6200	£1120.00

\*1 Except for LSM-902.

\*2 Except LSM-500S/902.

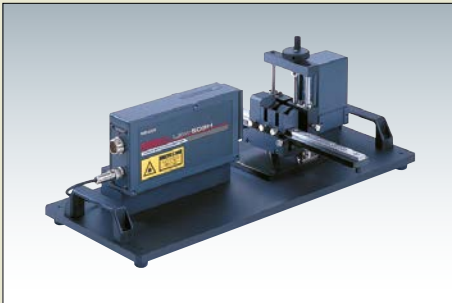
### XY Laser Micrometer

Mitutoyo's Dual Axis Laser Micrometer is a scanning-laser based measurement system designed to measure and feed back to control and recording equipment the external diameter of a wide variety of product including, but not limited to, extruded forms such as electrical wire, plastic and glass filaments, tubing, and similar. The crossed-axis lasers used enable position within the target area, as well as size, to be accurately measured.

- Non-contact measurement for online or offline checking of outside diameter, position, ovality.
- Choice of dual- or single-axis operation allows flexibility and high performance.
- Measurement insensitivity to product positioning or movement guarantees reliability.
- Process and line-control applications include continuous fibre drawing, loose tubing, glass pre-forming, glass tubes/bars.
- Automatic control potential saves labour costs.
- Aids continuous improvement in product quality and reduction of scrap.



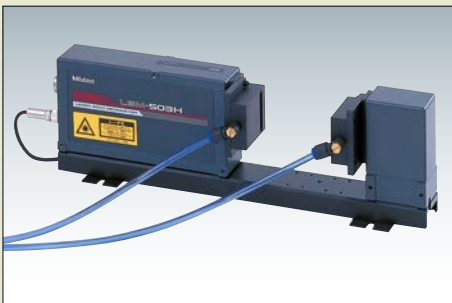
02AGD270 workstage application.



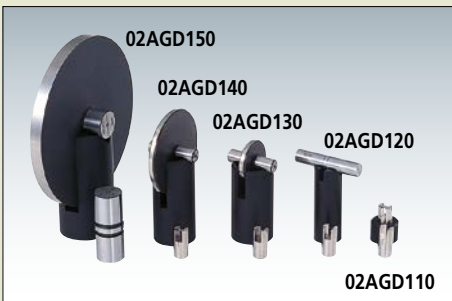
02AGD490 adjustable workstage application.



02AGD200 and 02AGD210 wire guiding pulley applications.



02AGD240 air shield application.



Calibration gauge sets.

# INTEGRATED SCALE UNITS LINEAR SCALES MULTIFUNCTION DISPLAYS



### Integrated Scale Units



### Linear Scales



### Multifunction Displays



### Contents

#### Integrated Scale Units

ABSOLUTE Digimatic Coolant Proof Scale H-04

ABSOLUTE Digimatic Scales H-05

#### Linear Scales

AT116 Slim Spar Economy Linear Scale H-08

AT715 ABSOLUTE Coolant Proof Linear Scale H-09

#### Multifunction Displays

2/3-Axis KA Counters H-10

# Integrated Scale Units

## SERIES 572 – ABSOLUTE Digimatic Scales

### EC Counter

This Display Unit with GO/±NG judgement function offers a large LED display for a Digimatic Scale Unit. The bright LED readout is ideal for low-light situations or when the scale unit must be positioned where its own display cannot be viewed directly



EC counter: 542-007E

### Coolant Proof Scale Unit



### Single-Function Type Scale Unit



### Multifunction Type Scale Unit



RS-232C output



RS-232C or USB output

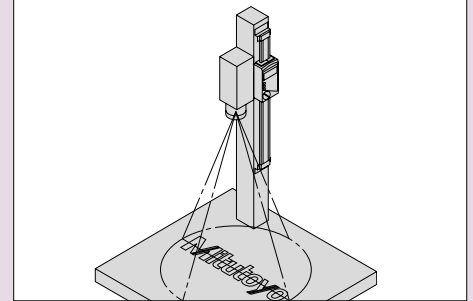


Data entry via USB

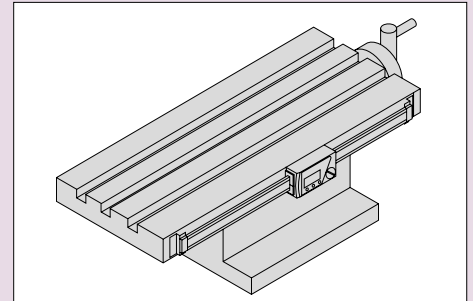
Mitutoyo's ABSOLUTE Digimatic Scale Units can be installed on almost any equipment, offering the user precise linear measurement capability with the added benefits of LCD readout and output for recording data and SPC.

### Applications

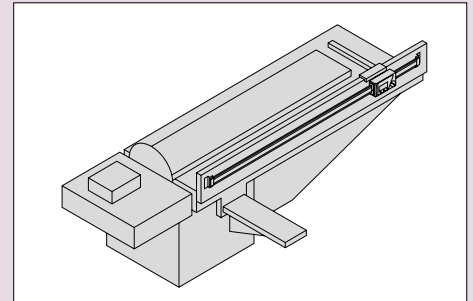
- Positioning of tables, etc., in adverse environments.
- Measuring equipment used on the workshop floor.
- Measurement of structure displacements.
- Positioning of machine tools.
- Measuring equipment used outside (in the rain).



Optical focussing.



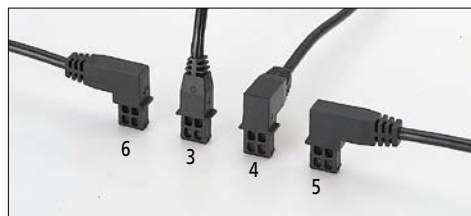
Positioning of machine tables.



Cutting machinery.

### Specifications

Code No.	Description
05CZA624	1 m SPC data cable with pushbutton
05CZA625	2 m SPC data cable with pushbutton
959149	1 m SPC data cable with pushbutton
959150	2 m SPC data cable with pushbutton
905338	1 m SPC data cable
905409	2 m SPC data cable
905689	1 m SPC data cable
905690	2 m SPC data cable
905691	1 m SPC data cable
905692	2 m SPC data cable
905693	1 m SPC data cable
905694	2 m SPC data cable
936937	1 m SPC data cable
965014	2 m SPC data cable



## Technical Data

Accuracy:	±0.03 mm (excluding quantizing error)
Resolution:	0005" /0.01 mm
Repeatability:	0.01 mm
Display:	LCD
Length standard:	ABSOLUTE electromagnetic induction linear encoder
Max. response speed:	Unlimited
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	Approx. 1.5 years under normal use
Dust/water protection level:	IP66
Functions:	Origin-set, zero-setting, automatic power on/off, data output, inch/mm conversion (inch/mm models)
Alarm:	Low voltage, measurement value composition error

## Optional Accessories

Code No.	Description	Price
05CZA624	SPC data cable with pushbutton (1 m)	£69.40
05CZA625	SPC data cable with pushbutton (2 m)	£83.50
06AFM380A	USB Input Tool Direct USB-ITN-A (2 m)	£126.00

## SERIES 572 – ABSOLUTE Digimatic Coolant Proof Scale

- A self-powered scale designed to capture positional coordinates from slides on machine tools and precision instruments; such as are incorporated in semiconductor production equipment, for example.
- The proprietary electromagnetic induction method used for detecting the position of the slider on the scale enables use in adverse environments subject to water and cutting oil mist and splashing.
- Specially designed output cables maintain the water resistant structure.
- No overspeed error since it uses an ABSOLUTE scale which does not depend on counting scale graduations.
- Once an absolute zero (origin) point is set, a Digimatic scale such as this always shows the absolute distance from this point when powered on rather than 0.00.
- With SPC data output.

**ABSOLUTE** IP66



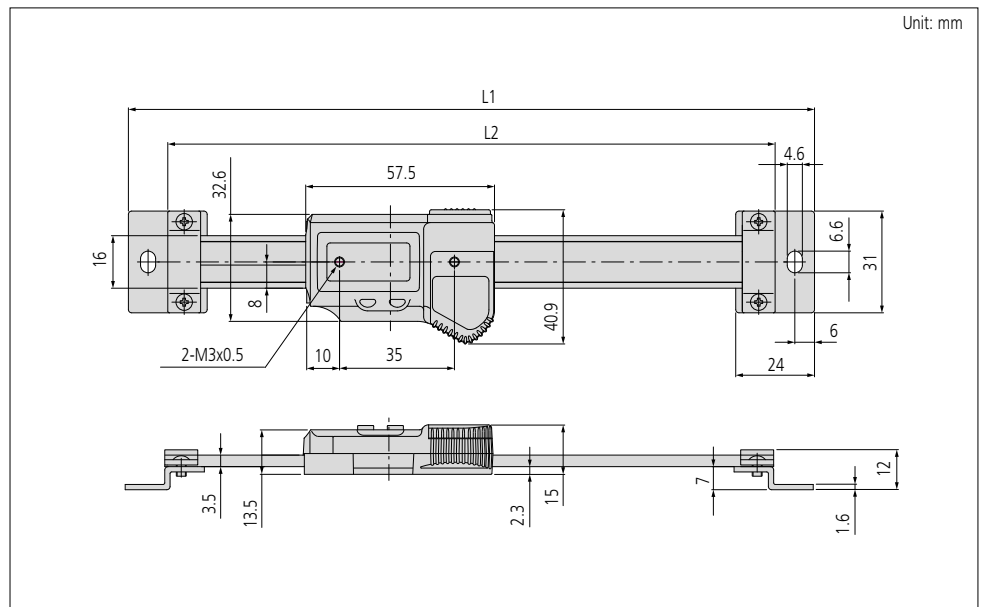
572-614

## Specifications

Code No.	Range	Accuracy*	L1	L2	Mass	Price
572-613	0-4" /0-100 mm	.001" /0.03 mm	209 mm	185 mm	0.39 kg	£221.00
572-614	0-6" /0-150 mm		259 mm	235 mm	0.41 kg	£235.00
572-615	0-8" /0-200 mm		311 mm	287 mm	0.43 kg	£261.00

\* Excluding quantizing error.

## Dimensions



# Integrated Scale Units

## SERIES 572 – ABSOLUTE Digimatic Scales Single-Function Type

- Self-powered scales designed to capture positional coordinates from slides on machine tools and precision instruments; such as are incorporated in semiconductor production equipment, for example.
- The ORIGIN key allows setting of an absolute zero point to be used as reference in subsequent measurements. Once set, the ABS Digimatic Scale Unit is ready to show its true position whenever turned on rather than 0.00 as with standard models.
- The ZERO/ABS key allows the display to be zero-set at any slider position along the beam for incremental comparison measurements. This key also allows the return to absolute coordinates with a display of the true position from the origin point.
- No rack, no pinion, no glass scale. The Digimatic scale is safely embedded in the hardened stainless steel blade.
- All units come with two mounting brackets, each located at one end of the scale.
- With SPC data output.

## ABSOLUTE

Horizontal type  
572-211-30



Vertical type  
572-310-10



### Specifications

Code No.	Range	Accuracy*	L1	L2	Mass	Price
Horizontal type						
572-210-30	0-4" / 0-100 mm	.001" / 0.03 mm	209 mm	185 mm	0.23 kg	£180.00
572-211-30	0-6" / 0-150 mm		259 mm	235 mm	0.25 kg	£182.00
572-212-30	0-8" / 0-200 mm		311 mm	287 mm	0.27 kg	£219.00
572-213-10	0-12" / 0-300 mm		.002" / 0.04 mm	444 mm	420 mm	0.37 kg
Vertical type						
572-310-10	0-4" / 0-100 mm	.001" / 0.03 mm	209 mm	185 mm	0.23 kg	£246.00
572-311-10	0-6" / 0-150 mm		259 mm	235 mm	0.25 kg	£250.00
572-312-10	0-8" / 0-200 mm		311 mm	287 mm	0.27 kg	£263.00
572-313-10	0-12" / 0-300 mm	.002" / 0.04 mm	444 mm	420 mm	0.37 kg	£425.00

\* Excluding quantizing error.

### Technical Data

Accuracy:	Refer to Specifications
Resolution:	.0005" / 0.01 mm
Display:	LCD
Length standard:	ABSOLUTE electrostatic capacitance type linear encoder
Max. response speed:	Unlimited
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	Approx. 3.5 years under normal use
Functions:	Origin-set, zero-setting, power on/off, presetting, data hold, data output, inch/mm conversion (inch/mm models)
Alarm:	Low voltage, measurement value composition error.

### Dimensions

See page H-07

### Optional Accessories

Code No.	Description	Price
905338	SPC data cable (1 m, standard)	£33.90
905409	SPC data cable (2 m, standard)	£38.00
905689	SPC data cable (1 m, L-shape, back)	£33.90
905690	SPC data cable (2 m, L-shape, back)	£46.60
905691	SPC data cable (1 m, L-shape, right)	£33.90
905692	SPC data cable (2 m, L-shape, right)	£46.60
905693	SPC data cable (1 m, L-shape, left)	£33.90
905694	SPC data cable (2 m, L-shape, left)	£46.60
959143	Data hold unit	£20.20
959149	SPC data cable with pushbutton (1 m)	£35.70
959150	SPC data cable with pushbutton (2 m)	£40.60



## Technical Data

Accuracy:	Refer to Specifications
Resolution:	.0005" / 0.01 mm
Display:	LCD
Length standard:	ABSOLUTE electrostatic capacitance type linear encoder
Max. response speed:	Unlimited
Battery:	SR44 (1 pc.), <b>938882</b>
Battery life:	Approx. 3.5 years under normal use
Functions:	Origin-set, zero-setting, power on/off, presetting, data hold, data output, inch/mm conversion (inch/mm models), measurement direction switching
Alarm:	Low voltage, measurement value composition error.

## Dimensions

See page H-07

## Optional Accessories

Code No.	Description	Price
<b>905338</b>	SPC data cable (1 m, standard)	<b>£33.90</b>
<b>905409</b>	SPC data cable (2 m, standard)	<b>£38.00</b>
<b>905689</b>	SPC data cable (1 m, L-shape, back)	<b>£33.90</b>
<b>905690</b>	SPC data cable (2 m, L-shape, back)	<b>£46.60</b>
<b>905691</b>	SPC data cable (1 m, L-shape, right)	<b>£33.90</b>
<b>905692</b>	SPC data cable (2 m, L-shape, right)	<b>£46.60</b>
<b>905693</b>	SPC data cable (1 m, L-shape, left)	<b>£33.90</b>
<b>905694</b>	SPC data cable (2 m, L-shape, left)	<b>£46.60</b>

## SERIES 572 – ABSOLUTE Digimatic Scales Multifunction Type

- Self-powered scales designed to capture positional coordinates from slides on machine tools and precision instruments; such as are incorporated in semiconductor production equipment, for example.
- The ORIGIN key allows setting of an absolute zero point to be used as reference in subsequent measurements. Once set, the ABS Digimatic Scale Unit is ready to show its true position whenever turned on rather than 0.00 as with standard models.
- The ZERO/ABS key allows the display to be zero-set at any slider position along the beam for incremental comparison measurements. This key also allows the return to absolute coordinates with a display of the true position from the origin point.
- No rack, no pinion, no glass scale. The Digimatic scale is safely embedded in the hardened stainless steel blade.
- All units come with two mounting brackets, each located at one end of the scale.
- With SPC data output.

## ABSOLUTE

Horizontal type  
**572-470**



Vertical type  
**572-571**



## Specifications

Code No.	Range	Accuracy*	L1	L2	Mass	Price
<b>Horizontal type</b>						
<b>572-470</b>	0-4" / 0-100 mm	.001" / 0.03 mm	244 mm	220 mm	0.25 kg	<b>£381.00</b>
<b>572-471</b>	0-6" / 0-150 mm		294 mm	270 mm	0.28 kg	<b>£418.00</b>
<b>572-472</b>	0-8" / 0-200 mm		344 mm	320 mm	0.31 kg	<b>£430.00</b>
<b>572-473</b>	0-12" / 0-300 mm	.002" / 0.04 mm	444 mm	420 mm	0.37 kg	<b>£495.00</b>
<b>572-474</b>	0-18" / 0-450 mm		594 mm	570 mm	0.76 kg	<b>£560.00</b>
<b>572-475</b>	0-24" / 0-600 mm		774 mm	750 mm	0.90 kg	<b>£640.00</b>
<b>572-476</b>	0-32" / 0-800 mm	.0025" / 0.06 mm	974 mm	950 mm	1.71 kg	<b>£1050.00</b>
<b>572-477</b>	0-40" / 0-1000 mm	.0025" / 0.07 mm	1174 mm	1150 mm	2.04 kg	<b>£1170.00</b>
<b>Vertical type</b>						
<b>572-570</b>	0-4" / 0-100 mm	.001" / 0.03 mm	244 mm	220 mm	0.25 kg	<b>£381.00</b>
<b>572-571</b>	0-6" / 0-150 mm		294 mm	270 mm	0.28 kg	<b>£418.00</b>
<b>572-572</b>	0-8" / 0-200 mm		344 mm	320 mm	0.31 kg	<b>£430.00</b>
<b>572-573</b>	0-12" / 0-300 mm	.002" / 0.04 mm	444 mm	420 mm	0.37 kg	<b>£495.00</b>
<b>572-574</b>	0-18" / 0-450 mm		594 mm	570 mm	0.76 kg	<b>£560.00</b>
<b>572-575</b>	0-24" / 0-600 mm		774 mm	750 mm	0.90 kg	<b>£640.00</b>
<b>572-576</b>	0-32" / 0-800 mm	.0025" / 0.06 mm	974 mm	950 mm	1.71 kg	<b>£1050.00</b>
<b>572-577</b>	0-40" / 0-1000 mm	.0025" / 0.07 mm	1174 mm	1150 mm	2.04 kg	<b>£1170.00</b>

\* Excluding quantizing error.

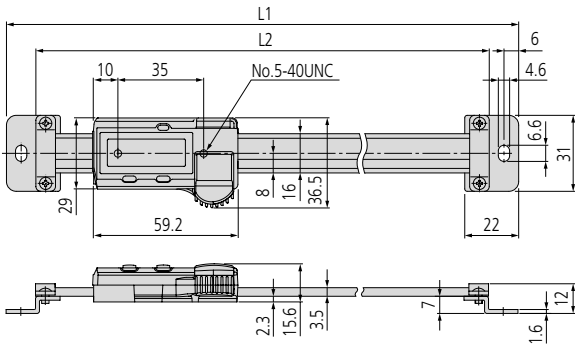
# Integrated Scale Units

## SERIES 572 – ABSOLUTE Digimatic Scales

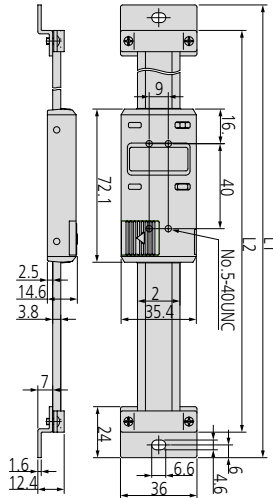
### Dimensions

Unit: mm

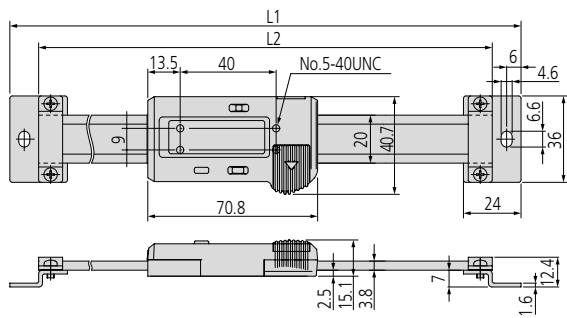
Single-function horizontal type, range: 100-200 mm.



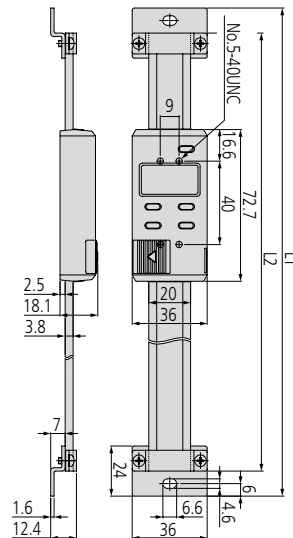
Single-function vertical type, range: 100-300 mm.



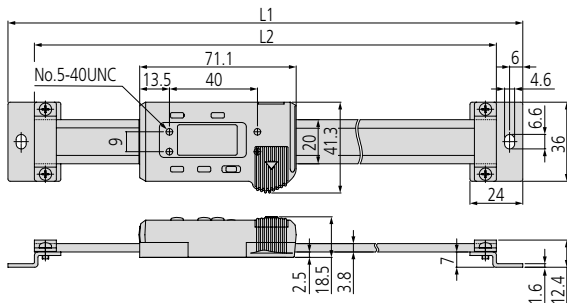
Single-function horizontal type, range: 300 mm.



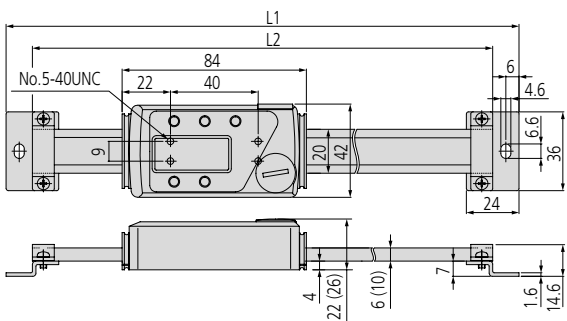
Multifunction vertical type, range: 100-300 mm.



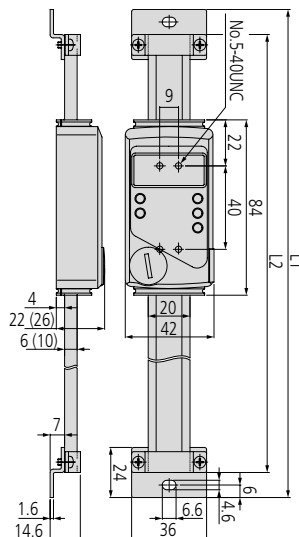
Multifunction horizontal type (range: 100-300 mm)



Multifunction horizontal type, range: 450-1000 mm.



Multifunction vertical type, range: 450-1000 mm.



( ) 0-800 mm/0-32" range and above only.

# Linear Scales

## SERIES 539 – AT116 Slim Spar Economy Linear Scale

- Designed to capture positional coordinates from slides on machine tools and precision instruments; such as are incorporated in semiconductor production equipment, for example.
- Suitable for milling machines, XY tables, jigs, etc.



### Technical Data

Effective range: 100 - 1500 mm  
 Output waveform: Two 90° phase-shifted sinusoidal signals  
 Max. response speed: 50 m/min.  
 Scale grating pitch: 20 μm  
 Scale reference point pitch: 50 mm  
 Operating temperature: 0 - 45°C

### Optional Accessories

Code No.	Description	Price
09AAA720A	Extension cable (2 m)	£125.00
09AAA720B	Extension cable (5 m)	£180.00
09AAA720C	Extension cable (7 m)	£198.00

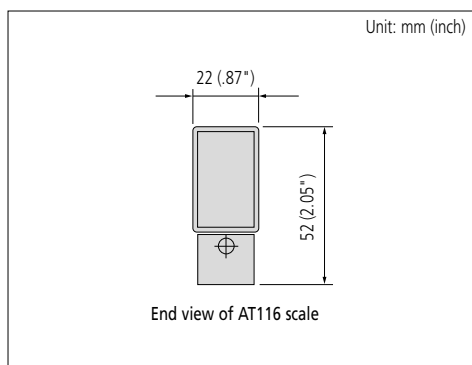


### Specifications

Code No.	Range	Accuracy at 20°C*	Signal cable length	Price
539-271-30	100 mm (4")	(5+5L/1000) μm	3.5 m	£246.00
539-272-30	150 mm (6")			£250.00
539-273-30	200 mm (8")			£252.00
539-274-30	250 mm (10")			£255.00
539-275-30	300 mm (12")			£258.00
539-276-30	350 mm (14")			£259.00
539-277-30	400 mm (16")			£260.00
539-278-30	450 mm (18")			£261.00
539-279-30	500 mm (20")			£268.00
539-281-30	600 mm (24")			£274.00
539-283-30	700 mm (28")		£277.00	
539-284-30	750 mm (30")		£282.00	
539-285-30	800 mm (32")		£288.00	
539-286-30	900 mm (36")		£296.00	
539-287-30	1000 mm (40")		£312.00	
539-288-30	1100 mm (44")		£327.00	
539-289-30	1200 mm (48")		£346.00	
539-290-30	1300 mm (52")		£368.00	
539-291-30	1400 mm (56")		£386.00	
539-292-30	1500 mm (60")		£411.00	

\* L = Effective range (mm).

### Dimensions



# Linear Scales

## SERIES 539 – AT715 ABSOLUTE Coolant Proof Linear Scale

- Designed to capture positional coordinates from slides on machine tools and precision instruments; such as are incorporated in semiconductor production equipment, for example.
- Uses an ABSOLUTE electromagnetic induction system to achieve IP67 environmental resistance.
- Detects and outputs the absolute position – no reference point setup needed at each power-on.
- Abnormal calculations do not occur as a result of electrical noise.
- Very suitable scale for mounting on the X axis of a lathe. The scale main unit has 2 mounting directions for easy installation on machine tools with difficult mounting positions.



### Technical Data

Effective range:	100-3000 mm
Measurement method:	Electromagnetic induction system
Max. response speed:	50 m/min.
Scale grating pitch:	20 µm
Dust/water protection level:	IP67
Operating temperature:	0-45°C

### Optional Accessories

Code No.	Description	Price
09AAB674A	Extension cable (2 m)	£187.00
09AAB674B	Extension cable (5 m)	£263.00
09AAB674C	Extension cable (7 m)	£310.00



### Specifications

Code No.	Range	Accuracy at 20°C*	Signal cable length	Price
539-801	100 mm (4")	±5 µm	3.5 m	£246.00
539-802	150 mm (6")			£250.00
539-803	200 mm (8")			£252.00
539-804	250 mm (10")			£255.00
539-805	300 mm (12")			£258.00
539-806	350 mm (14")			£259.00
539-807	400 mm (16")			£260.00
539-808	450 mm (18")			£261.00
539-809	500 mm (20")			£268.00
539-811	600 mm (24")	±7 µm	5 m	£274.00
539-813	700 mm (28")			£277.00
539-814	750 mm (30")			£282.00
539-815	800 mm (32")			£288.00
539-816	900 mm (36")			£296.00
539-817	1000 mm (40")			£312.00
539-818	1100 mm (44")			£327.00
539-819	1200 mm (48")			£346.00
539-820	1300 mm (52")			£368.00
539-821	1400 mm (56")	±10 µm	7 m	£386.00
539-822	1500 mm (60")			£411.00
539-823	1600 mm (64")			£468.00
539-824	1700 mm (68")			£497.00
539-825	1800 mm (72")			£525.00
539-860	2000 mm (80")			£646.00
539-861	2200 mm (88")			£695.00
539-862	2400 mm (96")			£820.00
539-863	2500 mm (100")			£850.00
539-864	2600 mm (104")	£880.00		
539-865	2800 mm (112")	£930.00		
539-866	3000 mm (120")	£1050.00		

\* L = Effective range (mm).

# Multifunction Displays

## SERIES 174 – 2/3-Axis KA Counters

- High performance/price ratio 2/3-axis counter with new 10-coordinate function and existing KL counter functions.
- The KA counter can be used a *standard counter* or a *lathe counter* by modifying parameters.
- Can be used with both the AT100 series optical scales and the AT715 electromagnetic induction scale.
- Text data can be output using the optional USB interface.
- The optional external RS-232C interface enables connection to a PC and a printer.

### Technical Data

Scale input ports:	2, 3
Resolution	0.05 - 0.0001 mm (AT100 series) 0.01 - 0.001 mm (AT715 series)
Display:	8-digit LED and a negative [-] sign
Power supply:	240VAC ±10%, 50/60 Hz
Mass:	1.25 kg (2 axis), 1.33 kg (3 axis)

### Functions

Zero-setting, preset, resolution setting, measurement direction setting, mm/inch conversion, diameter display, scale reference point setting \*1, 1/2 calculation, coordinate system switching, bolt-hole circle machining\*2, pitch machining, zero approach machining (inc mode), addition of 2-scale data\*3, linearity error compensation, pitch error compensation\*1, smoothing, memory backup, lower digit blanking out, external zero-setting\*4, RS-232C interface unit\*4, USB output\*5, error message.

- \*1 Only available when connecting with AT100 series.
- \*2 Not available in single-axis use.
- \*3 Only available for 3-axis model.
- \*4 Code out unit (06AET993) is required.
- \*5 Text can be output by interface unit and foot switch.

### Optional Accessories

Code No.	Description	Price
06ACF941	Extension cable for remote load and zero (2.2 m)*4	£143.00
06AET993	Code out unit*6	£182.00
09AAA207	Adapter for previous 6-pin linear scales	£70.50
09EAA094	RS-232C cable for DP1-VA LOGGER	£220.00
64AAB336	Footswitch, RS-232C output*4	£115.00
64AAB519	RS-232C cable, 25-9 pin (6 ft)	£10.50
936553	External zero box*7	£145.00
937179T	Footswitch, USB output*4	£46.70
937328	External load box*7	£195.00
965004	Footswitch, RS-232C output (for 06ACF941 only)	£92.60

Display mounting options available on request.

- \*6 Required for RS-232C / USB output and Digimatic input.
- \*7 Code out unit (06AET993) and extension cable (06ACF941) are required.



**174-183E**  
(for 1- or 2-axis applications)



**174-185E**  
(for 3-axis applications)

### Specifications

Code No.	Scale input ports	Dimensions (WxDxH)	Price
174-183E	2	300x75x167 mm	£450.00
174-185E	3		£560.00

# OPTICAL MEASURING



## Microscopes



## Profile Projectors



## Contents

### Microscopes

Pocket Comparators	J-03
Magnifiers	J-04
TM-500 Toolmakers' Microscope	J-05
MF Microscope	J-06
MF-U Microscope	J-07
Hyper MF / Hyper MF-U Microscope	J-08
Microscope Video Unit VMU	J-09
Microscope Head FS70	J-11
Optional Accessories	J-12

### Profile Projectors

PJ-A3000	J-23
PJ-H30	J-24
PV-5110	J-25
PH-3515F	J-26
PH-A14	J-27
Optional Accessories	J-28

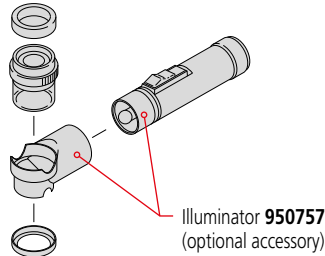
# Pocket Comparators

## SERIES 183 – Interchangeable Reticle Magnifier

- Small dimensions and angles, including radii and screw-thread form, can be checked easily at low resolution simply by interchanging optional reticles in the magnifier.
- An optional illuminator is available.



183-101



Illuminator **950757**  
(optional accessory)

### Technical Data

Reticle size:  $\varnothing 30$  mm  
Field of view: 24.5 mm  
Includes box

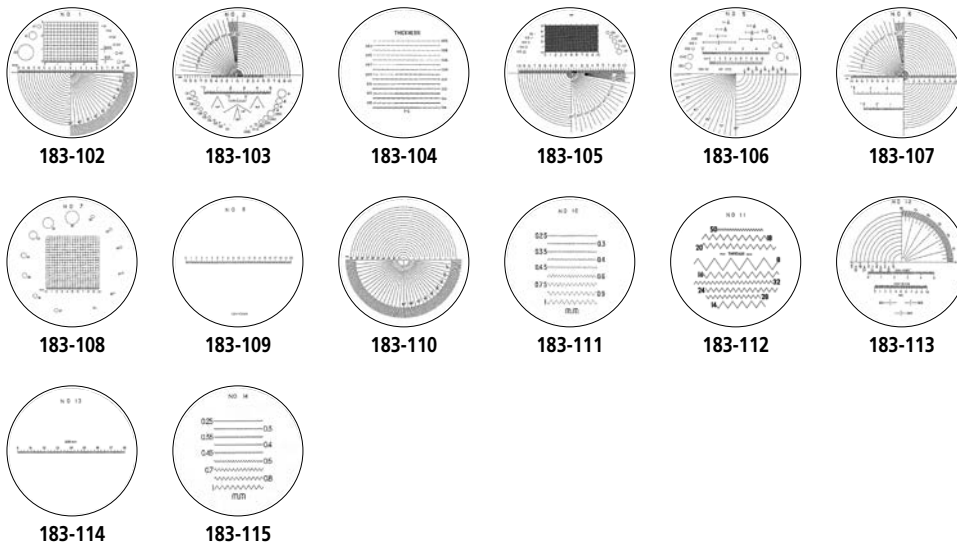
### Optional Accessory

Code No.	Description	Price
950757	Illuminator (without battery)	£47.50

### Specifications

Code No.	Magnification	Dimensions	Remarks	Price
183-101	8X	$\varnothing 37 \times 48$ mm	Optional reticles available	£59.50
183-131	10X	$\varnothing 37 \times 45$ mm	Optional reticles available	£88.30

### Optional Reticles



Code No.	Description	Price
183-102	Polar net, angle, radius	£28.50
183-103	Angle, radius, length, diameter	£28.50
183-104	Fine thickness	£28.50
183-105	Angle, radius, length, diameter, polar net (metric)	£28.50
183-106	Angle, radius, length, diameter	£28.50
183-107	Angle, radius, length	£28.50
183-108	Polar net, diameter	£28.50
183-109	Length in mm	£28.50
183-110	Angle, radius	£28.50
183-111	Thread pitches (metric)	£28.50
183-112	Thread pitches (inch)	£28.50
183-113	Angle, radius, length	£28.50
183-114	Length in inches	£28.50
183-115	Thread pitches (metric)	£28.50



# Magnifiers

## SERIES 183 – Pocket Magnifiers

- Stable design, secure holding.
- Easy handling.
- Includes box and cleaning cloth.
- Suitable for inspecting metal surfaces.



### Specifications

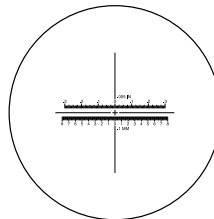
Code No.	Magnification	Dimensions	Field of view	Remarks	Price
183-201	25X	ø14.5 x 125 mm	3.4 mm	Pen type	£77.60
183-202	25X	ø31.5 x 115 mm	3.3 mm	With stand	£230.00
183-203	50X	ø31.5 x 100 mm	1.6 mm	With stand	£249.00

## SERIES 183 – Zoom Loupe Magnifier

- Allows the user 8X-16X zoom observation.
- Magnification indicator is provided for 8X, 10X, 12X, 14X, and 16X observation.
- Metric and inch scales are provided for measuring.
- Supplied with a carrying case.



183-304



Reticle provided

### Specifications

Code No.	Magnification	Dimensions	Field of view	Remarks	Price
183-304	8X-16X zoom	ø45 x 70 mm	10-20 mm	With reticle (scale graduation: 0.1 mm, .005")	£414.00

## SERIES 183 – Clear Loupe Magnifier

- Transparent draw tube enables clear imaging of the workpiece.
- Includes box and cleaning cloth.



183-301



183-302



183-303

### Specifications

Code No.	Magnification	Dimensions	Field of view	Remarks	Price
183-301	7X	ø32 x 43 mm	25 mm	Drawtube removable	£27.60
183-302	10X	ø32 x 40 mm	24 mm	Drawtube removable	£31.40
183-303	15X	ø32 x 30 mm	10 mm	Drawtube removable	£39.50

# TM Microscope

## SERIES 176 – Toolmakers' Microscope

- The Mitutoyo TM Series is a toolmakers' microscope well suited for measuring dimensions and angles of workpiece features. It can also be used to check the shape of screws and gears by inserting an optional reticle in the eyepiece.
- The compact body makes it ideal for use on shop floors that have very limited space for measuring instruments.
- Angle measurement is performed easily by turning the angle scale to align the cross-hair reticle with the image of the edges that define a workpiece feature.
- Illumination intensity can be adjusted to suit the reflectance of the surface of the feature under investigation.

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**TM-505B**  
(shown with optional Digimatic micrometer heads)

**TM-1005B**  
(shown with optional Digimatic micrometer heads)



### Specifications

Model	TM-505B	TM-1005B
Code No.	176-818E	176-819E
XY stage travel range	50 x 50 mm	100 x 50 mm
Measurement method	Micrometer head (optional)	
XY stage size	152 x 152 mm	240 x 152 mm
Effective glass size	96 x 96 mm	154 x 96 mm
Maximum workpiece height	115 mm	107 mm
Maximum stage loading	5 kg	
Transmitted illumination	Light source	White LED
	Functions	With green filter, light intensity adjustable
Surface illumination	Light source	White LED
	Functions	Light intensity adjustable
Mass	14 kg	15 kg
Price	£2880.00	£3710.00

### Technical Data

Image type:	Erect
Optical tube:	Monocular (diopter adjustable)
Inclination:	60°
Reticle:	90° broken cross-hair (176-126)
Angle reading	
Range:	360°
Min. reading:	6' (by vernier)
Eyepiece:	15X (176-116) field number 13 mm Optional: 10X, 20X
Objective:	2X (176-138) working distance: 67 mm Optional: 5X, 10X
Total magnification:	30X
Power supply:	240VAC ±10%, 50/60Hz

### Optional Accessories

Code No.	Description	Price
152-389*1	Micrometer head for Y axis (range: 0-25 mm, reading: 0.005 mm)	£184.00
152-390*1	Micrometer head for X axis (range: 0-25 mm, reading: 0.005 mm)	£184.00
152-391*1	Micrometer head for X axis (range: 1", reading: .0001")	£184.00
152-392*1	Micrometer head for Y axis (range: 1", reading: .0001")	£184.00
164-164*2	Digimatic micrometer head (range: 2"/50 mm, reading: .00005"/0.001 mm)	£749.00
176-114	Reticle (60° angle)	£56.50
176-115	10X eyepiece	£150.00
176-116	15X projection lens set	£150.00
176-117	20X eyepiece	£150.00
176-137	Objective, 10X	£166.00
176-139	Objective, 5X	£166.00
176-204	Dial indicator attachment for Z-axis measurement	£146.00
611201-131	Gauge block (1")	£50.30
611202-131	Gauge block (2")	£70.30
611635-131	Gauge block (25 mm)	£49.50
611675-131	Gauge block (50 mm)	£68.80
959149	SPC data cable with pushbutton (1 m)	£35.70
959150	SPC data cable with pushbutton (2 m)	£40.60
02AZD790C	SPC data cable for U-WAVE-T (160 mm)	£62.00
06ADV380C	USB Input Tool Direct USB-ITN-A (2 m)	£109.00
63AAA001	LED ringlight	£470.00

Fixture and stage accessories refer to page J-22.  
Illumination units refer to page J-18.

\*1 For details refer to page B-84.  
\*2 For details refer to page B-72.



Angle reading.

# MF Microscope

## SERIES 176 – Measuring Microscopes

### Technical Data

Image type:	BF (Brightfield)/erect
Measurement method:	Linear encoder
Optical tube (optional):	Monocular or binocular tube (inclination: 25°), reticle projection method, with TV mount, optical path ratio (eyepiece/TV mount: 50/50)
Eyepiece (optional):	10X, 15X, 20X
Objective:	3X (standard accessory); 1X, 5X, 10X, 20X, 50X, 100X (optional accessories)
Focussing method	
MF-A/-B models:	Manual focussing (coarse 30 mm/rev., fine 0.2 mm/rev.)
MF-J model:	Motor drive (max. measuring speed 20 mm/s)
Display unit	
No. of axes:	2 (MF-A model) or 3 (MF-B/-J models)
Resolution:	0.001/0.0005/0.0001 mm, .0001"/.00005"/.00001"
Functions:	Zero-setting, direction switching, data output (via RS-232C or USB interface)
Power supply:	240VAC ±10%, 50/60Hz
Remote box functions	
(MF-J model only):	Speed adjustment, coarse/fine speed switching, jog shuttle, emergency stop switch, AF button, counter reset button, data output button, power switch, limit setting (Z-axis)

### Illumination Unit (required option)

Type	LED	Halogen
Code No.	<b>176-445E</b>	<b>176-447E</b>

### Optional Accessories

Code No.	Description	Price
<b>176-308</b>	Vibration damping stand	<b>£2690.00</b>
<b>264-155E</b>	QM-Data200 2D data processing unit	<b>£1790.00</b>
<b>375-054</b>	0.5X camera adapter (with C-mount adapter)	<b>£1470.00</b>
<b>375-056</b>	Stage micrometer	<b>£281.00</b>
<b>970441</b>	C-mount adapter	<b>£54.00</b>
<b>12AAJ088</b>	Footswitch	<b>£252.00</b>

Filters		
<b>12AAA643</b>	ND2 colour filter	<b>£68.00</b>
<b>12AAA645</b>	GIF filter	<b>£74.40</b>
<b>12AAA646</b>	LB80 filter	<b>£68.00</b>

Mounts		
<b>176-370-1</b>	Slide type nosepiece (2-mount, parfocal)	<b>£580.00</b>
<b>176-370-2</b>	Slide type nosepiece (2-mount, mag. adjusted)	<b>£580.00</b>

Eyepieces and objective lenses refer to pages J-12 to J-17.  
 Fixture and stage accessories refer to page J-22.  
 Illumination units refer to page J-18.  
 QM-Data200 refer to page J-19.  
 Vision unit refer to page J-20.  
 Focus Pilot FP-05 refer to page J-21.



Optional (factory-fit) slide type nosepiece with 2-lens mount.

- Standard measuring microscope that has a wide variety of optional accessories including a Vision Unit and various digital CCD cameras.
- The MF measuring microscopes' expandability, such as when used in combination with Mitutoyo's Vision Unit to boost performance or data management on a PC, promises further improved measuring efficiency.
- Observation with a clear and flare-free erect image and a wide field of view.
- Measuring accuracy that is the highest in its class (and conforms to JIS B7153).
- ML series, high-NA objectives that are specially designed for the MF series (long working distance type).
- Illumination unit (reflected/transmitted) selectable from high-intensity LED or halogen bulb types (required).
- Variable aperture diaphragm (reflected/transmitted) allows observation and measurement while suppressing light diffraction.
- Variety of standardised stages in sizes to suit practically any application.
- Quick-release mechanism useful for moving the stage rapidly between measuring points when measuring workpieces that are large in size or quantity.
- Coarse/fine feed handles equipped as standard on both sides allow precise focus and observation measurement regardless of handedness.
- High-magnification eyepiece observation up to 2000X.

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**MF-B2017D**  
 (The binocular tube and illumination unit are optional accessories)



**MF-J2017D**  
 (The binocular tube and illumination unit are optional accessories)

### Specifications

Without Z-axis scale	Model Code No.	MF-A1010D 176-861-10	MF-A2010D 176-862-10	MF-A2017D 176-863-10	MF-A3017D 176-864-10	MF-A4020D 176-865-10
With Z-axis scale	Model Code No.	MF-B1010D 176-866-10	MF-B2010D 176-867-10	MF-B2017D 176-868-10	MF-B3017D 176-869-10	MF-B4020D 176-870-10
Motor-driven Z-axis scale	Model Code No.	—	—	MF-J2017D 176-891E	MF-J3017D 176-892E	MF-J4020D 176-893E
XY stage travel range		100x100 mm	200x100 mm	200x170 mm	300x170 mm	400x200 mm
Focussing method		Manual focussing (coarse 30 mm/rev., fine 0.2 mm/rev.)				
Resolution (switchable)		0.001/0.0005/0.0001 mm (.0001"/.00005"/.00001")				
Measuring accuracy (at 20°C)		XY axes: ±(2.2+2L/100) μm when not loaded, JIS B7153, L = measured length (mm)				
Quick-release mechanism		X and Y axes				
XY stage size		280x280 mm	350x280 mm	410x342 mm	510x342 mm	610x342 mm
Effective glass size		180x180 mm	250x150 mm	270x240 mm	370x240 mm	440x240 mm
Swivel function		—			±5° (left)	±3° (left)
Max. stage loading		10 kg			20 kg	15 kg
Max. workpiece height		150 mm			220 mm	
Transmitted illumination	Light source	Halogen bulb (12V, 50W) or white LED				
	Optical system	Telecentric illumination with adjustable aperture diaphragms				
	Functions	Light intensity adjustable, continuous brightness adjustment				
Surface illumination	Light source	Halogen bulb (12V, 50W) or white LED				
	Optical system	Koehler illumination with adjustable aperture diaphragms				
	Functions	Light intensity adjustable, continuous brightness adjustment				

# MF-U Microscope

## SERIES 176 – High-Power Multi-Function Measuring Microscopes

- The MF-U high-power multi-function measuring microscopes' expandability, such as when used in combination with Mitutoyo's Vision Unit to boost performance or data management on a PC, promises further improved measuring efficiency.
- Observation with a clear and flare-free erect image and a wide field of view.
- Measuring accuracy that is the highest in its class (and conforms to JIS B7153).
- Proven high-NA objectives from the FS optical system (long working distance type).
- Integration of metallurgical and measurement microscope functions provides high-resolution observation and a high-accuracy measurement solution.
- Illumination unit (reflected/transmitted) selectable from high-intensity LED or halogen bulb types (required).
- Variable aperture diaphragm (reflected/transmitted) allows observation and measurement while suppressing light diffraction.
- Quick-release mechanism useful for moving the stage rapidly between measuring points when measuring workpieces that are large in size or quantity.
- High-magnification eyepiece observation up to 4000X.

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Data Management Software by Mitutoyo



**MF-UB2017D**  
(The turret, objectives and illumination unit are optional accessories.)



**MF-UJ2017D**  
(The turret, objectives and illumination unit are optional accessories.)

### Specifications

Observation type		BF (brightfield)					
Without Z-axis scale	Model	MF-UA1010D	MF-UA2010D	MF-UA2017D	MF-UA3017D	MF-UA4020D	
	Code No.	176-871-10	176-872-10	176-873-10	176-874-10	176-875-10	
With Z-axis scale	Model	MF-UB1010D	MF-UB2010D	MF-UB2017D	MF-UB3017D	MF-UB4020D	
	Code No.	176-876-10	176-877-10	176-878-10	176-879-10	176-880-10	
Motor-driven Z-axis	Model	—	—	MF-UJ2017D	MF-UJ3017D	MF-UJ4020D	
	Code No.	—	—	176-894E	176-895E	176-896E	
Observation type		BD (brightfield/darkfield)					
Without Z-axis scale	Model	MF-UC1010D	MF-UC2010D	MF-UC2017D	MF-UC3017D	MF-UC4020D	
	Code No.	176-881-10	176-882-10	176-883-10	176-884-10	176-885-10	
With Z-axis scale	Model	MF-UD1010D	MF-UD2010D	MF-UD2017D	MF-UD3017D	MF-UD4020D	
	Code No.	176-886-10	176-887-10	176-888-10	176-889-10	176-890-10	
Motor-driven Z-axis	Model	—	—	MF-UK2017D	MF-UK3017D	MF-UK4020D	
	Code No.	—	—	176-897E	176-898E	176-899E	
XY stage travel range		100x100 mm	200x100 mm	200x170 mm	300x170 mm	400x200 mm	
Resolution (switchable)		0.001/0.0005/0.0001 mm (.0001/.00005/.00001")					
Measuring accuracy (at 20°C)		XY axes: $\pm(2.2+2L/100)$ $\mu$ m when not loaded, JIS B7153, L = measured length (mm)					
Quick-release mechanism		X and Y axes					
XY stage size		280x280 mm	350x280 mm	410x342 mm	510x342 mm	610x342 mm	
Effective glass size		180x180 mm	250x150 mm	270x240 mm	370x240 mm	440x240 mm	
Swivel function		—		$\pm 5^\circ$ (left)		$\pm 3^\circ$ (left)	
Max. stage loading		10 kg			20 kg	15 kg	
Max. workpiece height		150 mm			220 mm		
Transmitted illumination	Light source	Halogen bulb (12V, 50W) or white LED					
	Optical system	Telecentric illumination with adjustable aperture diaphragms					
	Functions	Light intensity adjustable, continuous brightness adjustment					
Surface illumination	Light source	Halogen bulb (12V, 50W) or white LED					
	Optical system	Koehler illumination with adjustable aperture diaphragms					
	Functions	Light intensity adjustable, continuous brightness adjustment					

### Technical Data

Image type:	Erect
Measurement method:	Linear encoder
Optical tube:	Siedentoph type (pupil distance adjustment: 51-76 mm), 1X tube lens, binocular tube (inclination: 0-30°), reticle projection method, with TV mount, optical path ratio (eyepiece/TV mount): 50/50)
Eyepiece:	10X (field number 24 mm) Optional: 15X, 20X
Turret (optional):	Manual or power
Objective (optional):	M/BD Plan Apo objective from 1X to 200X
Focussing method	
MF-UA/-UB/-UC/ -UD models:	Manual focussing (coarse 10 mm/rev., fine 0.1 mm/rev.)
MF-UJ/-UK models:	Motor drive (max. measuring speed 20 mm/s)
Display unit	
No. of axes:	2 (MF-A model) or 3 (MF-B/-J models)
Resolution:	0.001/0.0005/0.0001 mm, .0001"/.00005"/.00001"
Functions:	Zero-setting, direction switching, data output (via RS-232C or USB interface)
Power supply:	240VAC $\pm 10\%$ , 50/60Hz
Remote box functions (MF-UJ/-UK models only):	Speed adjustment, coarse/fine speed switching, jog shuttle, emergency stop switch, AF button, counter reset button, data output button, power switch, limit setting (Z-axis)

### Illumination Unit (required option)

Type	LED	Halogen
Code No.	176-446E	176-448E

Note: Because the MF-U is not supplied with an illumination unit as standard, it is necessary to purchase either an LED or a Halogen illumination unit in addition to the basic instrument.

### Optional Accessories

Code No.	Description	Price
176-308	Vibration damping stand	£2690.00
264-155E	QM-Data200 2D data processing unit	£1790.00
375-054	0.5X camera adapter (with C-mount adapter)	£1470.00
375-056	Stage micrometer	£281.00
517181	Halogen bulb (12V, 100W)	£61.80
970441	C-mount adapter	£54.00
12AAJ088	Footswitch	£252.00
12BAD602	Halogen bulb (high intensity type, 12V, 100W)	£38.50
DIC units		
378-076	For 100X, SL80X, SL50X objective	£1890.00
378-078	For 50X, SL20X objective	£1890.00
378-079	For 20X objective	£1890.00
378-080	For 10X, 5X objective	£1890.00
Filters		
12AAA643	ND2 colour filter	£68.00
12AAA645	GIF filter	£74.40
12AAA646	LB80 filter	£68.00
12AAG806	GIF filter	£162.00
12AAG807	LB80 filter	£139.00

Eyepieces and objective lenses refer to pages J-12 to J-17.  
Fixture and stage accessories refer to page J-22.  
Illumination units refer to page J-18.  
QM-Data200 refer to page J-19.  
Vision unit refer to page J-20.  
Focus Pilot FP-05 refer to page J-21.

# Hyper MF/Hyper MF-U Microscope

## SERIES 176 – High-Accuracy Measuring Microscopes

- The world's highest measuring accuracy of  $\pm(0.9+0.3L/100)$   $\mu\text{m}$  in the XY plane.
- The LAF (Laser Auto Focus) optical tube can be selected. The LAF system achieves high repeatability when measuring minute steps, etc., enabling difficult measurements with minimum fatigue.\*
- The X, Y, and Z axes are driven and controlled with one joystick that serves as the nerve centre of operation. Speed control is possible from high-speed traverse of the stage to ultra-low speed, precise positioning of a workpiece.
- The XY stage is a massive, highly stable design created using mechanical techniques developed over Mitutoyo's long years of experience in manufacturing precision measuring microscopes.
- These microscopes are equipped with highly accurate digital glass scales on all three axes.
- The XY (stage) and Z (optical tube) displacements are displayed digitally.
- High operability and repeatability.
- Power-drive auto focus unit is a standard feature.

\*Available for model MF-U only.

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**Hyper MF**  
(The optical tube, turret and objective lens are optional accessories)



**Hyper MF-U**  
(The optical tube, turret and objective lens are optional accessories)

### Specifications

Model	Hyper MF-B2515B	Hyper MF-UB2515B	Hyper MF-UD2515B	Hyper MF-UE2515B	Hyper MF-UF2515B
Code No.	176-430E	176-431E	176-432E	176-433E	176-434E
Observation type	BF (brightfield)		BD (brightfield/darkfield)	BF (brightfield)	BD (brightfield/darkfield)
LAF function	—	—	—	✓	✓
XY stage travel range	250 x 150 mm				
Z-axis travel range	150 mm				
Measurement method	Linear encoder				
Resolution	0.01 $\mu\text{m}$				
Measuring accuracy (at 20°C)	$\pm(0.9+0.3L/100)$ $\mu\text{m}$ , L = measured length in XY plane (mm)				
Drive system (X, Y and Z axes)	Motor-driver control with the joystick				
XY stage size	460 x 350 mm				
Effective glass size	300 x 200 mm				
Swivel function	$\pm 3^\circ$				
Max. stage loading	30 kg				
Max. workpiece height	150 mm				
Transmitted illumination	Light source	280 x 280 mm	Halogen bulb (12V, 100W)		
	Optical system	Telecentric illumination with adjustable aperture diaphragms			
Surface illumination	Light source	Halogen bulb (12V, 50W)			
	Optical system	Koehler illumination with adjustable aperture diaphragms			
Functions	Light intensity adjustable, 100 step brightness adjustment				
	Light intensity adjustable, stepless brightness adjustment				

### Hyper MF Technical Data

Image type:	Erect
Optical tube:	Monocular or binocular tube (optional, inclination: 0-25°), reticle projection method, with TV mount, optical path ratio (eyepiece/TV mount: 50/50)
Eyepiece (optional):	10X, 15X, 20X
Objective:	3X (375-037-1), W.D.: 77.0 mm
Optional objectives:	1X, 5X 10X, 20X, 50X, 100X
Data output:	Via RS-232C interface
Power supply:	240VAC $\pm 10\%$ , 50/60Hz

### Hyper MF-U Technical Data

Image type:	Erect
Optical tube:	Siedentoph type (pupil distance adjustment: 51-76 mm), 1X tube lens, binocular tube (inclination: 0-25°), reticle projection method, with TV mount, optical path ratio (eyepiece/TV mount: 50/50)
Eyepiece:	10X (field number 24 mm) Optional: 15X, 20X
Turret (optional):	Power
Objective (optional):	M/BD Plan Apo objective from 1X to 200X
Data output:	Via RS-232C interface
Power supply:	240VAC $\pm 10\%$ , 50/60Hz

### Optional Accessories

Code No.	Description	Price
176-308	Vibration damping stand	£2690.00
264-159E	QM-Data200 2D data processing unit	£1790.00
375-056	Stage micrometer	£281.00
517181	Halogen bulb (12V, 100W)	£61.80
970441	C-mount adapter	£54.00
12AAJ088	Footswitch	£252.00
12BAD602	Halogen bulb (high intensity type, 12V, 100W)	£38.50
DIC units		
378-076	For 100X, SL80X, SL50X objective	£1890.00
378-078	For 50X, SL20X objective	£1890.00
378-079	For 20X objective	£1890.00
378-080	For 10X, 5X objective	£1890.00
Filters		
12AAA643	ND2 colour filter	£68.00
12AAA645	GIF filter	£74.40
12AAA646	LB80 filter	£68.00
12AAG806	GIF filter	£162.00
12AAG807	LB80 filter	£139.00

Eyepieces and objective lenses refer to pages J-12 to J-17.

Fixture and stage accessories refer to page J-22.

Illumination units refer to page J-18.

QM-Data200 refer to page J-19.

Vision unit refer to page J-20.

Focus Pilot FP-05 refer to page J-21.



Three-axis joystick.

# Microscope Video Unit VMU

## SERIES 378 – Microscope Video Unit

- The VMU is a compact, lightweight and easy-to-install microscope unit for CCD camera monitoring in semiconductor fabrication facilities.
- An optical system featuring ultra-long working distance objectives and correction for the wide range of wavelengths in current use.
- Reflected illumination keeps the workpiece free from thermal expansion (the fibre-optic illuminator is required).
- Also available with a laser mount or turret (objective mount).



### Technical Data

Magnification of tube:	1X
Reflected illumination:	Telecentric system with aperture stop; fibre-optic illuminator (optional) is required
Light source:	Halogen bulb 12V, 150W (optional)
Objective lenses for bright field observation:	M Plan Apo, M Plan Apo SL, G Plan Apo (optional accessories)
Objective lenses for laser cutting:	M Plan Apo NIR, LCD Plan Apo NIR, M Plan Apo NUV and LCD Plan Apo NUV (optional accessories)
Objective lenses for laser machining:	M Plan UV for 378-514 only (optional accessories)

### Specifications

Model	VMU-V	VMU-H	VMU-LB	VMU-L4B
Code No.	378-505	378-506	378-513	378-514
Applicable wavelengths	Near infrared, visible		Near infrared, visible, near ultraviolet	Near infrared, visible, near ultraviolet, ultraviolet
Vertical CCD camera mount	✓	—	✓	✓
Horizontal CCD camera mount	—	✓	—	—
YAG laser mount	—	—	✓	✓
Fibre optic illumination unit mount	✓	✓	✓	✓
Mass	0.57 kg	0.59 kg	1.27 kg	1.3 kg

## Technical Data

Magnification of tube: 1X

Reflected illumination: Telecentric system with aperture stop system; fibre-optic illuminator (optional) is required

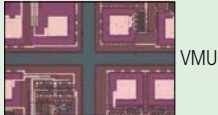
Light source: Fibre-optic 12V, 100W (optional)

Objective lenses for bright field observation:

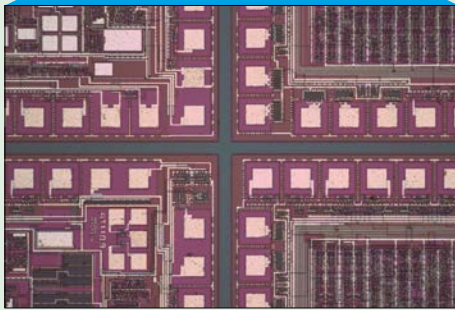
M Plan Apo, M Plan Apo HR, M Plan Apo SL, G Plan Apo (optional accessories)

Objective lenses for brightfield/darkfield observation:

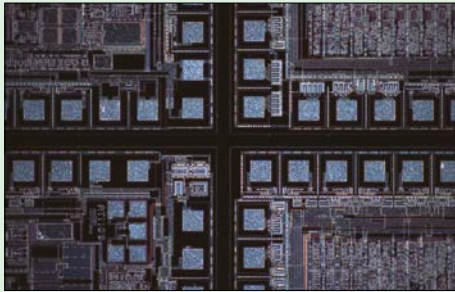
BD Plan Apo, BD Plan Apo HR, BD Plan Apo SL (optional accessories)



x7



WIDE VMU.



WIDE VMU darkfield.



Highly compact configuration of 4 WIDE VMU units.

## SERIES 378 – Wide-Field Microscope Video Unit

- Incorporates a wide-field image sensor (APS-C format or smaller size) providing seven times greater viewing area than the VMU Series for greatly enhanced inspection efficiency.
- In addition to normal brightfield observation, this series supports darkfield observation for scratch inspection, etc., and polarized light observation for increased contrast when viewing certain specimens.
- Bulk inspections covering a wide area can be performed with multiple units in a high density configuration.
- Supported sensor size of 2" equivalent, APS-C format.
- Image field of  $\varnothing 30$  mm with 1X tube lens.
- Both F-mount and C-mount cameras can be mounted.
- Brightfield observations are supported by the WIDE VMU-V and -H models.
- Brightfield/darkfield observations are supported by the WIDE VMU-BDV and -BDH models.
- With the flexible orientation for camera and illumination mounting very compact arrangements can be configured.



WIDE VMU-V



WIDE VMU-BDV



WIDE VMU-H



WIDE VMU-BDH

## Specifications

Model	WIDE VMU-V	WIDE VMU-H	WIDE VMU-BDV	WIDE VMU-BDH
Code No.	378-515	378-516	378-517	378-518
Image type	BF (brightfield)/erect	BF (brightfield)/inverted	BD (brightfield/darkfield)/erect	BD (brightfield/darkfield)/inverted
Vertical CCD camera mount	✓	—	✓	—
Horizontal CCD camera mount	—	✓	—	✓
Fibre optic illumination unit mount	✓	✓	✓	✓
Mass	1.8 kg	1.95 kg	2 kg	2.15 kg

J

# Microscope Head FS70

## SERIES 378 – Microscope Head for Semiconductor Inspection and Repair

- A versatile microscope head typically used as an OEM product suitable for fitting to specialist machines, such as those designed for inspection and repair of semiconductor wafers.
- Excellent operability is provided by the inwardly rotating turret and high quality, long working distance objectives.
- Ideal as the microscope unit of a prober station for semiconductors.
- Ergonomic design with combined knob for coarse- and fine-focus adjustment.
- The FS70L supports three YAG laser wavelengths (1064 nm, 532 nm and 355 nm), while the FS70L4 supports two wavelengths (532 nm and 266 nm), thus expanding the scope of laser applications, allowing laser-cutting of thin-films used in semiconductors and liquid crystal substrates. However, please note that Mitutoyo assumes no responsibility whatever for the performance and/or safety of the laser system used with Mitutoyo microscopes. Careful examination and testing is recommended when selecting a laser source.
- Brightfield, Differential Interference Contrast (DIC) and polarized light observation capabilities are standard with the FS70Z. The FS70L and FS70L4 do not support the DIC method.



**FS70L**  
(The turret, eyepieces and objectives are optional accessories)

### Technical Data

Focus adjustment	
Method:	With concentric coarse and fine focussing wheels (right and left)
Range:	50 mm travel range, 0.1 mm/rev. for fine adjustment, 3.8 mm/rev. for coarse adjustment
Functions:	Light intensity adjustable, 100 steps brightness adjustment
Trinocular tube image:	Erect
Interpupillary distance:	Siedentopf type, adjustment range: 51-76 mm
Field number:	24
Inclination:	0-20° (only - TH, - THS models)
Illumination system:	Reflective illumination for bright field (Koehler illumination, with aperture diaphragm)
Light source:	12V / 100W fibre-optic, non-stopped adjustment, light guide length 1.5 m, power consumption 150W
Objective lenses:	M Plan Apo, M Plan Apo SL, G Plan Apo (optional accessories)



**FS70L4** (The turret, eyepieces and objectives are optional accessories).



**FS70Z** (The turret, eyepieces and objectives are optional accessories).

### Specifications

Standard type	Model	FS70	FS70-TH	FS70Z	FS70Z-TH
	Code No.	378-184-1	378-184-3	378-185-1	378-185-3
Short-base type	Model	FS70-S	FS70-THS	FS70Z-S	FS70Z-THS
	Code No.	378-184-2	378-184-4	378-185-2	378-185-4
Optical pass ratio	50/50				
Tube lens	1X		1X, 2X zoom		
Camera mount	C-mount (using optional adapter B)				
Loading* <sup>1</sup>	14.5 kgf	13.6 kgf	14.1 kgf	13.2 kgf	
Mass	6.1 kg	7.1 kg	6.6 kg	7.5 kg	

Standard type	Model	FS70L	FS70L-TH	FS70L4	FS70L4-TH
	Code No.	378-186-1	378-186-3	378-187-1	378-187-3
Short-base type	Model	FS70L-S	FS70L-THS	FS70L4-S	FS70L4-THS
	Code No.	378-186-2	378-186-4	378-187-2	378-187-4
Optical pass ratio	100/0 or 0/100				
Protective filter	Built-in laser beam filter				
Tube lens	1X				
Applicable laser wavelengths	1064/532/355 nm		532/266 nm		
Camera mount	Use a laser with TV port		C-mount receptacle (with green filter switch)		
Objective, optional (for laser-cutting)	M/LCD Plan NIR /M/LCD Plan NUV		M Plan UV		
Loading* <sup>1</sup>	14.2 kgf	13.5 kgf	13.9 kgf	13.1 kgf	
Mass	6.4 kg	7.2 kg	6.7 kg	7.5 kg	

\*1 Allowable loading on optical tube excluding weight of objective lenses and eyepieces.



# Optional Accessories

## Eyepieces and Objectives for Measuring Microscopes

### Optional Reticles

Code No.	Description	Price
516576	Broken cross hairs (90° and 60°)	£92.40
516577	20 mm scale (min. reading: 0.1 mm) with cross-hair	£92.40
516578	Concentric circle (diametral increment: 1.2 mm)	£92.40
516848	Cross hair	£92.40
516849	10 mm scale (min. reading: 0.1 mm)	£92.40
516850	5 mm scale (min. reading: 0.05 mm)	£92.40

### SERIES 378 – Eyepieces

- The field of view is extra wide.
- Optional reticles are available.



Code No.	Magnification	Field number	Mass	Price
Individual				
378-866-5	10X	24	150 g	£370.00
378-857-5	15X	16	40 g	£460.00
378-858-5	20X	12	55 g	£480.00
2 piece set				
378-866	10X	24	150 g	£680.00
378-857	15X	16	40 g	£890.00
378-858	20X	12	55 g	£920.00

### SERIES 378 – Objectives

- The Mitutoyo 378 Series objectives have the world's longest working distance and an infinity correction optical system.
- These objectives provide flexible observation at high magnifications and independent correction of chromatic aberration.
- Long working distance objectives provide excellent clearance between the lens surface and the workpiece surface in focus, making it possible to observe features which are usually hard to bring to focus because of awkward projections.
- The metallurgical plan apochromatic (M Plan Apo) objective is an excellent optical system. This objective provides a flat, chromatic aberration-free image throughout the field of view, making it suitable for any type of microscope.
- Specially designed objectives are also available with correction for near infrared, near ultraviolet, and ultraviolet, or for observing through LCD screen glasses.
- The mounting screw threads of objectives are designed to conform to JIS B-7141-1988.

Note: Focal length and focal depth for objectives are specified at a reference wavelength of 0.55 μm irrespective of working wavelength.



M Plan Apo and M Plan Apo SL objectives for brightfield observation.



BD Plan Apo and BD Plan Apo SL objectives for brightfield/darkfield observation.



Near-infrared corrected M Plan Apo NIR objectives.



Near-ultraviolet corrected M Plan Apo NUV objectives.



Ultraviolet corrected M Plan UV objectives.

# Optional Accessories

## Objectives for Measuring Microscopes

### M Plan Apo/M Plan Apo HR for Brightfield Observation

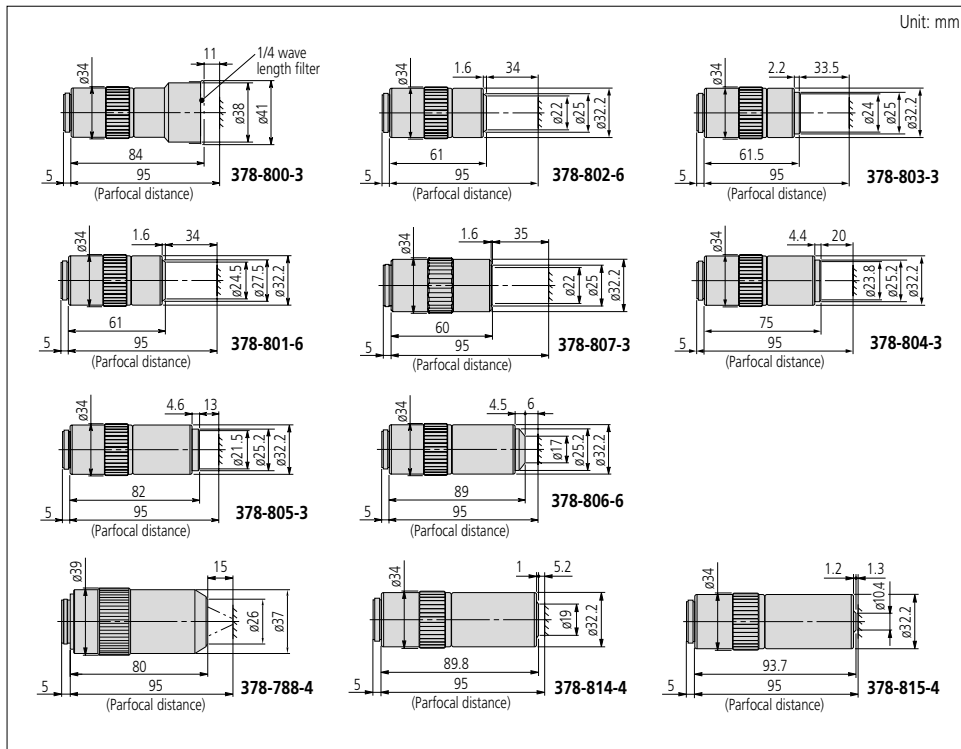
Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1* <sup>1</sup> (mm)	View field 2* <sup>2</sup> (mm)	Mass (g)	Price
<b>M Plan Apo</b>										
<b>378-800-3</b>	1X	0.025	11.0	200	11.0	440	ø24	4.8x6.4	300	<b>£1850.00</b>
<b>378-801-6</b>	2X	0.055	34.0	100	5.0	91	ø12	2.4x3.2	220	<b>£620.00</b>
<b>378-802-6</b>	5X	0.14	34.0	40	2.0	14	ø4.8	0.96x1.28	240	<b>£586.00</b>
<b>378-807-3</b>	7.5X	0.21	35.0	26.67	1.3	6.2	ø3.6	0.64x0.85	240	<b>£1150.00</b>
<b>378-803-3</b>	10X	0.28	33.5	20	1.0	3.5	ø2.4	0.48x0.64	230	<b>£660.00</b>
<b>378-804-3</b>	20X	0.42	20.0	10	0.7	1.6	ø1.2	0.24x0.32	270	<b>£1490.00</b>
<b>378-805-3</b>	50X	0.55	13.0	4	0.5	0.9	ø0.48	0.10x0.13	290	<b>£1950.00</b>
<b>378-806-3</b>	100X	0.70	6.0	2	0.4	0.6	ø0.24	0.05x0.06	320	<b>£2350.00</b>
<b>M Plan Apo HR</b>										
<b>378-788-4</b>	10X	0.42	15	20	0.7	1.6	ø2.4	0.48x0.64	460	<b>£6540.00</b>
<b>378-814-4</b>	50X	0.75	5.2	4	0.4	0.49	ø0.48	0.10x0.13	400	<b>£3590.00</b>
<b>378-815-4</b>	100X	0.90	1.3	2	0.3	0.34	ø0.24	0.05x0.06	410	<b>£4100.00</b>

\*1 Field of view when using a field number 24 mm eyepiece.

\*2 Field of view when using 1/2" CCD camera.

### High-resolution objectives

These objectives offer extra-high resolving power for observation or measurement in the most demanding applications. (Note that a Polarizing Unit (**378-074**) is required when using the 1X objective.)

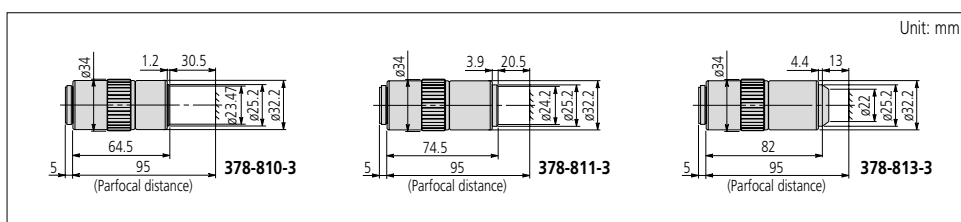


### M Plan Apo SL for Brightfield Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1* <sup>1</sup> (mm)	View field 2* <sup>2</sup> (mm)	Mass (g)	Price
<b>378-810-3</b>	20X	0.28	30.5	10	1.0	3.5	ø1.2	0.24x0.32	240	<b>£1520.00</b>
<b>378-811-3</b>	50X	0.42	20.5	4	0.7	1.6	ø0.48	0.10x0.13	280	<b>£2130.00</b>
<b>378-813-3</b>	100X	0.55	13.0	2	0.5	0.9	ø0.24	0.05x0.06	290	<b>£2500.00</b>

\*1 Field of view when using a field number 24 mm eyepiece.

\*2 Field of view when using 1/2" CCD camera.



### Extra-long working distance objectives

These objectives offer extra-long working distances to enable easier working and provide better protection for the lens.



### Optimised for through-glass working

The G Plan Apo Series objectives are designed for observing a workpiece through glass (thickness = 3.5 mm).



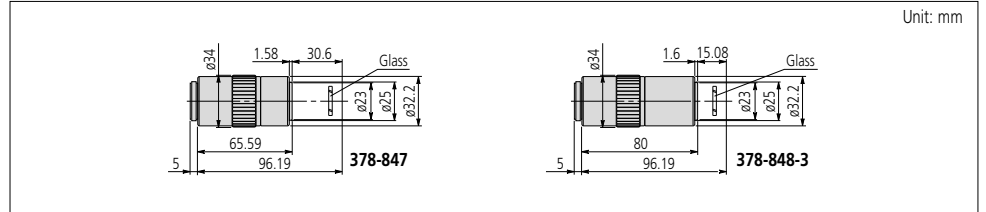
### Glass Thickness (t = 3.5 mm) Corrected G Plan Apo for Brightfield Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)* <sup>3</sup>	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1* <sup>1</sup> (mm)	View field 2* <sup>2</sup> (mm)	Mass (g)	Price
<b>378-847</b>	20X	0.28	29.42	10	1.0	3.5	ø1.2	0.24 x 0.32	270	<b>£2600.00</b>
<b>378-848-3</b>	50X	0.50	13.89	4	0.6	1.1	ø0.48	0.10 x 0.13	320	<b>£2790.00</b>

\*<sup>1</sup> Field of view when using a field number 24 mm eyepiece.

\*<sup>2</sup> Field of view when using 1/2" CCD camera.

\*<sup>3</sup> In air.



### High-resolution objectives

These objectives offer extra-high resolving power for observation or measurement in the most demanding applications.



### BD Plan Apo/BD Plan Apo HR for Brightfield/Darkfield Observation

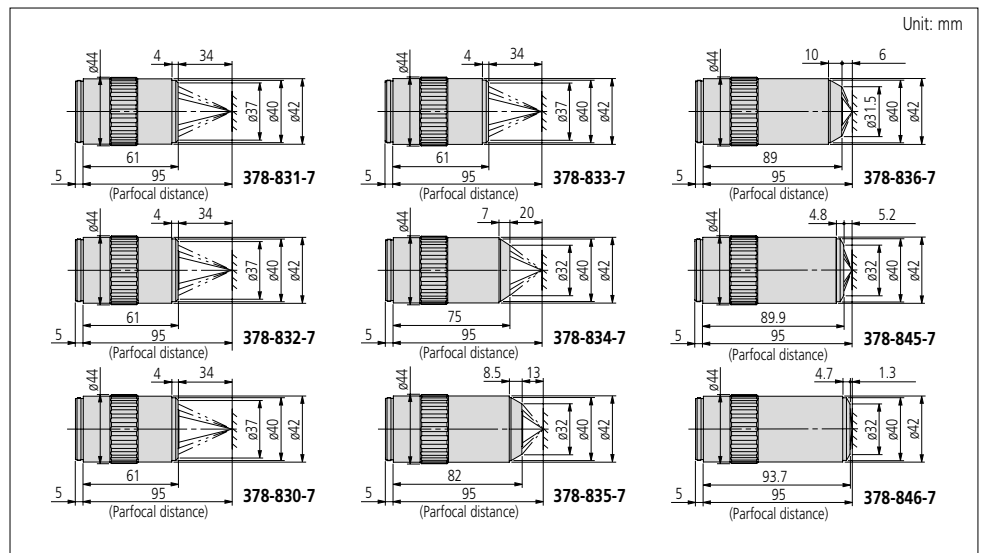
Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1* <sup>1</sup> (mm)	View field 2* <sup>2</sup> (mm)	Mass (g)	Price
<b>BD Plan Apo</b>										
<b>378-831-7</b>	2X	0.055	34	100	5.0	91	ø12	2.4 x 3.2	340	<b>£650.00</b>
<b>378-832-7</b>	5X	0.14	34	40	2.0	14	ø4.8	0.96 x 1.28	350	<b>£832.00</b>
<b>378-830-7</b>	7.5X	0.21	34	26.67	1.3	6.2	ø3.6	0.64 x 0.85	350	<b>£1150.00</b>
<b>378-833-7</b>	10X	0.28	34	20	1.0	3.5	ø2.4	0.48 x 0.64	350	<b>£750.00</b>
<b>378-834-7</b>	20X	0.42	20	10	0.7	1.6	ø1.2	0.24 x 0.32	400	<b>£1760.00</b>
<b>378-835-7</b>	50X	0.55	13	4	0.5	0.9	ø0.48	0.10 x 0.13	440	<b>£2320.00</b>
<b>378-836-7</b>	100X	0.70	6	2	0.4	0.6	ø0.24	0.05 x 0.06	460	<b>£2610.00</b>

### BD Plan Apo HR

<b>378-845-7</b>	50X	0.75	5.2	4	0.4	0.49	ø0.48	0.10 x 0.13	530	<b>£3390.00</b>
<b>378-846-7</b>	100X	0.90	1.3	2	0.3	0.34	ø0.24	0.05 x 0.06	545	<b>£3890.00</b>

\*<sup>1</sup> Field of view when using a field number 24 mm eyepiece.

\*<sup>2</sup> Field of view when using 1/2" CCD camera.



# Optional Accessories

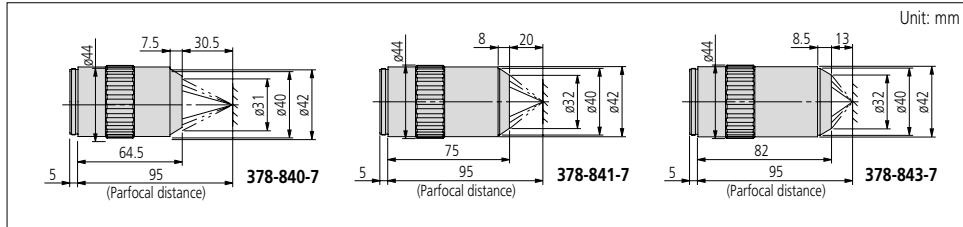
## Objectives for Measuring Microscopes

### BD Plan Apo SL for Brightfield/Darkfield Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1* <sup>1</sup> (mm)	View field 2* <sup>2</sup> (mm)	Mass (g)	Price
378-840-7	20X	0.28	30.5	10	1.0	3.5	∅1.2	0.24 x 0.32	350	£1850.00
378-841-7	50X	0.42	20	4	0.7	1.6	∅0.48	0.10 x 0.13	410	£1950.00
378-843-7	100X	0.55	13	2	0.5	0.9	∅0.24	0.05 x 0.06	440	£2630.00

\*<sup>1</sup> Field of view when using a field number 24 mm eyepiece.

\*<sup>2</sup> Field of view when using 1/2" CCD camera.



### Extra-long working distance objectives

These objectives offer extra-long working distances to enable easier working and provide better protection for the lens.



### Near-Infrared Corrected

#### M Plan Apo NIR/M Plan Apo NIR HR for Brightfield Observation

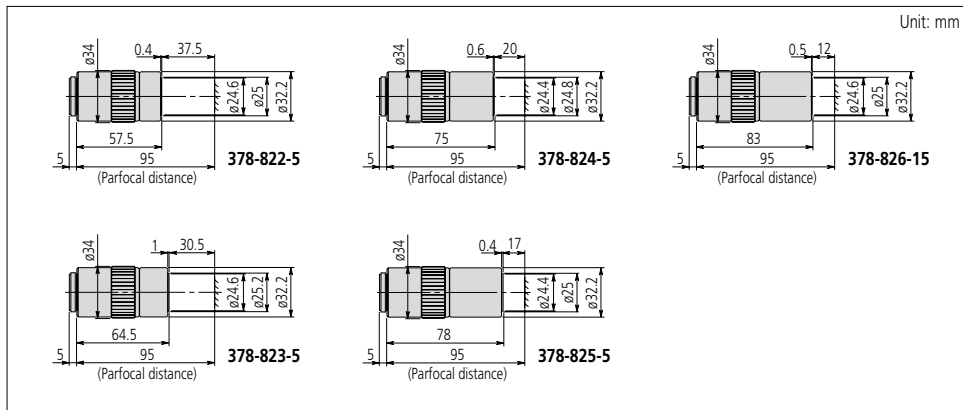
Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1* <sup>1</sup> (mm)	View field 2* <sup>2</sup> (mm)	Mass (g)	Price
<b>M Plan Apo NIR</b>										
378-822-5	5X	0.14	37.5	40	2.0	14	∅4.8	0.96 x 1.28	220	£680.00
378-823-5	10X	0.26	30.5	20	1.1	4.1	∅2.4	0.48 x 0.64	250	£1100.00
378-824-5	20X	0.40	20	10	0.7	1.7	∅1.2	0.24 x 0.32	300	£1850.00
378-825-5	50X	0.42	17	4	0.7	1.6	∅0.48	0.10 x 0.13	315	£2190.00
378-826-15	100X	0.50	12	2	0.6	1.1	∅0.24	0.05 x 0.06	335	£2450.00

#### M Plan Apo NIR HR

378-863-5	50X	0.65	10	4	0.42	0.65	∅0.48	0.10 x 0.13	450	£6450.00
378-864-5	100X	0.70	10	2	0.39	0.56	∅0.24	0.05 x 0.06	450	£6930.00

\*<sup>1</sup> Field of view when using a field number 24 mm eyepiece.

\*<sup>2</sup> Field of view when using 1/2" CCD camera.



### Stable parafocal distance with operating wavelength

These objectives are designed so that a workpiece's image remains substantially in focus even when the wavelength used is changed anywhere from the visible range ( $\lambda = 480 \text{ nm}$ ) up to near-infrared ( $\lambda = 1800 \text{ nm}$ ). Therefore the M Plan APO NIR Series is suitable for laser repair. However, when the wavelength used exceeds 1100 nm, the focussing position may slightly deviate from that in the visible range due to changes in glass dispersion and refractive index.



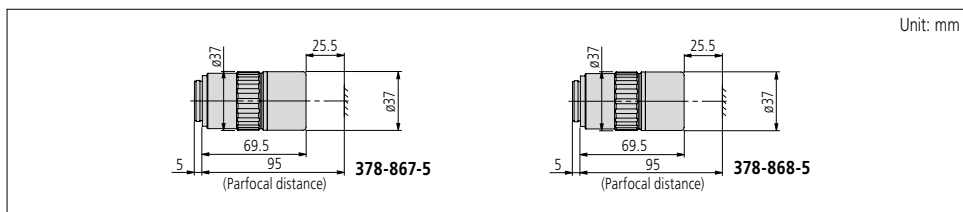
### Near-Infrared Corrected

#### M Plan Apo NIR B for Brightfield Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1* <sup>1</sup> (mm)	View field 2* <sup>2</sup> (mm)	Mass (g)	Price
378-867-5	20X	0.40	25.5	10	0.7	1.7	∅1.2	0.24 x 0.32	350	£1700.00
378-868-5	50X	0.42	25.5	4	0.7	1.6	∅0.48	0.10 x 0.13	375	£2260.00

\*<sup>1</sup> Field of view when using a field number 24 mm eyepiece.

\*<sup>2</sup> Field of view when using 1/2" CCD camera.



### Optimised for through-glass working

These near-infrared ( $\lambda = 1800 \text{ nm}$ ) corrected objectives are designed for observing a workpiece through LCD glass (thickness = 1.1 mm (**378-827-5**, **378-828-5**, **378-752-5**) or 0.7 mm (**378-829-5**, **378-754-5**) and for laser repair.



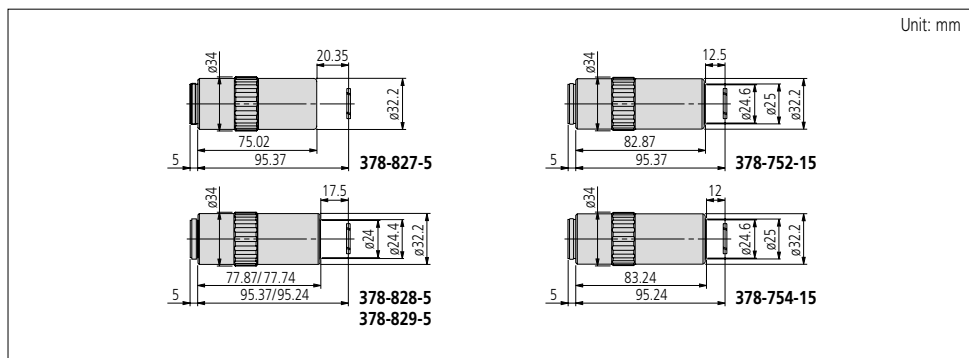
### Near-Infrared and LCD Glass Thickness ( $t = 1.1 \text{ mm}$ or $0.7 \text{ mm}$ ) Corrected LCD Plan Apo NIR for Brightfield Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power ( $\mu\text{m}$ )	Focal depth ( $\mu\text{m}$ )	View field 1* <sup>1</sup> (mm)	View field 2* <sup>2</sup> (mm)	Mass (g)	Price
<b>378-827-5</b>	20X	0.40	19.98	10	0.7	1.7	$\phi 1.2$	0.24x0.32	305	<b>£2110.00</b>
<b>378-828-5</b>	50X	0.42	17.13	3.9	0.7	1.6	$\phi 0.48$	0.10x0.13	320	<b>£2630.00</b>
<b>378-829-5</b>	50X	0.42	17.26	3.9	0.7	1.6	$\phi 0.48$	0.10x0.13	320	<b>£4140.00</b>
<b>378-752-15</b> * <sup>3</sup>	100X	0.50	12.13	2	0.6	1.1	$\phi 0.24$	0.05x0.06	335	<b>£4750.00</b>
<b>378-754-15</b>	100X	0.50	11.76	2	0.6	1.1	$\phi 0.24$	0.05x0.06	335	<b>£4750.00</b>

\*<sup>1</sup> Field of view when using a field number 24 mm eyepiece.

\*<sup>2</sup> Field of view when using 1/2" CCD camera.

\*<sup>3</sup> Made to order.



### Stable parfocal distance with operating wavelength

These objectives are designed so that a workpiece's image remains substantially in focus even when the wavelength used is changed anywhere from the visible range ( $\lambda = 620 \text{ nm}$ ) to the near-ultraviolet range ( $\lambda = 355 \text{ nm}$ ). Therefore the M Plan APO NUV Series is suitable for laser repair applications.



### Near-Ultraviolet Corrected M Plan Apo NUV/M Plan Apo NUV HR for Brightfield Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power ( $\mu\text{m}$ )	Focal depth ( $\mu\text{m}$ )	View field 1* <sup>1</sup> (mm)	View field 2* <sup>2</sup> (mm)	Mass (g)	Price
<b>M Plan Apo NUV</b>										
<b>378-809-5</b>	10X	0.28	30.5	20	1.0	3.5	$\phi 2.4$	0.48x0.64	255	<b>£3240.00</b>
<b>378-817-8</b>	20X	0.40	17	10	0.7	1.7	$\phi 1.2$	0.24x0.32	340	<b>£4180.00</b>
<b>378-819-4</b>	100X	0.50	11	2	0.6	1.1	$\phi 0.24$	0.05x0.06	380	<b>£5200.00</b>
<b>M Plan Apo NUV HR</b>										
<b>378-888-6</b>	50X	0.65	10	4	0.42	0.65	$\phi 0.48$	0.10x0.13	500	<b>£11150.00</b>

M Plan Apo NUV

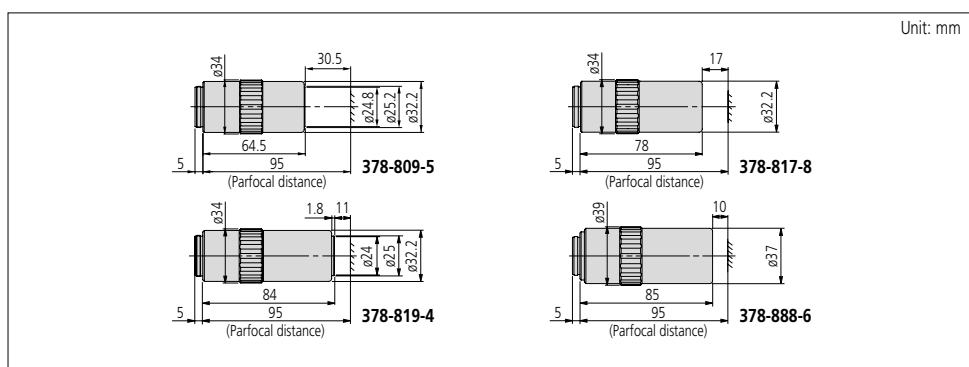
<b>378-809-5</b>	10X	0.28	30.5	20	1.0	3.5	$\phi 2.4$	0.48x0.64	255	<b>£3240.00</b>
<b>378-817-8</b>	20X	0.40	17	10	0.7	1.7	$\phi 1.2$	0.24x0.32	340	<b>£4180.00</b>
<b>378-819-4</b>	100X	0.50	11	2	0.6	1.1	$\phi 0.24$	0.05x0.06	380	<b>£5200.00</b>

M Plan Apo NUV HR

<b>378-888-6</b>	50X	0.65	10	4	0.42	0.65	$\phi 0.48$	0.10x0.13	500	<b>£11150.00</b>
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\*<sup>1</sup> Field of view when using a field number 24 mm eyepiece.

\*<sup>2</sup> Field of view when using 1/2" CCD camera.



# Optional Accessories

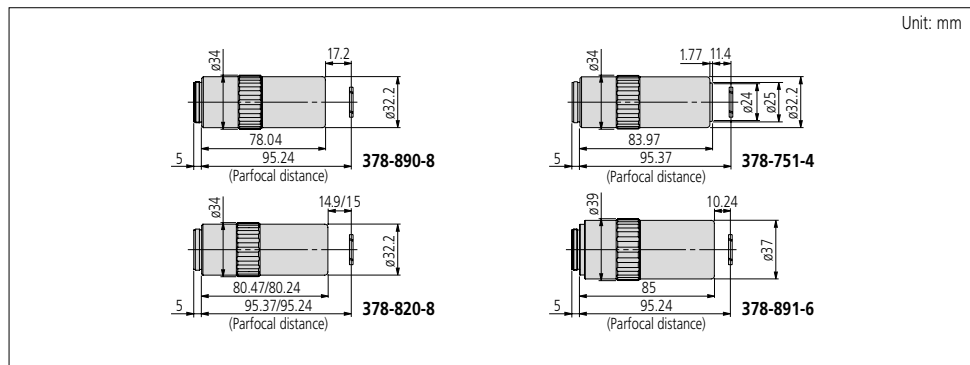
## Objectives for Measuring Microscopes

### Near-Ultraviolet and LCD Glass Thickness ( $t = 1.1 \text{ mm}$ or $0.7 \text{ mm}$ ) Corrected LCD Plan Apo NUV/LCD Plan Apo NUV HR for Brightfield Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power ( $\mu\text{m}$ )	Focal depth ( $\mu\text{m}$ )	View field 1* <sup>1</sup> (mm)	View field 2* <sup>2</sup> (mm)	Mass (g)	Price
LCD Plan Apo NUV										
<b>378-890-8</b>	20X	0.40	16.96	10	0.7	1.7	$\phi 1.2$	0.24 x 0.32	340	<b>£4670.00</b>
<b>378-820-8</b>	50X	0.42	14.76	4	0.7	1.6	$\phi 0.48$	0.10 x 0.13	350	<b>£4590.00</b>
<b>378-751-4</b>	100X	0.50	11.03	2	0.6	1.1	$\phi 0.24$	0.05 x 0.06	380	<b>£7080.00</b>
LCD Plan Apo NUV HR										
<b>378-891-6</b>	50X	0.65	9.76	4	0.4	0.7	$\phi 0.48$	0.10 x 0.13	500	<b>£9490.00</b>

\*<sup>1</sup> Field of view when using a field number 24 mm eyepiece.

\*<sup>2</sup> Field of view when using 1/2" CCD camera.



### Optimised for through-glass working

These near-infrared ( $\lambda = 355 \text{ nm}$ ) corrected objectives are designed for observing a workpiece through LCD glass (thickness = 1.1 mm **(378-753-6, 378-751-4)** or 0.7 mm **(378-890-6, 378-820-6, 378-891-6)**) and for laser repair.

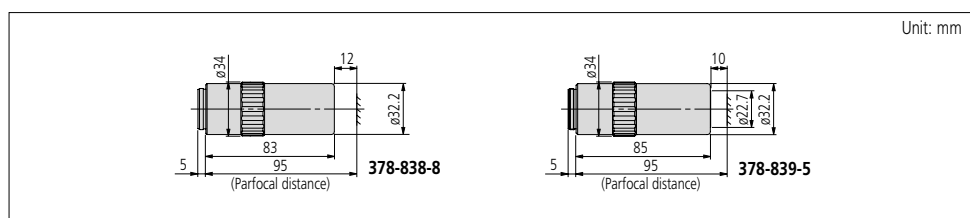


### Ultraviolet Corrected M Plan UV for Brightfield Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power ( $\mu\text{m}$ )	Focal depth ( $\mu\text{m}$ )	View field 1* <sup>1</sup> (mm)	View field 2* <sup>2</sup> (mm)	Mass (g)	Price
<b>378-838-8</b>	50X	0.40	12	4	0.7	1.7	$\phi 0.48$	0.10 x 0.13	400	<b>£9450.00</b>
<b>378-839-5</b>	80X	0.55	10	2.5	0.5	0.9	$\phi 0.3$	0.06 x 0.08	380	<b>£12920.00</b>

\*<sup>1</sup> Field of view when using a field number 24 mm eyepiece.

\*<sup>2</sup> Field of view when using 1/2" CCD camera.



### Stable parafocal distance with operating wavelength

These ultraviolet corrected objectives are designed so that a workpiece's image remains substantially in focus even when the wavelength used is changed anywhere from the visible range ( $\lambda = 550 \text{ nm}$ ) to the ultraviolet ( $\lambda = 266 \text{ nm}$ ). Therefore the M Plan UV Series is suitable for laser repair applications.

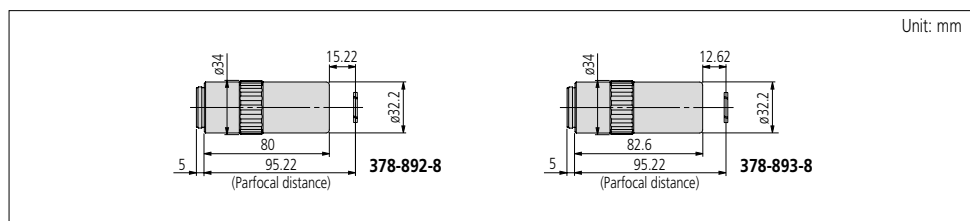


### Ultraviolet Corrected LCD Plan UV for Brightfield Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power ( $\mu\text{m}$ )	Focal depth ( $\mu\text{m}$ )	View field 1* <sup>1</sup> (mm)	View field 2* <sup>2</sup> (mm)	Mass (g)	Price
<b>378-892-8</b>	20X	0.36	15	10	0.8	2.1	$\phi 1.2$	0.24 x 0.32	330	<b>£11500.00</b>
<b>378-893-8</b>	50X	0.41	12.4	4	0.7	1.6	$\phi 0.48$	0.10 x 0.13	400	<b>POA</b>

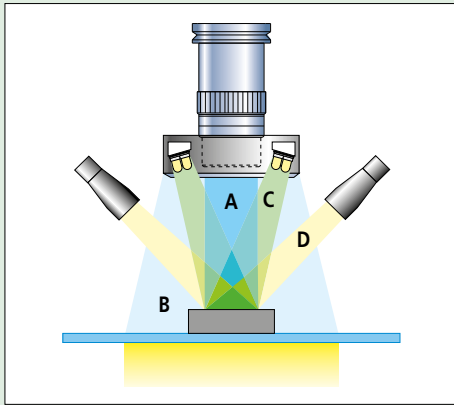
\*<sup>1</sup> Field of view when using a field number 24 mm eyepiece.

\*<sup>2</sup> Field of view when using 1/2" CCD camera.

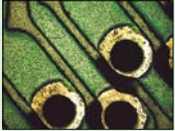


### Optimised for through-glass working

These ultraviolet ( $\lambda = 266 \text{ nm}$ ) corrected objectives are designed for observing a workpiece through LCD glass (thickness = 0.7 mm).



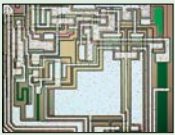
A: Vertical surface illumination (Halogen)



PCB.

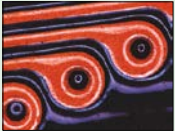


HDD suspension.

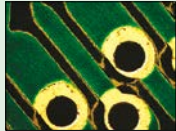


IC circuit.

B: Ring fibre-optic illumination



Flexible PCB.



PCB.

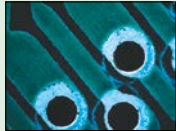


Electrical parts.

C: LED ring illumination



HDD suspension.



PCB.



Black resin moulded parts.

D: Twin fibre-optic illumination



IC package.



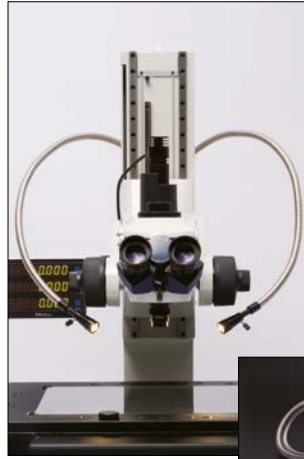
Garnet.



PCB.

## Illumination Units for Measuring Microscopes

### Twin Fibre-Optic Illuminator



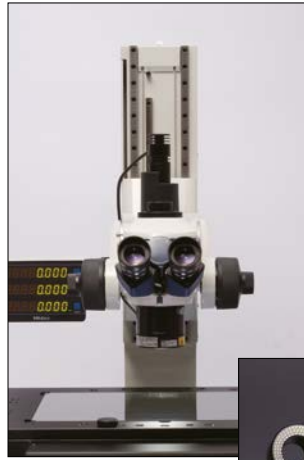
<b>Code No.</b>	<b>176-343E</b>
Applicable microscopes	MF, MF-U models
Length of fibre cable	700 mm
Light source	Halogen bulb (12V, 100W) (517181: halogen bulb)
Dimensions (WxDxH)	Light unit: 235 x 76 x 120 mm
<b>Price</b>	<b>£1150.00</b>

### Ring Fibre-Optic Illuminator



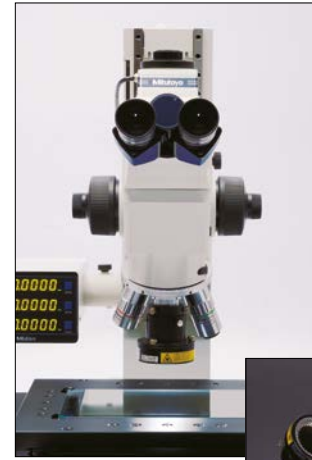
<b>Code No.</b>	<b>176-366E</b>
Applicable microscopes	MF models
Length of fibre cable	1000 mm
Light source	Halogen bulb (12V, 100W) (517181: halogen bulb)
Dimensions (WxDxH)	Light unit: 235 x 76 x 120 mm
<b>Price</b>	<b>£1650.00</b>

### LED Ring Illuminator



<b>Code No.</b>	<b>176-367-2E</b>
Applicable microscopes	MF models (ML objective 10X or lower)
Length of LED cable	1500 mm
Light source	White LED
Dimensions (WxDxH)	Light unit: 75 x 150 x 90 mm
<b>Price</b>	<b>£1990.00</b>

### LED Ring Light (for FS Objectives)



<b>Code No.</b>	Please contact us
Applicable microscopes	MF-U models (FS objective M plan Pro 10X or lower)
Length of LED cable	1500 mm
Light source	Supplied from microscope (surface illumination)
Dimensions (WxDxH)	Light unit: 75 x 150 x 90 mm
<b>Price</b>	<b>POA</b>

# Optional Accessories

## SERIES 264 – QM-Data200 2D Data Processing Unit for Measuring Microscopes

- The QM-Data200 is a geometric readout/analysis unit for optical instruments such as measuring microscopes and profile projectors.
- This unit features powerful 2D coordinate measurement capabilities with easy-to-use key operation.
- The QM-Data200 improves operator productivity, minimizes errors and saves total measurement time and production cost.
- Informative graphic displays on the large LCD screen make for easy measurement operations.
- One-key operation for combined measurements that are often used (circle-circle distance, etc.).
- The AI measurement function (Automatic Identification of measuring item) eliminates switching between the measurement command keys.
- Equipped with a measurement procedure teaching function and measuring position navigation in Repeat mode.
- The user-menu function allows the user to store measurement commands or part programs to create custom menus.
- Tolerance zone measurement of data processing results and various statistical processing routines for each item are available.
- Measurement result output in spreadsheet (CSV) format.

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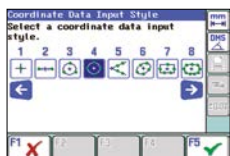
264-155E

### Specifications

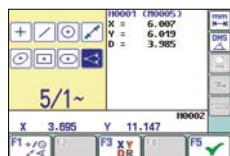
Model No.	QM-Data200	
Code No.	264-155E	264-159E
Applicable microscopes	MF/MF-U	Hyper MF/Hyper MF-U
Unit of measurement	mm	
Length	mm	
Angle	Switchable between decimal degree and sexagesimal notation	
Resolution	0.1 $\mu$ m	0.01 $\mu$ m
Display unit	Colour graphic LCD (equipped with a backlight)	
External dimensions (W x H x D)	260 x 242 x 310 mm (including the stand section)	
Mass	Approx. 2.9 kg	
Price	£1790.00	£1790.00

### Graphic display

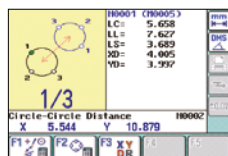
Measurement information and data are visualized on the back-lit LCD colour display with graphical interfaces. The geometric feature selected is displayed with the probing navigator. The measurements map and blink indication show the probing points and sequences. Simply probe points and click by following the blink indicator. Measurements can be easily completed even by a beginner. This improves operation accuracy and reduces errors and measurement time.



Clear function icons.



Coloured LCD display with backlight.



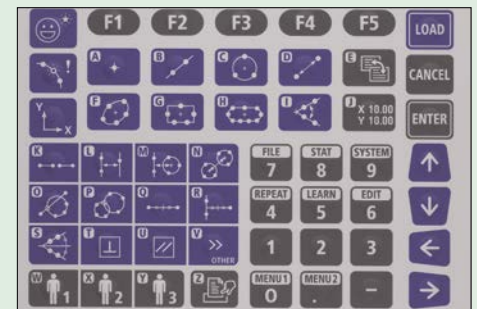
One-key operation for combined measurements.



Measurement procedure teaching function.

### Technical Data

Program functions:	Part program creation, execution, editing
Statistical processing:	Number of data, maximum value, minimum value, mean value, standard deviation, range, histogram
Element memory:	Maximum of 1000 elements
Element recall:	Point, line, circle, distance, ellipse, rectangular hole, slotted hole, intersection and intersecting angle
Element key-in:	Point, line, circle
Display system:	Colour LCD (320 x 240 dots, with LED back light)
Measurement result file output:	RS-232C output (CSV format, MUX-10F format)
Display language:	Japanese/English/German/French/Italian/Spanish/Portuguese/Czech/Chinese (simplified/traditional), Korean
Data input:	RS-232C, X/Y/Z-axis signal, footswitch
Data output:	RS-232C, printer
Power supply:	240VAC $\pm$ 10%, 50/60Hz



### Intuitive panel design

The QM-Data200 employs Geometry Keys to accelerate the measurement process. The routine of probing geometric features and combinations is implemented from these dedicated keys on the front panel. Simply clicking a key and then capturing the feature coordinates means you can complete the measurement quickly and accurately. This improves operator productivity, reduces error and saves operation time and cost.



## Technical Data

Projected image:	Inverted
Camera	
Image sensor:	1/2" colour CMOS camera
Dimensions:	100x58x89 mm (WxDxH)
Mass:	0.4 kg
TV adapter (supplied)	
Dimensions:	ø45x123 mm
Magnification:	0.5X
Mass:	0.3 kg
Magnification:	19X - 1900X on 22" monitor (image resizable)

## QSPAK VUE (Optional Software)

For observation/comparison of form

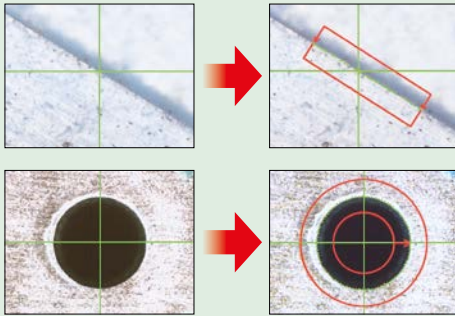
- Template matching function.
- Manual pattern matching function.

For simple measurement

- One-click edge detection tool function.
- Smart tool function.
- User macro function.

Functions for repeated measurement/auto-measurement

- Quick navigation.
- Playback.
- Graphics.
- External data output.
- Statistical calculations.

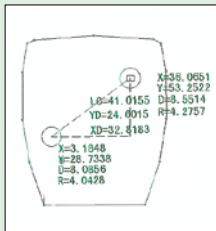


### One-click edge detection

Just by clicking the mouse near the edge of a workpiece, QSPAK automatically scans the edge and detects it, displaying the coordinates of the closest point on the edge to the crosshair intersection. This function also works with the point tool, box tool, circle tool and auto-focus tool.

### Graphics window

The measurement results and measured elements are plotted in the graphics window in real time. By using this function the user can check the current measuring position at a glance. The graphics window can be used for geometrical calculations.



## Optional Accessory

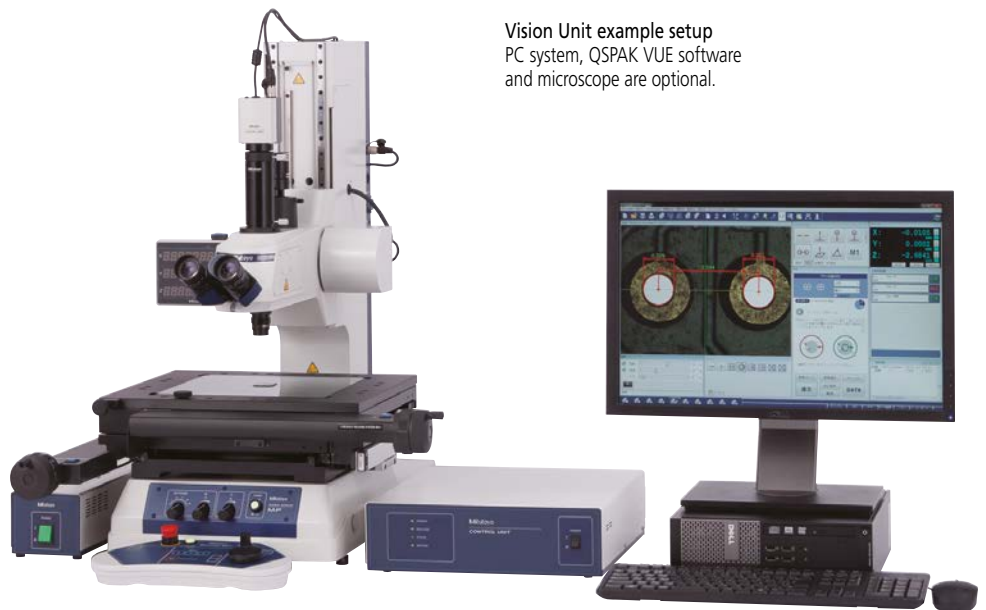
Code No.	Description	Price
12AAJ088	Footswitch	£252.00

## SERIES 359 – Vision Unit for Measuring Microscopes

- Installation of this unit upgrades a standard measuring microscope to match the performance of a vision measuring machine when used with the optional software QSPAK VUE.
- QSPAK VUE enables judgement of measurement results relative to tolerance zones and implementation of various types of statistical processing for each item.
- Informative graphics and measurement navigation functions promote ease of use with measurement tools and macro icons enabling common measurement tasks to be performed in one easy step.
- A series of measuring operations can be performed using just one screen display.
- Measurement results can be output to Microsoft Excel for easy local generation of an inspection report.
- The auto-brightness control function reproduces type and degree of illumination used.
- The image AF (Auto Focus) function is realized when this unit is installed in the MF/MF-U Series (motor-driven Z-axis types).
- Highly accurate height measurements are possible when used with the focus pilot.\*

\*Patent pending.

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Vision Unit example setup  
PC system, QSPAK VUE software  
and microscope are optional.

## Specifications

Model No.	Vision Unit 6D	Vision Unit 6UD	Vision Unit 8D	Vision Unit 8UD
Code No.	359-707	359-709	359-717	359-719
Applicable microscope	MF-A	MF-UA	MF-B	MF-UB
Model No.	Vision Unit 9D	Vision Unit 9UD	Vision Unit 10D	Vision Unit 7D
Code No.	359-727	359-729	359-763	359-779
Applicable microscope	MF-C	MF-UC	MF-D MF-UD	Hyper MF-B Hyper MF-UB
Relay magnification of the optical system	When installed on the microscope 0.5X (using the 0.5X TV adapter)			
Image detection	High-sensitivity 1/2" colour CMOS camera, 3 megapixel			
Resolution	0.1 µm			
Measuring accuracy	Depends on measuring microscope			
Software (optional)	QSPAK Vision Unit Edition			

Note: QSPAK VUE and a PC are required separately.

# Optional Accessories

## For Measuring Microscopes

### Focus Pilot FP-05

- By installing this system on the camera mount of an MF series measuring microscope and projecting a target pattern onto the workpiece surface, the focal plane can be detected with high accuracy and repeatability.
- The brightness of the target pattern can be adjusted according to the reflectivity of the workpiece surface.
- A wide view field observation on the monitor is made possible with the use of a CCD camera (C-mount adapter is included).
- Two target patterns (concentric circle, slit) projected in red or green are available for matching to the workpiece surface texture.



Concentric circle target



Slit target

Code No.	375-057E	375-058E	375-067E	375-068E
Applicable microscopes	MF models		MF-U models	
Light source	Green LED	Red LED	Green LED	Red LED
Focussing reproducibility	Approximately 1.5 μm (when using a 20X lens)*			
Camera adapter	C-mount (provided)			
Applicable CCD camera	Up to 2/3*			
Mass	1.8 kg			
Price	£3990.00	£3990.00	£4620.00	£4620.00

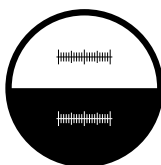
\* This is a reference value based on an inspection performed using our standard sample.

### Manual and Power Turrets for MF-U



Code No.	176-211	378-018	176-212E	378-016E	378-216E
Observation type	BD	BF	BD	BF	BF
No. of objective mounts	4				5
Driving method	Manual		Motor		
Power supply	—		240VAC ±10%, 50/60Hz		
Dimensions (WxDxH)	Turret	—		164x65x137 mm	
	Control box	—		108x72x193 mm	
Price	£634.00	£975.00	£6920.00	£3540.00	£6920.00

### Stage Micrometer

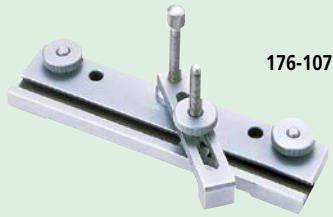


Code No.	Scale length	Graduation	Accuracy*	Dimensions (WxD)	Mass	Price
375-056	1 mm	0.01 mm	±(1+L) μm	76x26 mm	16 g	£281.00

\* At 20°C, L = measured length (mm).

## Workpiece Fixtures for Measuring Microscopes

### Holder with Clamp



176-107

<b>Code No.</b>	<b>176-107</b>
Max. workpiece height	35 mm
Mass	0.42 kg
<b>Price</b>	<b>£177.00</b>

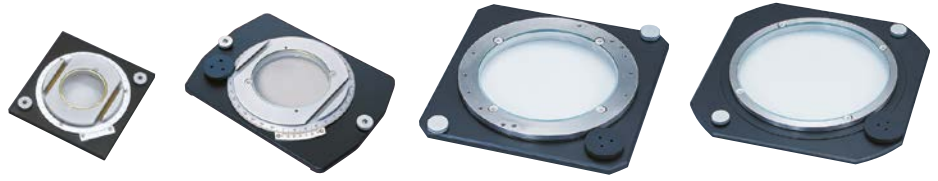
### Vertical Holder



172-132

<b>Code No.</b>	<b>172-132</b>
Mass	1.3 kg
<b>Price</b>	<b>£221.00</b>

### Rotary Tables



176-106

172-198

176-305

176-306

<b>Code No.</b>	<b>176-106</b>	<b>172-198</b>	<b>176-305</b>	<b>176-306</b>
Effective glass diameter	66 mm	96 mm	182 mm	238 mm
Angular resolution	6'	2'	—	
Fine feed	—	Available		
Mass	1.7 kg	2.4 kg	5.5 kg	6.5 kg
<b>Price</b>	<b>£430.00</b>	<b>£639.00</b>	<b>£1440.00</b>	<b>£1860.00</b>

### Centre Support and Centre Support Riser



172-142



172-143

<b>Code No.</b>	<b>172-142</b>	<b>172-143</b>
Description	Centre support	Centre support riser
Max. workpiece height	120 mm (240 mm*)	60 mm
Mass	3.3 kg	2.2 kg
<b>Price</b>	<b>£604.00</b>	<b>£265.00</b>

\* When using a centre support riser (172-143).

### Swivel Centre Supports



176-105



172-197

<b>Code No.</b>	<b>176-105</b>	<b>172-197</b>
Max. workpiece diameter	70 mm (45 mm*)	80 mm (65 mm*)
Max. workpiece length	140 mm	
Swivel range	±10°	
Mass	2.4 kg	2.5 kg
<b>Price</b>	<b>£581.00</b>	<b>£476.00</b>

\* When swivelled 10°.

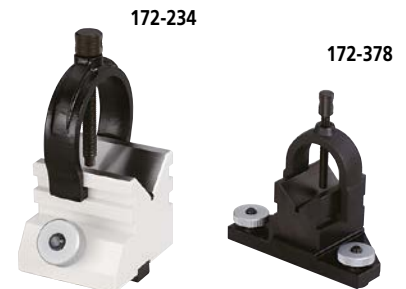
### Rotary Vice



172-144

<b>Code No.</b>	<b>172-144</b>
Rotation range	360°
Maximum workpiece height	60 mm
Width of jaws	40 mm
Angle graduations	5°
Mass	2.8 kg
<b>Price</b>	<b>£632.00</b>

### V-Block with Clamp



172-234

172-378

<b>Code No.</b>	<b>172-234</b>	<b>172-378</b>
Maximum workpiece diameter	50 mm	25 mm
Width of block	60 mm	41 mm
Mass	1.24 kg	0.8 kg
<b>Price</b>	<b>£325.00</b>	<b>£231.00</b>

# PJ-A3000

## SERIES 302 – Profile Projectors

- The PJ-A3000 Series profile projectors comprises medium-size bench-top models that feature excellent versatility and easy operation.
- Easy-to-read digital XY counter is located near the projection screen to minimize eye movement.
- Digital readout protractor screen enables accurate angle measurement.
- Combination use with the optional 2D Data Processor QM-Data200 facilitates a variety of dimensional measurement methods.

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302-701-1E



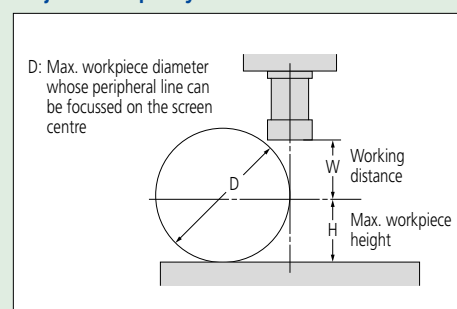
### Specifications

Model	PJ-A3010F-100	PJ-A3010F-200	
Code No.	302-703-1E	302-701-1E	
XY stage travel range	100 x 100 mm	200 x 100 mm	
Measurement method	Linear encoder		
Resolution	0.001 mm or .0001" / 0.001 mm (.00005" / 0.001 mm: digital head)		
Focussing method	Manual		
Quick-release mechanism	X and Y axes		
XY stage size	250 x 250 mm	380 x 250 mm	
Effective glass size	142 x 142 mm	266 x 170 mm	
Swivel function	—	±3°	
Maximum stage loading	10 kg	8 kg	
Maximum workpiece height	91 mm	92.5 mm	
Contour illumination	Light source	Halogen bulb (24V, 150W)	
	Optical system	Telecentric	
	Functions	2-step (high/low) brightness switch, heat-absorbing filter, cooling fan	
Surface illumination	Light source	Halogen bulb (24V, 150W)	
	Optical system	Vertical illumination with adjustable condenser lens	
	Functions	Heat-absorbing filter, cooling fan	
Mass	112 kg	140 kg	

### Technical Data

Projected image:	Inverted
Protractor screen	
Effective diameter:	315 mm (12.4")
Screen material:	Fine-ground glass
Screen rotation:	±360°, fine feed and clamp
Angle reading:	Digital counter (LED)
	Resolution: 1' or 0.01° (switchable)
	Range: ±370°
	ABS/INC mode switching, zero set
Reference lines:	Cross hairs
Projection lens:	10X ( <b>172-202</b> )
	Optional: 20X, 50X, 100X
Magnification accuracy	
	Contour illumination: ±0.1% or better
	Surface illumination: ±0.15% or better
Power supply:	240VAC ±10%, 50/60Hz

### Projection Capacity



Unit: mm

	Magnification			
	10X	20X	50X	100X
View field	ø31.5	ø15.7	ø6.3	ø3.1
W	66 (20)	32.5 (2)	12.6	5
H	-100 model	91		
	-200 model	92.5		
D	-100 model	182	87 (61)	27
	-200 model	185	87 (61)	27

( ): When using surface illumination.

### Optional Accessories

Code No.	Description	Price
172-116	Standard scale (50 mm)	£91.10
172-117	Standard scale (2")	£91.10
172-118	Reading scale (200 mm)	£151.00
172-119	Reading scale (8")	£151.00
172-160-2	Green filter	£52.20
172-161	Reading scale (300 mm)	£209.00
172-162	Reading scale (12")	£209.00
172-202	10X projection lens set	£547.00
172-203	20X projection lens set	£488.00
172-204	50X projection lens	£624.00
172-207	100X projection lens	£624.00
172-229	Oblique illumination mirror for 10X lens	£59.30
172-230	Oblique illumination mirror for 20X lens	£47.40
332-151	OPTOEYE-200 image edge sensor*	£975.00
383876	Vinyl cover	£27.60
512305	Halogen bulb (24V, 150W)	£17.00
999678D	Fixture mount adapter	£773.00
12AAA807D	RS-232C cable	£36.20

Fixture and stage accessories refer to page J-30.

QM-Data200 2D data processing unit refer to page J-28.

\* For details refer to page J-29.

# PJ-H30

## SERIES 303 – Profile Projectors

- The PH-30 Series of profile projectors comprises medium-size bench-top models featuring a ø306mm screen and erect, unreversed images.
- Newly developed transmitted-illumination optical system improves the illumination intensity for all types of projection lenses by 60%, on average, making edge definition sharper and so enhancing operability.
- High-level visibility of digital display for all models allows easy XY and angle readings.
- 3-lens turret type bayonet mount is parfocal.
- Quick-release mechanism useful for moving the stage rapidly between measuring points when measuring workpieces that are large in size or quantity.
- All models have a precision workstage to achieve the high measuring accuracy of  $\pm(3+0.02L) \mu\text{m}$  in the X- and Y-axis directions.
- Models with a high-precision edge detector (OPTOEYE) built in are also available.

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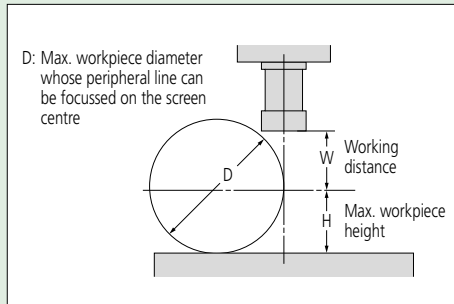


303-732-1E

### Technical Data

Projected image: Erect  
 Protractor screen  
 Effective diameter: 306 mm (12")  
 Screen material: Fine-ground glass  
 Screen rotation:  $\pm 360^\circ$ , fine feed and clamp  
 Angle reading: Digital counter (LED)  
 Resolution:  $1'$  or  $0.01^\circ$  (switchable)  
 Range:  $\pm 370^\circ$   
 ABS/INC mode switching, zero set  
 Cross hairs  
 Reference lines:  
 Projection lens: 10X (172-472)  
 Optional: 5X, 20X, 50X, 100X  
 Magnification accuracy  
 Contour illumination:  $\pm 0.1\%$  or better  
 Surface illumination:  $\pm 0.15\%$  or better  
 Power supply: 240VAC  $\pm 10\%$ , 50/60Hz

### Projection Capacity



Unit: mm

	Magnification				
	5X	10X	20X	50X	100X
View field	ø61.2	ø30.6	ø15.3	ø6.12	ø3.06
W	66	70.5	56.5	50	
H	105				
D	148	197	137	114	

### Optional Accessories

Code No.	Description	Price
172-116	Standard scale (50 mm)	£91.10
172-117	Standard scale (2")	£91.10
172-118	Reading scale (200 mm)	£151.00
172-119	Reading scale (8")	£151.00
172-161	Reading scale (300 mm)	£209.00
172-162	Reading scale (12")	£209.00
172-271	5X projection lens	£1310.00
172-473	20X projection lens	£1180.00
172-474	50X projection lens	£1220.00
172-475	100X projection lens	£1230.00
332-151	OPTOEYE-200 image edge sensor*	£975.00
011534	MC special cleaner	£15.00
999678D	Fixture mount adapter	£773.00
12AAA807D	RS-232C cable	£36.20
12AAG981	Green filter	£190.00
12AAG982	Stand for QM-Data 200	£505.00

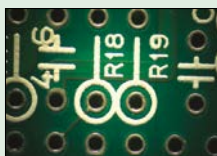
Fixture and stage accessories refer to page J-30.

QM-Data200 2D data processing unit refer to page J-28.

\* For details refer to page J-29.



Vertical illumination.



Oblique illumination.

### Specifications

Model	PJ-H30A1010B	PJ-H30D1010B	PJ-H30A2010B	PJ-H30D2010B
Code No.	303-712-1E	303-732-1E	303-713-1E	303-733-1E
Focussing method	Manual	Power focus	Manual	Power focus
Edge detector	Optional	Built-in	Optional	Built-in
Accuracy	$\pm(3+0.02L) \mu\text{m}$ , L = measured length (mm)			
Resolution	0.001 mm			
XY stage travel range	100 x 100 mm		200 x 100 mm	
Measurement method	Linear encoder			
Quick-release mechanism	X and Y axes			
XY stage size	300 x 240 mm		350 x 280 mm	
Effective glass size	180 x 150 mm		250 x 150 mm	
Swivel function	$\pm 3^\circ$			
Maximum stage loading	10 kg			
Maximum workpiece height	105 mm			
Contour illumination	Light source	Halogen bulb (24V, 150W)		
	Optical system	Telecentric zoom		
	Functions	Continuously variable brightness switch, heat-absorbing filter, cooling fan		
Surface illumination	Light source	Halogen bulb (24V, 150W)		
	Optical system	Vertical/oblique illumination with adjustable condenser lens		
	Functions	Continuously variable brightness switch, heat-absorbing filter, cooling fan		
Mass	176 kg		178 kg	

# PV-5110

## SERIES 304 – Profile Projectors

- Floor-standing model using overhead illumination which allows a large, conveniently positioned screen so that projected images can be easily traced or compared with a template.
- Digital readout protractor screen (including zero-setting, ABS/INC coordinate switching functions) for easy and error-free angle measurement.
- The optional oblique surface illumination unit (**172-422**) provides clear and bright images, allowing easy inspection of non-reflective workpieces such as plastic parts or printed materials.

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304-919E



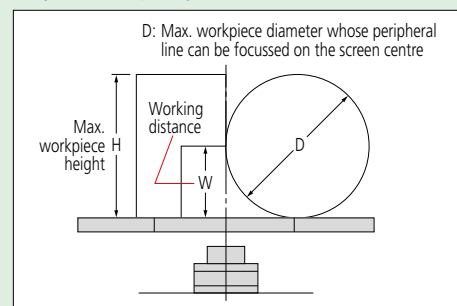
### Specifications

<b>Model</b>	<b>PV-5110</b>	
<b>Code No.</b>	<b>304-919E</b>	
XY stage travel range	200x100 mm	
Measurement method	Linear encoder	
Resolution	0.001 mm	
Focussing method	Manual	
Quick-release mechanism	X and Y axes	
XY stage size	380x250 mm	
Effective glass size	266 x 170 mm	
Swivel function	±3°	
Maximum stage loading	5 kg	
Contour illumination	Light source	Halogen bulb (24V, 150W)
	Optical system	Telecentric zoom
	Functions	2-step (high/low) brightness switch, heat-absorbing filter, cooling fan
Surface illumination	Light source	Halogen bulb (24V, 150W)
	Optical system	Vertical illumination
	Functions	Adjustable condenser lens, oblique illumination (for 5X, 10X and 20X), heat-absorbing filter, cooling fan
Mass	210 kg	

### Technical Data

Projected image:	Inverted
Protractor screen	
Effective diameter:	508 mm (20")
Screen material:	Fine-ground glass
Screen rotation:	±360°, fine feed and clamp
Angle reading:	Digital counter (LED)
	Resolution: 1' or 0.01° (switchable)
	Range: ±370°
	ABS/INC mode switching, zero set
Reference lines:	Cross hairs
Projection lens:	10X ( <b>172-402</b> )
	Optional: 5X, 20X, 50X, 100X
Magnification accuracy	
Contour illumination:	±0.1% or better
Surface illumination:	±0.15% or better
Maximum workpiece height:	Refer to <i>Projection Capacity</i> below
Power supply:	240VAC ±10%, 50/60Hz

### Projection Capacity



Unit: mm

	Magnification				
	5X	10X	20X	50X	100X
View field	ø101.6	ø50.8	ø25.4	ø10.16	ø5.08
W	60 (27)	60		32.4	22.5
H	125	181	206	87	
D	120			64.8	45

(): When using surface illumination.

### Optional Accessories

Code No.	Description	Price
<b>172-116</b>	Standard scale (50 mm)	<b>£91.10</b>
<b>172-117</b>	Standard scale (2")	<b>£91.10</b>
<b>172-160-2</b>	Green filter	<b>£52.20</b>
<b>172-161</b>	Reading scale (300 mm)	<b>£209.00</b>
<b>172-162</b>	Reading scale (12")	<b>£209.00</b>
<b>172-319</b>	Canopy	<b>£700.00</b>
<b>172-329</b>	Reading scale (600 mm)	<b>£520.00</b>
<b>172-330</b>	Standard scale (80 mm)	<b>£179.00</b>
<b>172-401</b>	5X projection lens set	<b>£4895.00</b>
<b>172-402</b>	10X projection lens set	<b>£1630.00</b>
<b>172-403</b>	20X projection lens set	<b>£1295.00</b>
<b>172-404</b>	50X projection lens set	<b>£1335.00</b>
<b>172-405</b>	100X projection lens set	<b>£1485.00</b>
<b>332-151</b>	OPTOEYE-200 image edge sensor*	<b>£975.00</b>
<b>011534</b>	MC special cleaner	<b>£15.00</b>
<b>512305</b>	Halogen bulb (24V, 150W)	<b>£17.00</b>
<b>12AAA807D</b>	RS-232C cable	<b>£36.20</b>
<b>12AAF182</b>	Digital counter stand	<b>£76.40</b>

Fixture and stage accessories refer to page J-30.

QM-Data200 2D data processing unit refer to page J-28.

KA Counter digital counter refer to page H-10.

\* For details refer to page J-29.

# PH-3515F

## SERIES 172 – Profile Projector

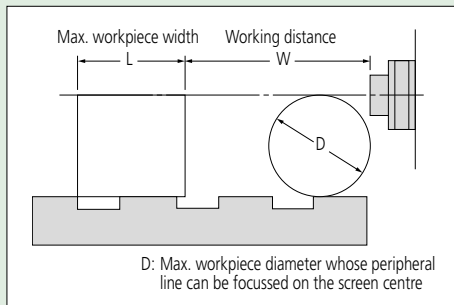
- Bench-top model based on a horizontal optical system.
- Suitable for thread pitch measurements – blurred or distorted images will not be produced when workpiece is angled.
- Erect image on the day-bright screen.
- 353 mm diameter protractor screen with cross hairs and staggered lines for easy alignment.
- Digital angle measurement to 1' or 0.01°.
- Heavy-duty XY stage incorporates linear scales for fast, accurate measurement.

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### Technical Data

Projected image: Erect  
 Protractor screen  
 Effective diameter: 353 mm (13.9")  
 Screen material: Fine-ground glass  
 Screen rotation: ±360°, fine feed and clamp  
 Angle reading: Digital counter (LED)  
 Resolution: 1' or 0.01° (switchable)  
 Range: ±370°  
 ABS/INC mode switching, Zero Set  
 Cross hairs  
 Reference lines:  
 Projection lens: 10X (172-184)  
 Optional: 5X, 20X, 50X, 100X  
 Magnification accuracy  
 Contour illumination: ±0.1% or better  
 Surface illumination: ±0.15% or better  
 Maximum workpiece height: Refer to *Projection Capacity* below  
 Power supply: 240VAC ±10%, 50/60Hz

### Projection Capacity



Unit: mm

	Magnification				
	5X	10X	20X	50X	100X
View field	ø70.6	ø35.3	ø17.65	ø7.06	ø3.5
W	160 (64)	93 (35)	40	14.6	9.5
H	175	235	80	109	
D	152.4	116	30.4	19	

( ): When using surface illumination.

### Optional Accessories

Code No.	Description	Price
172-000-100	Stand for PH-3515F	£630.00
172-116	Standard scale (50 mm)	£91.10
172-117	Standard scale (2")	£91.10
172-118	Reading scale (200 mm)	£151.00
172-119	Reading scale (8")	£151.00
172-145	5X projection lens set	£1800.00
172-161	Reading scale (300 mm)	£209.00
172-162	Reading scale (12")	£209.00
172-165	50X projection lens set	£597.00
172-166	100X projection lens set	£1070.00
172-173	20X projection lens set	£437.00
172-184	10X projection lens set	£592.00
172-286	Green filter	£185.00
172-423	Illumination unit	£520.00
332-151	OPTOEYE-200 image edge sensor*	£975.00
011534	MC special cleaner	£15.00
383228	Vinyl cover	£27.60
512305	Halogen bulb (24V, 150W)	£17.00
12AAA807D	RS-232C cable	£36.20
12AAF182	Digital counter stand	£76.40
12BAA637	Halogen bulb (24V, 200W)	£56.60

Fixture and stage accessories refer to page J-30.

QM-Data200 2D data processing unit refer to page J-28.

KA Counter digital counter refer to page H-10.

\* For details refer to page J-29.

172-868E



### Specifications

Model	PH-3515F	
Code No.	172-868E	
XY stage travel range	254x152 mm	
Measurement method	Linear encoder	
Resolution	0.001 mm or .0001" / 0.001 mm (using optional KA counter)	
Focussing method	Manual	
Quick-release mechanism	X axis	
XY stage top size	450 x 146 mm	
Swivel function	±10°	
Maximum stage loading	45 kg	
Contour illumination	Light source	Halogen bulb (24V, 150W)
	Optical system	Telecentric
	Functions	2-step (high/low) brightness switch, heat-absorbing filter, cooling fan
Surface illumination	Light source	Halogen bulb (24V, 200W)
	Optical system	Vertical illumination
	Functions	Adjustable condenser lens, vertical/ oblique surface illumination selectable, heat-absorbing filter, cooling fan
Mass	150 kg	

# PH-A14

## SERIES 172 – Profile Projector

- Bench-top model that uses a horizontal optical system.
- Suitable for thread pitch measurements – blurred or distorted images will not be produced when workpiece is angled.
- Inverted image on the day-bright screen.
- 356 mm diameter inclined protractor screen with cross hairs and staggered lines for easy alignment.
- Heavy-duty XY stage incorporates linear scales for fast, accurate measurement.

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172-810-20E

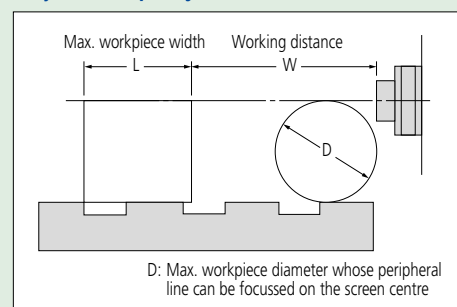
### Specifications

Model	PH-A14	
Code No.	172-810-20E	
XY stage travel range	203 x 102 mm	
Measurement method	Linear encoder	
Resolution	0.001 mm or .0001" / 0.001 mm (using optional KA counter)	
Focussing method	Manual	
XY stage top size	407 x 153 mm	
Maximum stage loading	45 kg	
Contour illumination	Light source	Halogen bulb (24V, 150W)
	Optical system	Telecentric
	Functions	2-step (high/low) brightness switch linked to main power switch, heat-absorbing filter, cooling fan
Surface illumination	Light source	Halogen bulb (24V, 150W)
	Optical system	Vertical illumination
Functions	Adjustable condenser lens, vertical/oblique surface illumination selectable linked to main power switch, heat-absorbing filter, cooling fan	
Mass	140 kg	

### Technical Data

Projected image:	Inverted
Protractor screen	
Effective diameter:	356 mm (14")
Screen material:	Fine-ground glass
Screen rotation:	±360°, fine feed and clamp
Angle reading:	Vernier (graduation: 1')
Reference lines:	Cross hairs
Projection lens:	10X ( <b>172-011</b> ) Optional: 20X, 50X, 100X
Magnification accuracy	
Contour illumination:	±0.1% or better
Surface illumination:	±0.15% or better
Maximum workpiece height:	Refer to <i>Projection Capacity</i> below
Power supply:	240VAC ±10%, 50/60Hz

### Projection Capacity



Unit: mm

	Magnification			
	10X	20X	50X	100X
View field	ø35.6	ø17.3	ø7.12	ø3.56
W	93	40	14.6	9.5
H	235		80	109
D	130	116	30.4	19

### Optional Accessories

Code No.	Description	Price
172-000-108	Stand for PH-A14	£590.00
172-011	10X projection lens set	£497.00
172-012	20X projection lens set	£437.00
172-013	50X projection lens set	£685.00
172-014	100X projection lens set	£975.00
172-116	Standard scale (50 mm)	£91.10
172-117	Standard scale (2")	£91.10
172-118	Reading scale (200 mm)	£151.00
172-119	Reading scale (8")	£151.00
172-161	Reading scale (300 mm)	£209.00
172-162	Reading scale (12")	£209.00
172-286	Green filter	£185.00
332-151	OPTOEYE-200 image edge sensor*	£975.00
011534	MC special cleaner	£15.00
512305	Halogen bulb (24V, 150W)	£17.00
12AAA807D	RS-232C cable	£36.20
12AAF182	Digital counter stand	£76.40

Fixture and stage accessories refer to page J-30.

QM-Data200 2D data processing unit refer to page J-28.

KA Counter digital counter refer to page H-10.

\* For details refer to page J-29.

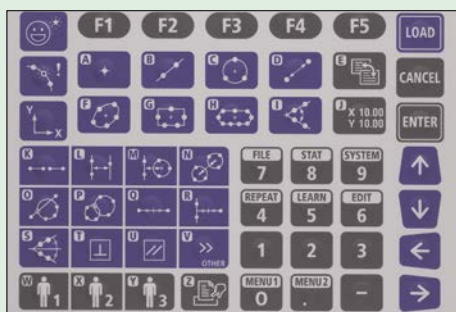


## Technical Data

Program functions:	Part program creation, execution, editing
Statistical processing:	Number of data, maximum value, minimum value, mean value, standard deviation, range, histogram
Element memory:	Maximum of 1000 elements
Element recall:	Point, line, circle, distance, ellipse, rectangular hole, slotted hole, intersection and intersecting angle
Element key-in:	Point, line, circle
Display system:	Colour graphic TFT LCD
Measurement result file output:	RS-232C output (CSV format, MUX-10F format)
Display language:	Japanese/English/German/French/Italian/Spanish/Portuguese/Czech/Chinese (simplified/traditional), Korean
Data input:	RS-232C, XYZ-axis signal, footswitch
Data output:	RS-232C, printer
Power supply:	240VAC $\pm$ 10%, 50/60Hz



264-156E Flexible-arm type.



### Intuitive panel design

The QM-Data200 employs Geometry Keys to accelerate the measurement process. The routine of probing geometric features and combinations is implemented from these dedicated keys on the front panel. Simply clicking a key and then capturing the feature coordinates means you can complete the measurement quickly and accurately. This improves operator productivity, reduces errors and saves operation time and cost.

# Optional Accessories

## SERIES 264 – QM-Data200 2D Data Processing Unit for Profile Projectors

- The QM-Data200 is a geometric readout/analysis unit for optical instruments such as profile projectors and measuring microscopes.
- This unit features powerful 2D coordinate measurement capabilities with easy-to-use key operation.
- The QM-Data200 improves operator productivity, minimizes errors and saves total measurement time and production cost.
- Informative graphic displays on the large LCD screen make for easy measurement operations.
- One-key operation for combined measurements that are often used (circle-circle distance, etc.).
- The AI measurement function (Automatic Identification of measuring item) eliminates switching between the measurement command keys.
- Equipped with a measurement procedure teaching function and measuring position navigation in Repeat mode.
- The user-menu function allows the user to store measurement commands or part programs to create custom menus.
- Tolerance zone measurement of data processing results and various statistical processing routines for each item are available.
- Measurement result output in spreadsheet (CSV) format.
- Two models are available for profile projectors: a stand mounted type with a tilt system and a flexible-arm type that attaches to the side of the instrument next to the screen.

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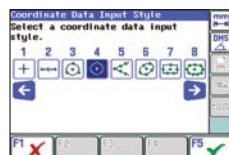
264-155E Stand mounted type

### Specifications

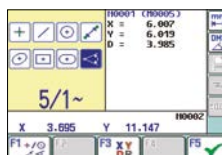
Model No.	QM-Data200	
Code No.	264-155E	264-156E
Type	Stand mount	Flexible arm
Unit of measurement	mm	
Angle	Switchable between decimal degree and sexagesimal notation	
Resolution	0.1 $\mu$ m	
Display unit	Colour graphic LCD (equipped with a backlight)	
External dimensions (W x H x D)	260 x 242 x 310 mm (including the stand section)	318 x 153 x 275 mm (when the arm is horizontal)
Mass	Approx. 2.9 kg	Approx. 2.8 kg
Price	<b>£1790.00</b>	<b>£1790.00</b>

### Graphic display

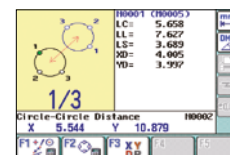
Measurement information and data are visualized on the back-lit LCD colour display with graphical interfaces. The geometric feature selected is displayed with the probing navigator. The measurements map and blink indication show the probing points and sequences. Simply probe points and click by following the blink indicator. Measurements can be easily completed even by a beginner. This improves operation accuracy and reduces errors and measurement time.



Clear function icons.



Coloured LCD display with backlight.



Guided measurements.

# Optional Accessories

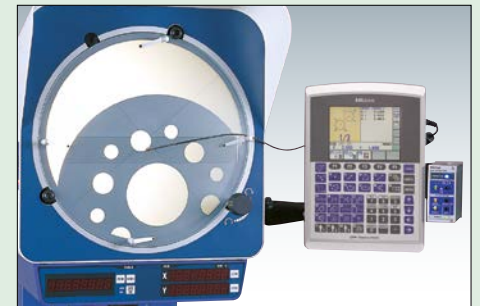
## SERIES 332 – OPTOEYE-200 Image Edge Sensor for Profile Projectors

- The OPTOEYE-200 Image Edge Sensor eliminates the human error that can occur with visual alignment when using the cross hairs for edge location, thus ensuring speedy, accurate, and consistent measurements, regardless of the operator's skill level.
- Bright and dark buttons allow easy calibration.
- A thin fibre-optic cable for the detector connection allows easy set-up and use without obstructing the operator's vision.
- OPTOEYE is conveniently powered from the QM-Data200 via the connecting cable.



## Optional Accessories

Code No.	Description	Price
12AAE671	Sensor attachment A (for ø250 to ø350 mm screen of PJ-A3000 and PH-3515)	£27.70
12AAE672	Sensor attachment B (for ø500 to ø600 mm screen of PV-5110)	£40.60



Locating the edge of a hole.

## Specifications

Code No.	332-151	
Image detection	Directivity	Non-directional
	Minimum diameter	ø2 mm on the screen
	Minimum width	1 mm on the screen
	Maximum capture speed	1000 mm/s
Illumination	Type	Surface/Contour
	Range	30 to 1500 Lux on the screen
Brightfield/darkfield difference	20 Lux	
Repeatability	1 µm in contour illumination mode	
Function	Creating, performing, and editing measuring procedures	
Price	£975.00	

## Scales for Profile Projectors

### Standard Scales

Used for checking magnification accuracy in conjunction with a reading scale.



Metric	172-116		172-330	
Code No.	172-116	172-330		
Graduation	0.1 mm			
Range	50 mm	80 mm		
Accuracy (20°C)*	±(3+5L/1000) µm			
Price	£91.10	£179.00		

\* L = measured length (mm).

Inch	172-117	
Code No.	172-117	
Graduation	.01"	
Range	2"	
Accuracy (20°C)	±.00013"	
Price	£91.10	

### Reading Scales

Specially designed for inspecting the magnified image of a standard scale on the projection screen.



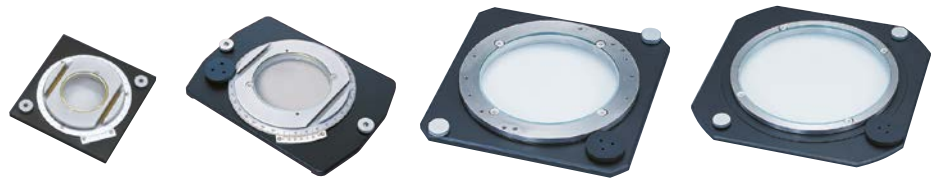
Metric	172-118			172-161		172-329	
Code No.	172-118	172-161	172-329				
Graduation	0.5 mm						
Range	200 mm	300 mm	600 mm				
Accuracy (20°C)*	±(15+15L/1000) µm						
Price	£151.00	£209.00	£520.00				

\* L = measured length (mm).

Inch	172-119		172-162	
Code No.	172-119	172-162		
Graduation	.02"			
Range	8"	12"		
Accuracy (20°C)	±.00071"			
Price	£151.00	£209.00		

## Workpiece Fixtures for Profile Projectors

### Rotary Tables



Code No.	176-106	172-198	176-305	176-306
Effective glass diameter	66 mm	96 mm	182 mm	238 mm
Angular resolution	6'	2'	—	
Fine feed	—	Available		
Mass	1.7 kg	2.4 kg	5.5 kg	6.5 kg
Price	<b>£430.00</b>	<b>£639.00</b>	<b>£1440.00</b>	<b>£1860.00</b>

### Centre Support and Centre Support Riser



172-142



172-143

Code No.	172-142	172-143
Description	Centre support	Centre support riser
Max. workpiece height	120 mm (240 mm*)	60 mm
Mass	3.3 kg	2.2 kg
Price	<b>£604.00</b>	<b>£265.00</b>

\* When using a centre support riser (172-143).

### Swivel Centre Supports



176-105

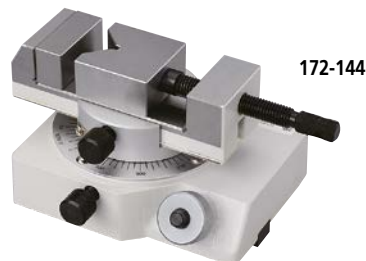


172-197

Code No.	176-105	172-197
Max. workpiece diameter	70 mm (45 mm*)	80 mm (65 mm*)
Max. workpiece length	140 mm	
Swivel range	±10°	
Mass	2.4 kg	2.5 kg
Price	<b>£581.00</b>	<b>£476.00</b>

\* When swivelled 10°.

### Rotary Vice



172-144

Code No.	172-144
Rotation range	360°
Maximum workpiece height	60 mm
Width of jaws	40 mm
Angle graduations	5°
Mass	2.8 kg
Price	<b>£632.00</b>

### V-Block with Clamp

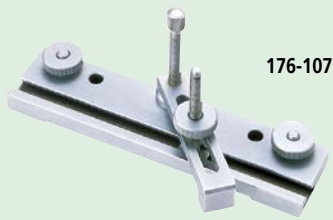


172-234

172-378

Code No.	172-234	172-378
Maximum workpiece diameter	50 mm	25 mm
Width of block	60 mm	41 mm
Mass	1.24 kg	0.8 kg
Price	<b>£325.00</b>	<b>£231.00</b>

### Holder with Clamp



176-107

Code No.	176-107
Max. workpiece height	35 mm
Mass	0.42 kg
Price	<b>£177.00</b>

### Vertical Holder



172-132

Code No.	172-132
Mass	1.3 kg
Price	<b>£221.00</b>

# VISION MEASURING SYSTEMS

K



## Quick Image



## Quick Scope



## Quick Vision



## Contents

Quick Image	K-03
QIPAK Software	K-04
Quick Scope	K-05
QSPAK Software	K-06
Quick Vision Active	K-07
Quick Vision Apex	K-08
Quick Vision Hyper	K-09
Quick Vision STREAM PLUS	K-10
Quick Vision ACCEL	K-11
Quick Vision ULTRA	K-12
Quick Vision HYBRID Type 1	K-13
Quick Vision HYBRID Type 4	K-14
Hyper Quick Vision WLI	K-15
Quick Vision TP	K-16
MISCAN Vision System	K-17
UMAP Vision System Type 2	K-18
M-NanoCoord	K-19
QVPAK Software	K-20
Optional Accessories	K-21
OPTI-FIX	K-22

# Quick Image

## SERIES 361 – 2D Vision Measuring System

- A high-resolution manual 2D Vision Measuring System featuring double telecentric, fixed-magnification optics with 4-quadrant LED ring lighting and megapixel colour CCD camera providing highly efficient, cost-effective measurement.
- Simple operation with One-Click measurement.
- The stitching function enables the entire display of a large workpiece so that highly accurate and speedy measurement can be performed.
- Deep focal depth and wide field of view objectives.
- Ideal for applications requiring distortion-free imaging with accurate measurement capability for workpieces with multi-level surfaces.
- QI-A and QI-C models provide the widest field of view while the higher magnification QI-B models offer easier measurement of very small workpieces.
- Excellent repeatability is achieved even at low magnification, and the ability to switch between deep focal depth and high resolution modes for higher accuracy enhances operability.
- Five stages are available up to the largest that provides a 400 x 200 mm XY measuring range for large or multiple workpiece applications.
- Quick-release handles enable the stage to be moved rapidly but with fine feed always available, thus saving time when measuring longer dimensions and dramatically improving productivity.
- The QI-C model is equipped with a motorized stage to offer easy and comfortable stage operation.

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### Specifications

Model	QI-A1010D	QI-A2010D	QI-A2017D	QI-A3017D	QI-A4020D
Code No.	361-850A	361-851A	361-852A	361-853A	361-854A

Model	QI-B1010D	QI-B2010D	QI-B2017D	QI-B3017D	QI-B4020D
Code No.	361-855A	361-856A	361-857A	361-858A	361-859A

Stage adjustment	Manual				
Measuring range (X : Y)	100 : 100 mm	200 : 100 mm	200 : 170 mm	300 : 170 mm	400 : 200 mm
Stage glass size	170 x 170 mm	242 x 140 mm	260 x 230 mm	360 x 230 mm	440 x 232 mm
Max. stage loading	10 kg		20 kg		15 kg
Mass	65 kg	69 kg	150 kg	158 kg	164 kg

Model	QI-C2010D	QI-C2017D	QI-C3017D
Code No.	361-860A	361-861A	361-862A
Stage adjustment	Motorized		
Measuring range (X : Y)	200 : 100 mm	200 : 170 mm	300 : 170 mm
Stage glass size	242 x 140 mm	260 x 230 mm	360 x 230 mm
Max. stage loading	10 kg	20 kg	
Mass	72 kg	153 kg	161 kg

### Technical Data for QI-A/QI-C

Measurement modes: High-resolution/normal  
 Camera type: 3 megapixel 1/2 inch colour CCD  
 Accuracy  
 Within the screen: ±2 µm (high-resolution mode), ±4 µm (normal mode)  
 E1<sub>xv</sub>: ±(3.5+0.02L) µm\*<sup>1</sup>  
 Repeatability within the screen (2σ): ±1 µm (high-resolution mode), ±2 µm (normal mode)  
 Monitor magnification\*<sup>2</sup>: 7.6X  
 Optical system  
 Working distance: 90 mm  
 Magnification\*<sup>3</sup>: 0.2X  
 Field of view: 32 x 24 mm  
 Depth of focus: ±0.6 mm (high-resolution mode), ±11 mm (normal mode)  
 Illumination: Contour, surface and 4-quadrant LED

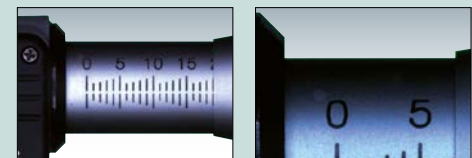
### Technical Data for QI-B

Measurement modes: High-resolution/normal  
 Camera type: 3 megapixel 1/2 inch colour CCD  
 Accuracy  
 Within the screen: ±1.5 µm (high-resolution mode), ±3 µm (normal mode)  
 E1<sub>xv</sub>: ±(3.5+0.02L) µm\*<sup>1</sup>  
 Repeatability within the screen (2σ): ±0.7 µm (high-resolution mode), ±1 µm (normal mode)  
 Monitor magnification\*<sup>2</sup>: 18.9X  
 Optical system  
 Working distance: 90 mm  
 Magnification\*<sup>3</sup>: 0.5X  
 Field of view: 12.8 x 9.6 mm  
 Depth of focus: ±0.6 mm (high-resolution mode), ±1.8 mm (normal mode)  
 Illumination: Contour, surface and 4-quadrant LED

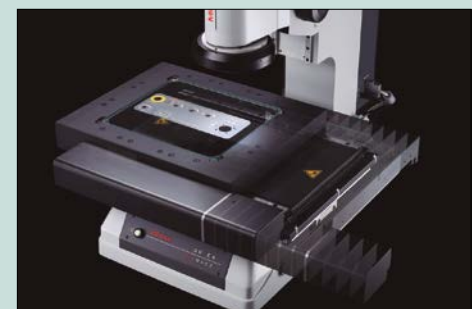
\*<sup>1</sup> L = measured length (mm).  
 \*<sup>2</sup> For 1X digital zoom (when using a 22-inch monitor).  
 \*<sup>3</sup> Double telecentric system.

### Optional Accessories

Code No.	Description
937179T	Footswitch
02ATX180	Ring light diffuse plate
12AAJ088	Reinforced footswitch



Field of view with 0.2X magnification (QI-A/QI-C).      Field of view with 0.5X magnification (QI-B).



Motorized stage.

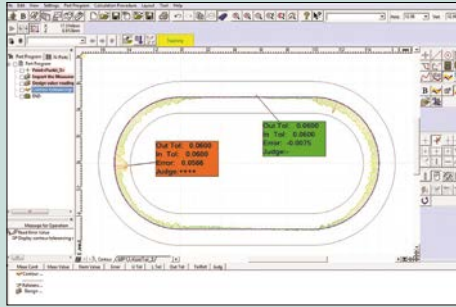
## Optional Additional Software

- QS CAD-IMPORT/EXPORT
- MeasurLink

This software provides statistical arithmetic processing of measurement results. (See page A-05 for details).

- FORMTRACEPAK-AP

Simple and easy-to-use 2D contour analysis. Graphic reports for geometry or profile. Allows measurement by comparison.



FORMTRACEPAK-AP sample screenshot.

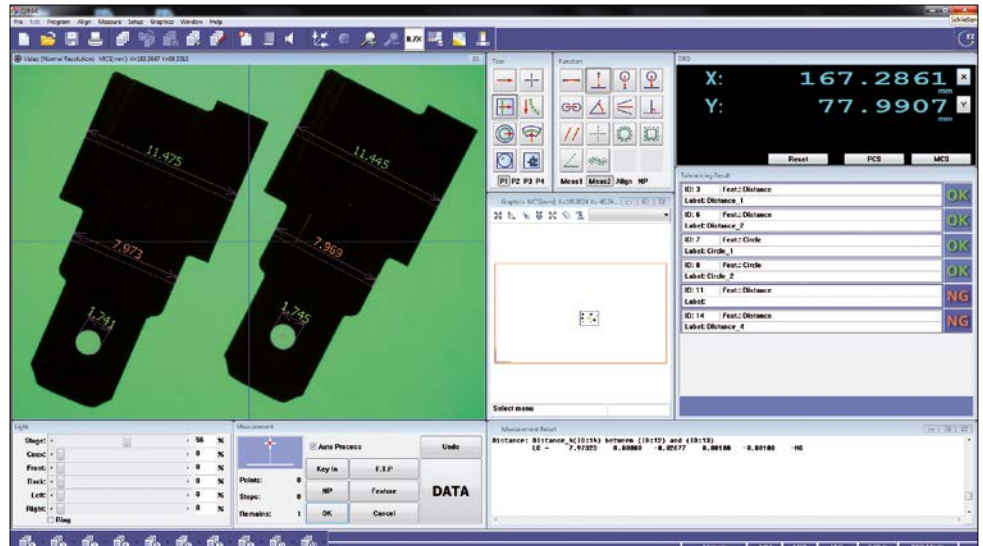
# QIPAK

## Software for Quick Image Systems

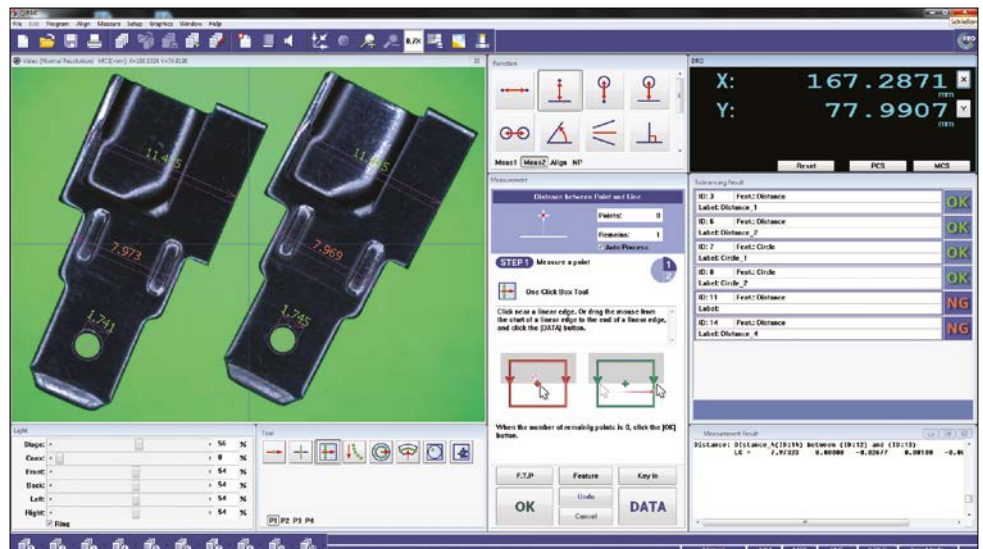
- The NEW stitching function enables the entire display of a large workpiece so that highly accurate and speedy measurement can be performed.
- One-click measurement with a quick pass/fail decision-making function enhances productivity.
- One-click edge-detection tools make this software very easy to use.
- Template tools for comparative analysis.
- Video image capture.
- Stage navigation function gives improved measurement cycles.

### MeasurLink ENABLED

Data Management Software by Mitutoyo



QIPAK layout: Pro Mode.



QIPAK layout: Easy Mode.

# Quick Scope

## SERIES 359 – 3D Vision Measuring System

- A high-resolution manual 3D Vision Measuring System featuring power-zoom optics, colour CCD camera, adaptive lighting and a Quick Navigation function for repetitive measurements to provide efficient and cost-effective operation.
- A Z-axis measurement range of 150 mm is standard on all models.
- Power zoom enables quick and easy magnification changing, with auto-focus provided for non-contact height measurement.
- 0.1 µm resolution.
- Halogen coaxial, stage and ring lighting provides versatile surface and contour illumination to match workpiece requirements.
- Three stages are available up to the largest that provides a 400x200 mm XY measuring range for large or multiple workpiece applications.
- Quick-release handles enable the stage to be moved rapidly but with fine feed always available, thus saving time when measuring longer dimensions and dramatically improving productivity.

**MeasurLink<sup>®</sup> ENABLED**  
Data Management Software by Mitutoyo



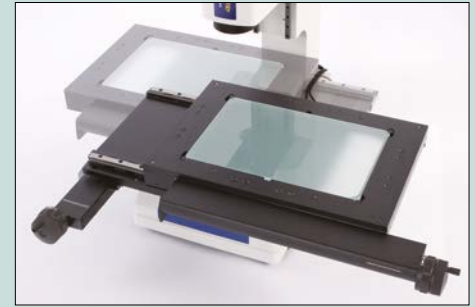
QS-L3017 Zoom AF

### Technical Data

Resolution:	0.1 µm
Scale type:	Linear encoder
Illumination	
Surface:	Halogen coaxial light, halogen ring light
Contour:	Halogen stage light
Control unit	
Dimensions:	186x452x381 mm
Mass:	14 kg

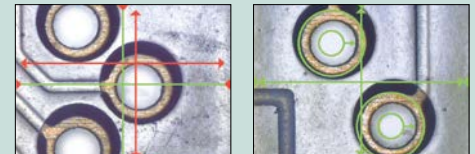
### Optional Accessories

Code No.	Description
<b>937179T</b>	Footswitch
<b>12AAJ088</b>	Reinforced footswitch



Quick release mechanism for rapid stage positioning.

### Guided stage navigation for repeat measurements



X: -6.5480 mm	X: FEED	X: 0.0000 mm	X: FEED
Y: -16.7338 mm	Y: PCS	Y: 0.0002 mm	Y: PCS
Z: 0.0005 mm	Z: MCS	Z: 0.0005 mm	Z: MCS

Step 1: Not in position.

Step 2: In position.

### Specifications

Model	QS-L2010 Zoom AF	QS-L3017 Zoom AF	QS-L4020 Zoom AF
Code No.	359-703D	359-704D	359-705D
Measuring range (X:Y:Z)	200:100:150 mm	300:170:150 mm	400:200:150 mm
Measuring accuracy (20°C)*	XY	±(2.5+2L/100) µm	
	Z	±(5+0.6L/100) µm	
Camera type	Colour CCD		
Stage glass size	250x150 mm	370x240 mm	440x240 mm
Max. stage loading	10 kg	20 kg	15 kg
Max. workpiece height	150 mm		
Main unit	Dimensions (WxDxH)	624x705x722 mm	757x860x837 mm
	Mass	66 kg	134 kg

\* Using 2.5X or 3.0X zoom magnification (QS-L Zoom AF models),  
L = measured distance between two arbitrary points (mm).



## Optional Additional Software

- QS CAD-IMPORT/EXPORT
- MeasurLink

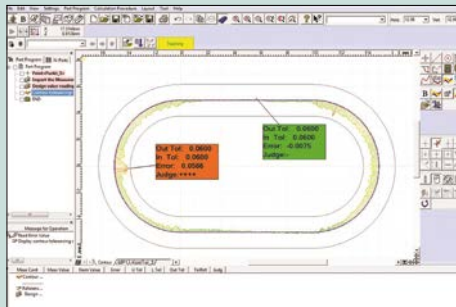
This software provides statistical arithmetic processing of measurement results. (See page A-05 for details).

- EASYPAG (only for QS CNC)

This software creates measurement procedure programs using 2D CAD data. This allows users to reduce program creation man-hours and shorten lead times.

- FORMTRACEPAK-AP

Simple and easy-to-use 2D contour analysis. Graphic reports for geometry or profile. Enables measurement by comparison.

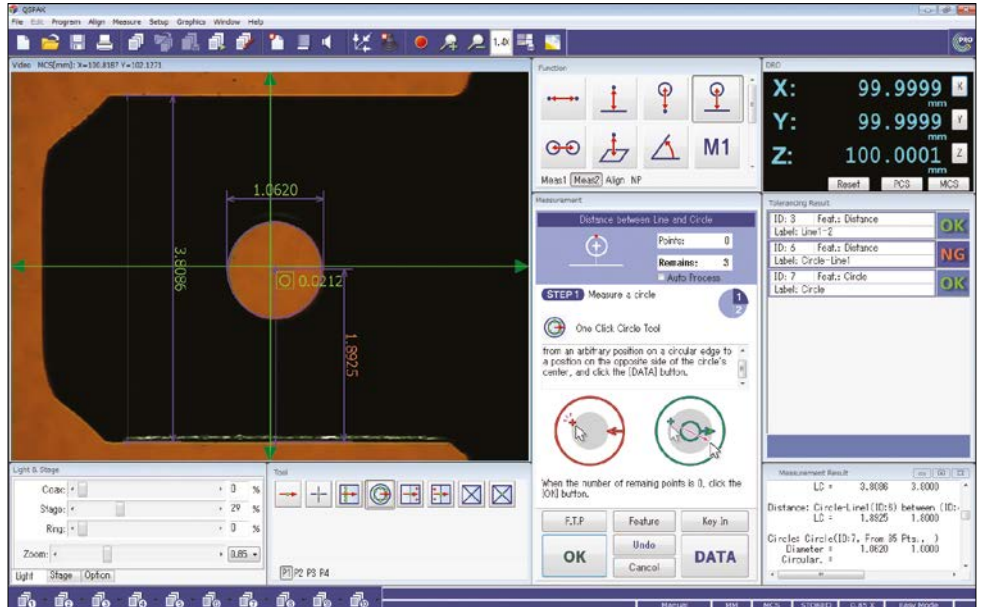


# QSPAK

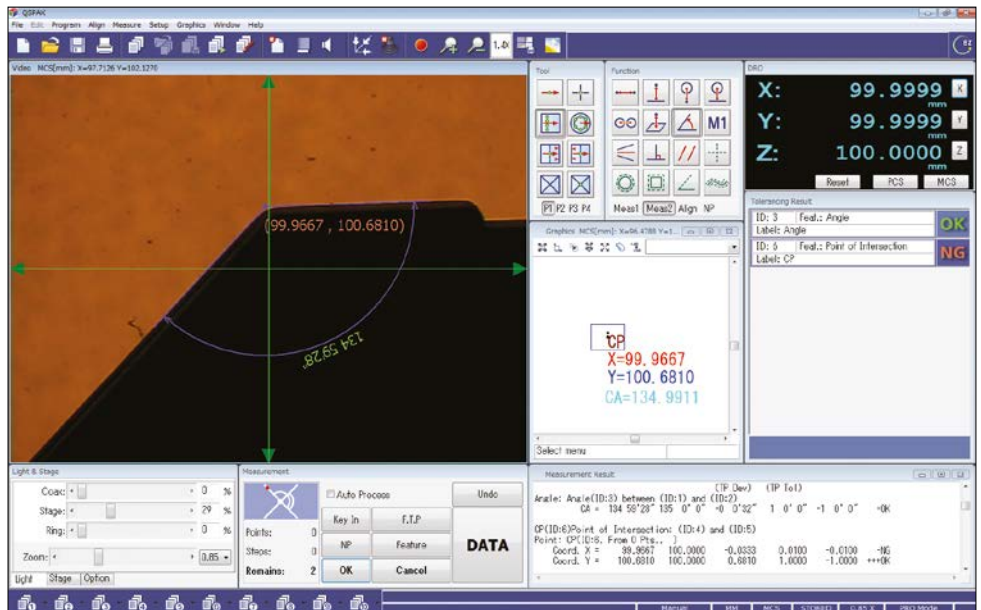
## Software for Quick Scope Systems

- Easy to use, one-click edge detection tools.
- Template tools for comparative analysis.
- Video image capture.
- Stage navigation function for CNC machines delivers improved measurement cycles.

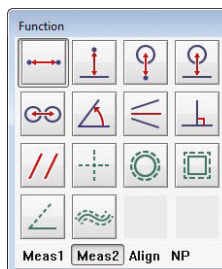
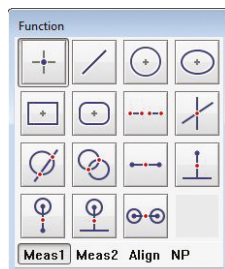
**MeasurLink** ENABLED  
Data Management Software by Mitutoyo



QSPAK layout: Easy Mode.



QSPAK layout: Pro Mode.



Measurement item commands.

# Quick Vision Active

## SERIES 363 – CNC Vision Measuring System

- This CNC vision measuring system combines the flexibility of a high quality zoom lens with the speed of a state-of-the-art digital colour camera.
- Programmable LED stage and coaxial lighting.
- Programmable 4-quadrant LED ring lighting.
- High-resolution and high-speed CMOS colour camera.
- High quality 7-step zoom optics with interchangeable lenses.
- Compact design using a fixed bridge, moving table for the ultimate in rigidity.
- Powerful, user-friendly QVPAK software.
- A touch-trigger probe option is available for applications requiring access to undercuts and similar features not accessible to the camera.

**MeasurLink<sup>®</sup> ENABLED**  
Data Management Software by Mitutoyo



QV-L202Z1L-D



### Technical Data

Resolution:	0.1 µm
Scale type:	Linear encoder
Illumination	
Coaxial:	White LED
Transmitted:	White LED
Programmable ring light:	4-quadrant fixed white LED

### Optional Accessory

Code No.	Description
02ATN695	Calibration chart with holder



Optional Opti-fix clamping system.



1X, 1.5X and 2X interchangeable lenses.

### Specifications

Model	QV Active 202	QV Active 404
Code No.	363-109Y-10Y	363-110Y-10Y
Measuring range (X:Y:Z)	200:200:150 mm	400:400:200 mm
Camera type	Colour CMOS	
Accuracy*	E1XY	±(2.0+0.3L/100) µm
	E1Z	±(3.0+0.5L/100) µm
	E2XY	±(2.5+0.4L/100) µm
Magnification changing system	Zoom optical system with 8 positions; standard 1.5X magnification lens	
Stage glass size	311 x 269 mm	466 x 480 mm
Max. stage loading	10 kg	20 kg
Dimensions (W x D x H)	570 x 767 x 845 mm	776 x 1303 x 1004 mm
Mass (main unit)	120 kg	275 kg

\* Inspected to a Mitutoyo standard. L = Measured length (mm).

# Quick Vision Apex

## SERIES 363 – Standard and High-Accuracy CNC Vision Measuring Systems

- 3D CNC Vision Measuring Systems offering a choice of accuracy specification up to the 1.0 µm class (measuring 100 mm) and high functionality.
- Programmable LED stage and coaxial lighting.
- Programmable 4-quadrant LED ring lighting provides the flexibility in lighting direction, angle and intensity that results in maximum surface contrast for best imaging resolution and accuracy.
- Pattern focus function.
- Accuracy specifications conforming to ISO 10360-7 standard are available (on request).
- A touch-trigger probe option is available for applications requiring access to undercuts and similar features not accessible to the camera.
- 3D topography measurements are possible with the optional PFF functionality. (See page K-20 for details.)
- Temperature compensation is a standard feature.

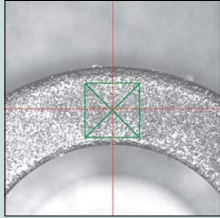
**MeasurLink** ENABLED  
Data Management Software by Mitutoyo



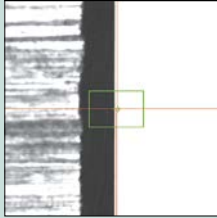
### Technical Data

Resolution:	0.1 µm
Scale type:	Linear encoder
Illumination	
Coaxial:	White LED
Transmitted:	White LED
Programmable ring light:	4-quadrant white LED

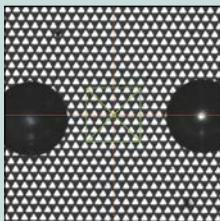
### Features



**Surface focus**  
Surface focus can be selected for each unique material type and texture. A single Z measurement is extracted in this example.



**Edge focus**  
Robust edge detection methods for use with multiple lighting techniques are available with edge focus.



**Pattern focus**  
An image of the pattern focus reticule is obtained from the surface of low contrast transparent objects or highly reflective surfaces and brought to focus. This technique is useful for measuring the height of surfaces that would otherwise be difficult to measure optically.

Programmable Ring Light (PRL), see next page for details.

### Optional Accessories

Code No.	Description
02ATN695	Calibration chart with holder

Tracking Auto Focus (TAF), see next page for details.\*<sup>1</sup>  
PFF (Points From Focus) function, see next page for details.  
Touch Probe, see page K-16 for details.

\*<sup>1</sup> Factory-fit option.



Touch Probe option.



QV Apex 302 Pro

### Specifications

Model	QV Apex 302 PRO	QV Apex 404 PRO	QV Apex 606 PRO	
Code No.	363-170-105Y	363-180-105Y	363-190-105Y	
Measuring range (X:Y:Z)	300:200:200 mm	400:400:250 mm	600:650:250 mm	
Accuracy* <sup>2</sup>	E1XY	±(1.5+0.3L/100) µm		
	E1Z	±(1.5+0.4L/100) µm		
	E2XY	±(2+0.4L/100) µm		
Camera type	B&W CCD			
Stage glass size	399x271 mm	493x551 mm	697x758 mm	
Max. stage loading	20 kg	40 kg	50 kg	
Main unit	Dimensions (WxDxH)	859x951x1609 mm	1027x1407x1778 mm	1309x1985x1794 mm
	Mass	360 kg	579 kg	1450 kg

\*<sup>2</sup> Inspected to a Mitutoyo standard. L = Measured length (mm).

# Quick Vision Hyper

## SERIES 363 – Standard and High-Accuracy CNC Vision Measuring Systems

- 3D CNC Vision Measuring Systems offering a choice of accuracy specification up to the 1.0 µm class (measuring 100 mm) and high functionality.
- Programmable LED stage and coaxial lighting.
- Programmable 4-quadrant LED ring lighting provides the flexibility in lighting direction, angle and intensity that results in maximum surface contrast for best imaging resolution and accuracy.
- Pattern focus function.
- Accuracy specifications conforming to ISO 10360-7 standard are available (on request).
- A touch-trigger probe option is available for applications requiring access to undercuts and similar features not accessible to the camera.
- 3D topography measurements are possible with the optional PFF functionality. (See page K-20 for details.)
- Temperature compensation is a standard feature.

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QV Hyper 404 Pro

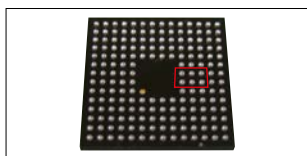
### Specifications

Model	QV Hyper 302 PRO	QV Hyper 404 PRO	QV Hyper 606 PRO
Code No.	363-173-105Y	363-183-105Y	363-193-105Y
Measuring range (X:Y:Z)	300:200:200 mm	400:400:250 mm	600:650:250 mm
Accuracy* <sup>1</sup>	E1XY	±(0.8+0.2L/100) µm	
	E1Z	±(1.5+0.2L/100) µm	
	E2XY	±(1.4+0.3L/100) µm	
Camera type	B&W CCD		
Stage glass size	399x271 mm	493x551 mm	697x758 mm
Max. stage loading	15 kg	30 kg	40 kg
Main unit	Dimensions (WxDxH)	1027 x 1407 x 1778 mm	1309 x 1985 x 1794 mm
	Mass	360 kg	579 kg

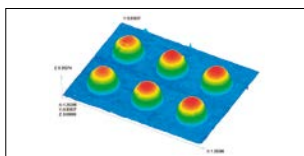
\*<sup>1</sup> Inspected to a Mitutoyo standard. L = Measured length (mm).

### Optional PFF function (Points From Focus)

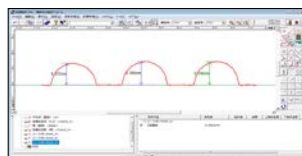
- PFF enhances the functionality of standard QV models with 3D topography measurements.
- No additional sensor necessary.
- High scanning range in Z axis from 2.7 mm up to 40.6 mm depending on the objective lens in use and in wide range mode.



Workpiece to be measured with PFF.



3D analysis of PFF measurement.



2D analysis of PFF measurement.

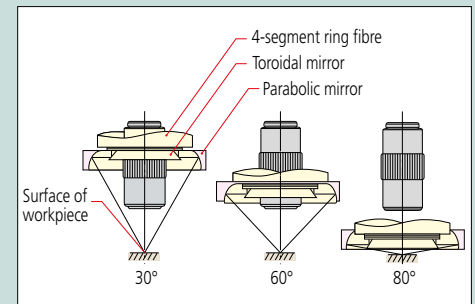
### Technical Data

Resolution:	0.02 µm
Scale type:	Linear encoder
Illumination	
Coaxial:	White LED
Transmitted:	White LED
Programmable ring light:	4-quadrant fixed white LED

### Features

#### Programmable Ring Light (PRL)

Fine control of angle and direction provides optimum illumination for optical measurement. The angle can be set in the range from 30° to 80°. This type of illumination is effective for enhancing the edge of inclined surfaces or very small steps. Illumination can be controlled independently from back or front, right or left. Measurement with edge enhancement is possible if a shadow is formed by illuminating from only one direction.



Surface focus, see previous page for details.

Edge focus, see previous page for details.

Pattern focus, see previous page for details.

### Optional Accessories

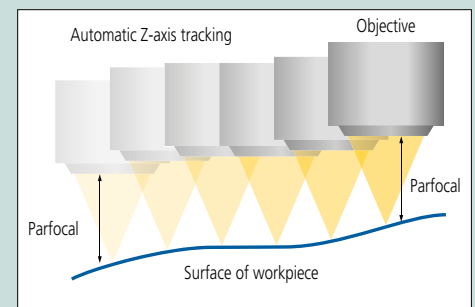
Code No.	Description
02ATN695	Calibration chart with holder

Touch Probe, see page K-16 for details.

### Tracking Auto Focus (TAF)\*<sup>2</sup>:

The TAF feature allows continuous focussing in response to changes in workpiece height. This results in improved measurement throughput.

\*<sup>2</sup> Factory-fit option.



Laser source	Semiconductor laser peak wavelength: 690 nm		
Laser safety	Class 2 (JIS C6802:2011, EN/IEC 60825-1:2007)		
Autofocus system	Objective coaxial autofocussing (knife-edge method)		
Applicable objectives	QV-HR1X, QV-SL1X	QV-HR2.5X, QV-SL2.5X	QV-5X
Tracking range	6.3 mm (±3.15 mm)	1 mm (±0.5 mm)	0.25 mm (±0.125 mm)

# Quick Vision STREAM PLUS

## SERIES 363 – Standard and High-Accuracy CNC Vision Measuring Systems

- A 3D CNC Vision Measuring System offering accuracy in the 1.8 µm class (measuring 100 mm).
- This advanced machine is hugely productive on most workpieces because of its high-intensity-LED stroboscopic image-capturing technique that operates while the stage is moving.
- Programmable ring lighting enables achievement of maximum surface contrast for best imaging resolution, and hence accuracy, on the more problematic workpiece.
- The fixed bridge, moving table design is used for the ultimate in rigidity.
- A programmable power turret provides control of magnification for optimal viewing.
- A tracking focus function that allows continuous focussing in relation to workpiece height is available.

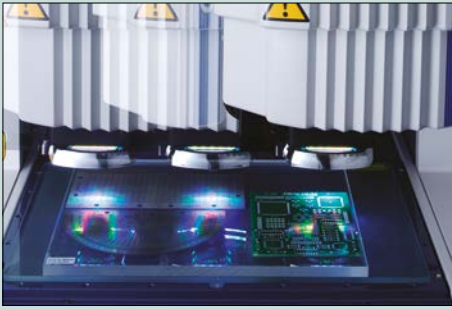
**MeasurLink** ENABLED  
Data Management Software by Mitutoyo



### Technical Data

Resolution: 0.1 µm  
Scale type: Linear encoder

### Features



#### Non-stop vision measurement means extreme improvement in throughput\*5:

Conventional vision measuring systems endlessly repeat the cycle of stage displacement, stage stop, measurement, stage start and stage displacement again. This mode of operation is a fundamental limitation on improving measurement throughput. In contrast, the Quick Vision Stream system uses an innovative image capture technique that avoids the need to repeatedly stop the stage so measurement can be continuous, but measuring accuracy is retained. Eliminating the time needed to accelerate, decelerate and then hold the stage motionless while a measurement is made achieves an extreme improvement in productivity.

\*5 Comparison of measurement throughput (using a Mitutoyo sample workpiece) with that of Mitutoyo conventional systems.

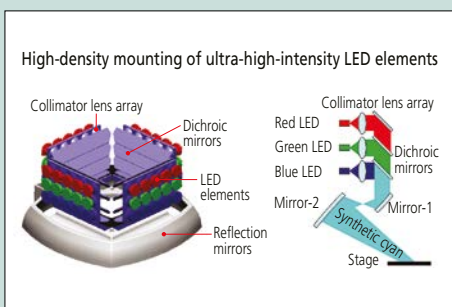
Measurement throughput comparison between QV STREAM and the conventional system: STREAM PLUS series is more than 5 times faster.

#### STREAM mode:

The measurement mode of a non-stop vision measuring system is referred to as the STREAM mode.

#### Newly developed stroboscopic illumination system:

The development of a high-intensity LED flash illuminator made non-stop vision measurement possible. At the precise moment the camera reaches a measurement point on the workpiece the illuminator creates an extremely short, high-intensity flash that effectively freezes all motion. The illuminator turns on and off so fast that no image blur occurs and the image is captured in full and accurate detail. This innovative design takes full advantage of high-density, high-intensity LED arrays aided by collimating lenses and dichroic mirrors to produce ultra bright, directional and efficient illumination.



### Optional Accessories

Code No.	Description
02ATN695	Calibration chart with holder

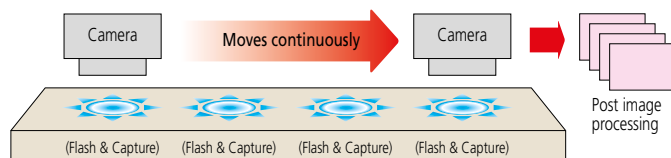
Tracking Auto Focus (TAF), see previous page for details.\*6

\*6 Factory-fit option.

QV STREAM PLUS 606



### STREAM MODE



### Specifications

Model	QV STREAM PLUS 302	QV STREAM PLUS 404	QV STREAM PLUS 606
Code No.	363-172-10Y	363-182-10Y	363-192-10Y
Measuring range (X:Y:Z)	300:200:200 mm	400:400:250 mm	600:650:250 mm
Camera type	High-sensitivity B&W, progressive scan CCD		
Accuracy*1	E1XY	±(1.5+0.3L/100) µm	
	E1Z	±(1.5+0.4L/100) µm	
	E2XY	±(2.0+0.4L/100) µm	
Illumination*2	Coaxial light*3	Colour LED	
	Transmitted light	Blue LED	
	Programmable ring light*3	Colour LED	
Magnification change system	Programmable power turret		
Max. drive speed (X/Y/Z-axis)	300 mm/s	XY: 400 mm/s, Z: 300 mm/s	
Max. measuring speed	40 mm/s		
Stage glass size	399x271 mm	493x551 mm	697x758 mm
Max. stage loading	20 kg	40 kg	50 kg
Dimensions (W x D x H)	859 x 951 x 1609 mm	1027 x 1407 x 1778 mm	1309 x 1985 x 1794 mm
Mass*4	360 kg	579 kg	1450 kg

\*1 Determined by Mitutoyo's inspection method. L is the measured length (mm).

\*2 Only one of the illumination functions (reflected, transmitted, or PRL illumination) can be set in STREAM mode. The 4-way PRL illumination can be set to flood lighting (4-direction lighting) or single-direction lighting.

\*3 Cyan illumination only while using STREAM mode.

\*4 Including machine stand.

# Quick Vision ACCEL

## SERIES 363 – Large-Sized CNC Vision Measuring Systems

- A 3D CNC Vision Measuring System in the 1.8-2.5 µm accuracy class (measuring 100 mm).
- The primary focus is on measurement efficiency, with the moving-bridge design eliminating the need for a moving stage. This allows a more simplified design of the workpiece fixture, resulting in a significant reduction in the time required for fixture fabrication and inspection.
- A programmable power turret provides control of magnification for optimal viewing.
- The exceptionally rigid construction allows a drive speed in X and Y of 400 mm/s, approximately 30% faster than standard QV Apex models, therefore minimizing non-productive time during the measuring cycle.
- A touch-trigger probe option is available for applications requiring access to undercuts and similar features not accessible to the camera. (See page K-17 for details.)

**MeasurLink<sup>®</sup> ENABLED**  
Data Management Software by Mitutoyo



### QV ACCEL 1212



### Specifications

Model	QV ACCEL 808 PRO	QV ACCEL 1010 PRO	QV ACCEL 1212 PRO	QV ACCEL 1517 PRO
Code No.	363-315Y	363-335Y	363-355Y	363-375Y
Measuring range (X:Y:Z)	800:800:150 mm	1000:1000:150 mm	1250:1250:100 mm	1500:1750:100 mm
Camera type	B&W CCD			
Accuracy*	E1xy	±(1.5+0.3L/100) µm		±(2.2+0.3L/100) µm
	E1z	±(1.5+0.4L/100) µm		±(2.5+0.5L/100) µm
	E2xy	±(2.5+0.4L/100) µm		±(3.5+0.4L/100) µm
Magnification changing system	Programmable power turret			
Max. drive speed	X/Y axes	400 mm/s		300 mm/s
	Z-axis	150 mm/s		
Stage glass size	883 x 958 mm	1186 x 1186 mm	1440 x 1440 mm	1714 x 1968 mm
Max. stage loading	10 kg	30 kg	30 kg	30 kg
Dimensions (WxDxH)	1475 x 1860 x 1578 mm	1912 x 2141 x 1603 mm	2166 x 2370 x 1554 mm	2440 x 2898 x 1554 mm
Mass	2050 kg	2950 kg	3600 kg	4500 kg

\* Determined by Mitutoyo's inspection method. L is the measured length (mm).

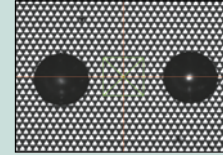
### Technical Data

Resolution:	0.1 µm
Scale type:	Linear encoder
illumination	
Coaxial:	White LED
Transmitted:	White LED
Programmable ring light:	4-quadrant white LED

### Features

#### Image multi-auto focus:

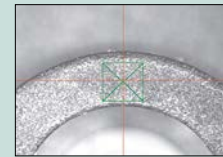
The optimal focus can be selected for each surface texture and measured feature, realizing high repeatability and reliable edge detection.



Pattern focus.



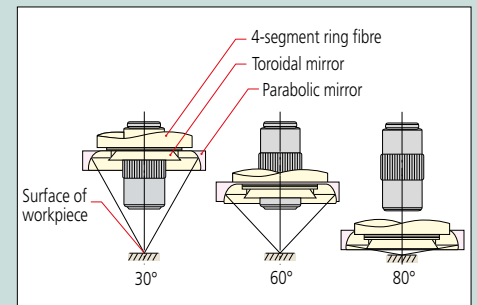
Edge focus.



Surface focus.

#### Programmable Ring Light (PRL):

Fine control of angle and direction provides optimum illumination for optical measurement. The angle can be set in the range from 30° to 80°. This type of illumination is effective for enhancing the edge of inclined surfaces or very small steps. Illumination can be controlled independently from back or front, right or left. Measurement with edge enhancement is possible if you form a shadow by illuminating from only one direction.

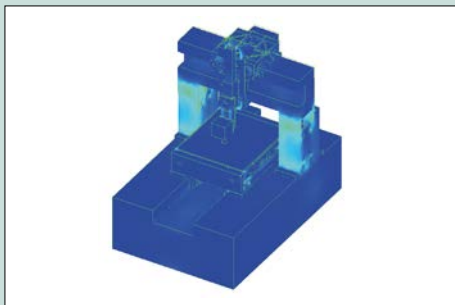


# Quick Vision ULTRA

## SERIES 363 – Ultra-High Accuracy CNC Vision Measuring System

### Technical Data

Resolution:	0.01 $\mu\text{m}$
Scale type:	Linear encoder
Illumination	
Coaxial:	Halogen
Transmitted:	Halogen
Programmable ring light:	4-quadrant halogen



By using FEM (Finite-Element Method) analysis of the base design, the placement of stiffening ribs and beams has been determined for the Quick Vision Ultra to provide optimal structural rigidity.



The Quick Vision Ultra is equipped with a crystallized glass scale having a resolution of 0.01  $\mu\text{m}$  and linear expansion coefficient of  $0.08 \times 10^{-6}/\text{K}$ . This virtually zero thermal expansion means the Quick Vision Ultra can minimize accuracy fluctuation resulting from thermal changes.



Mitutoyo's ultra-precision scale manufacturing facility eleven metres underground produces the exceptionally accurate scales for the Quick Vision Ultra.

- ULTRA QV404 PRO is an ultra-high accuracy CNC vision measuring system.
- This machine uses air bearings specially developed for use in high-accuracy 3D measuring machines on the X-, Y-, and Z-axes to provide a guide system with minimum straightness errors.
- Optimal design is achieved by using FEM (Finite Element Method) analysis to provide high rigidity of the main unit.
- An optical linear encoder featuring a resolution of 0.01  $\mu\text{m}$  has been adopted for the all-important length measurement system. In order to minimize error caused by temperature fluctuations, the linear encoder scale is made of a special crystallized glass whose expansion coefficient is almost zero.
- This model supports ISO10360-7:2011 guaranteed accuracy (specifications on request).
- 3D topography measurements are possible with the optional PFF functionality. (See page K-20 for details.)

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ULTRA QV 404 PRO

### Specifications

Model	ULTRA QV 404 PRO	
Code No.	363-518-105Y	
Measuring range (X:Y:Z)	400:400:200 mm	
Camera type	High-sensitivity B&W CCD	
Accuracy* <sup>1</sup>	E1XY	$\pm(0.25+0.1L/100) \mu\text{m}$
	E1Z	$\pm(1.5+0.2L/100) \mu\text{m}$ [(1.0+0.2L/100) $\mu\text{m}$ : 10 - 60 mm]
	E2XY	$\pm(0.5+0.2L/100) \mu\text{m}$
Magnification changing system	Programmable power turret	
Max. drive speed (X/Y/Z-axis)	150 mm/s	
Stage glass size	493 x 551 mm	
Max. stage loading	40 kg	
Dimensions (WxDxH)	1172 x 1735 x 1910 mm	
Mass* <sup>2</sup>	2150 kg	

\*<sup>1</sup> Determined by Mitutoyo's inspection method. L is the measured length (mm).

\*<sup>2</sup> Including machine stand.

# Quick Vision HYBRID Type 1

## SERIES 365 – CNC Vision Measuring Systems equipped with a Non-Contact Displacement Sensor

- The Quick Vision Hybrid Type 1 is a complex machine which allows vision measurement with both a CCD camera and high-speed scanning by applying a vision measurement unit in parallel with a non-contact displacement sensor.
- The focussing point method minimizes any difference in the measuring face reflectance and achieves high measurement reproducibility.
- Capable of measuring detailed shapes at high resolution.

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QV H1 APEX 404



### Specifications

Model		QV H1 Apex 302	QV H1 Apex 404	QV H1 Apex 606
<b>Code No.</b>		<b>365-170-10SY</b>	<b>365-180-10SY</b>	<b>365-190-10SY</b>
Measuring range (X:Y:Z)	Vision	300:200:200 mm	400:400:250 mm	600:650:250 mm
	Non-contact displacement sensor	180:200:200 mm	280:400:250 mm	480:650:250 mm
Accuracy (Vision)*	E1XY		$\pm(1.5+0.3L/100) \mu\text{m}$	
	E1Z		$\pm(1.5+0.4L/100) \mu\text{m}$	
	E2XY		$\pm(2+0.4L/100) \mu\text{m}$	
Accuracy (Non-contact displacement sensor)*	E1Z		$\pm(1.5+0.4L/100) \mu\text{m}$	

Model		QV H1 Hyper 302	QV H1 Hyper 404	QV H1 Hyper 606
<b>Code No.</b>		<b>365-173-10SY</b>	<b>365-183-10SY</b>	<b>365-193-10SY</b>
Measuring range (X:Y:Z)	Vision	300:200:200 mm	400:400:250 mm	600:650:250 mm
	Non-contact displacement sensor	180:200:200 mm	280:400:250 mm	480:650:250 mm
Accuracy (Vision)*	E1XY		$\pm(0.8+0.2L/100) \mu\text{m}$	
	E1Z		$\pm(1.5+0.2L/100) \mu\text{m}$	
	E2XY		$\pm(1.4+0.3L/100) \mu\text{m}$	
Accuracy (Non-contact displacement sensor)*	E1Z		$\pm(1.5+0.2L/100) \mu\text{m}$	

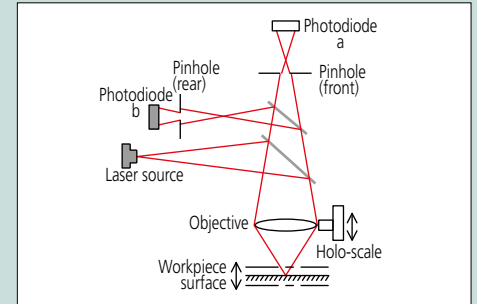
Model		QV H1 STREAM PLUS 302	QV H1 STREAM PLUS 404	QV H1 STREAM PLUS 606
<b>Code No.</b>		<b>365-172-10Y</b>	<b>365-182-10Y</b>	<b>365-192-10Y</b>
Measuring range (X:Y:Z)	Vision	300:200:200 mm	400:400:250 mm	600:650:250 mm
	Non-contact displacement sensor	180:200:200 mm	280:400:250 mm	480:650:250 mm
Accuracy (Vision)*	E1XY		$\pm(1.5+0.3L/100) \mu\text{m}$	
	E1Z		$\pm(1.5+0.4L/100) \mu\text{m}$	
	E2XY		$\pm(2.0+0.4L/100) \mu\text{m}$	
Accuracy (Non-contact displacement sensor)*	E1Z		$\pm(1.5+0.4L/100) \mu\text{m}$	

Model		QV H1 ACCEL 808	QV H1 ACCEL 1010	QV H1 ACCEL 1212	QV H1 ACCEL 1517
<b>Code No.</b>		<b>365-315Y</b>	<b>365-335Y</b>	<b>365-355Y</b>	<b>365-375Y</b>
Measuring range (X:Y:Z)	Vision	800:800: 150 mm	1000:1000: 150 mm	1250:1250: 100 mm	1500:1750: 100 mm
	Non-contact displacement sensor	680:800: 150 mm	880:1000: 150 mm	1130:1250: 100 mm	1380:1750: 100 mm
Accuracy (Vision)*	E1XY		$\pm(1.5+0.3L/100) \mu\text{m}$	$\pm(2.2+0.3L/100) \mu\text{m}$	
	E1Z		$\pm(1.5+0.4L/100) \mu\text{m}$	$\pm(2.5+0.5L/100) \mu\text{m}$	
	E2XY		$\pm(2.5+0.4L/100) \mu\text{m}$	$\pm(3.5+0.4L/100) \mu\text{m}$	
Accuracy (Non-contact displacement sensor)*	E1Z		$\pm(2.5+0.4L/100) \mu\text{m}$	$\pm(3.5+0.5 L/100) \mu\text{m}$	

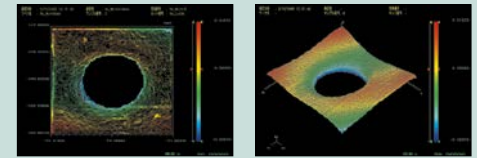
\* Determined by Mitutoyo's inspection method. L is the measured length (mm).

### Features

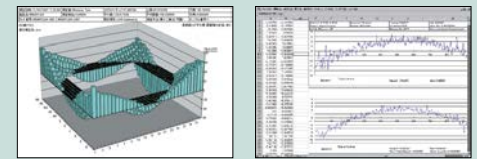
- The focussing point method minimizes any difference in the measuring face reflectance and realizes high measurement reproducibility.
- The double pinhole method (less directivity) is employed as the measurement principle.



- Curved-form analysis (MSHAPE-QV).
- 2D/3D contour lines display.
- 2D/3D unfiltered profile display.
- Shadow graph display.
- Curved plane analysis.
- Unfiltered profile analysis, etc.



- Data processing (QV Graph).
- 3D bar chart display.
- 3D surface chart display.
- 2D continuous cross-section graph display.



The scanning laser system for Quick Vision HYBRID Type 1 adds 3D profiling capability. The laser probe with 0.01 μm resolution continuously scans the workpiece surface and gathers coordinate data, enabling the evaluation of surface contours, peak heights, etc.

### Laser beam safety precautions

This system uses a low-power invisible laser beam (780 nm) which corresponds to CLASS 1 (invisible radiation) of IEC60825-1 for measurement. The CLASS 1 laser warning label as shown below is attached to the main unit.





# Quick Vision HYBRID Type 4

## SERIES 365 – CNC Vision Measuring Systems equipped with a Non-Contact Displacement Sensor

- The Quick Vision Hybrid Type 4 is a complex machine which enables vision measurement with both a CCD camera and high-speed scanning by applying a vision measurement unit in parallel with a non-contact displacement sensor.
- Measuring range of the scanning sensor is 0 - 1200 µm.
- Effective even for high inclination angles both of highly reflective surfaces and diffuse surfaces. Maximum measurable inclination angle: ±80° (diffuse surface).
- Achieves high-resolution and high-accuracy height measurement by the wavelength confocal method using axial chromatic aberration.
- Automatic light intensity control provides reliable measurements even when reflectance of the measured surface changes during measurement.
- Enables surface topography and the thickness of transparent objects to be measured.

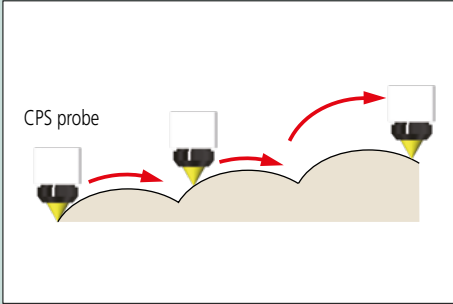
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### Features



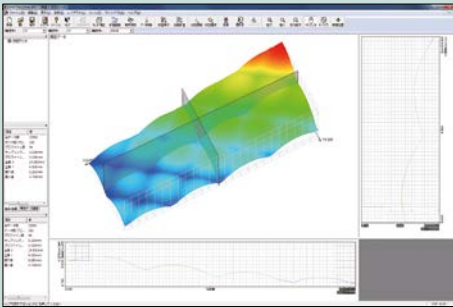
The Quick Vision Hybrid Type 4 is a machine which allows vision measurement with a CCD camera and high-speed scanning with a non-contact displacement sensor.



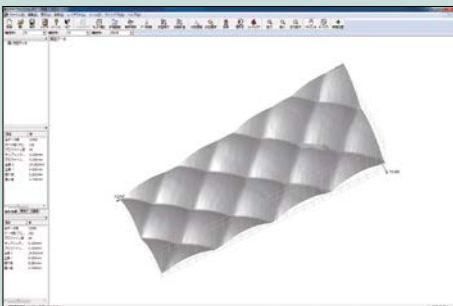
Scanning measurement with automatic movement in the Z-axis direction.

### FORMTRACEPAK-PRO

Analysis example.



Colour-coded 3D display.



Shaded display.

### Laser beam safety precautions

This system uses a low-power invisible laser beam (780 nm) which corresponds to CLASS 1 (invisible radiation) of IEC60825-1 for measurement. The CLASS 1 laser warning label as shown below is attached to the main unit.

**CLASS 1 LASER PRODUCT**



### Specifications

Model		QV H4 Apex 302	QV H4 Apex 404	QV H4 Apex 606
Code No.		365-413-10SY	365-433-10SY	365-453-10SY
Measuring range (X:Y:Z)	Vision	300:200:200 mm	400:400:250 mm	600:650:250 mm
	Non-contact displacement sensor	176:200:200 mm	276:400:250 mm	476:650:250 mm
Accuracy (Vision)*	E1xy		±(1.5+0.3L/100) µm	
	E1z		±(1.5+0.4L/100) µm	
	E2xy		±(2+0.4L/100) µm	
Accuracy (Non-contact displacement sensor)*	E1z		±(1.5+0.4L/100) µm	

Model		QV H4 Hyper 302	QV H4 Hyper 404	QV H4 Hyper 606
Code No.		365-416-10SY	365-436-10SY	365-456-10Y
Measuring range (X:Y:Z)	Vision	300:200:200 mm	400:400:250 mm	600:650:250 mm
	Non-contact displacement sensor	176:200:200 mm	276:400:250 mm	476:650:250 mm
Accuracy (Vision)*	E1xy		±(0.8+0.2L/100) µm	
	E1z		±(1.5+0.2L/100) µm	
	E2xy		±(1.4+0.3L/100) µm	
Accuracy (Non-contact displacement sensor)*	E1z		±(1.5+0.2L/100) µm	

Model		QV H4 STREAM PLUS 302	QV H4 STREAM PLUS 404	QV H4 STREAM PLUS 606
Code No.		365-415-10Y	365-435-10Y	365-455-10Y
Measuring range (X:Y:Z)	Vision	300:200:200 mm	400:400:250 mm	600:650:250 mm
	Non-contact displacement sensor	176:200:200 mm	276:400:250 mm	476:650:250 mm
Accuracy (Vision)*	E1xy		±(1.5+0.3L/100) µm	
	E1z		±(1.5+0.4L/100) µm	
	E2xy		±(2.0+0.4L/100) µm	
Accuracy (Non-contact displacement sensor)*	E1z		±(1.5+0.4L/100) µm	

\* Determined by Mitutoyo's inspection method. L is the measured length (mm).

# Hyper Quick Vision WLI

## SERIES 363 – Non-Contact 3D Measuring System

- The Hyper Quick Vision WLI can measure coordinates and dimensions and assess micro-3D forms without contact.
- This machine is a high accuracy, dual-head vision measuring system equipped with a white light interferometer enabling high accuracy freeform surface measurement by using interference-fringe analysis.
- The standard vision measuring function can continuously perform coordinate, dimension and 3D shape measuring without interruption.
- The large work stage easily handles large-sized workpieces such as PCBs.
- Enhanced functionality with the WLI system for high-resolution topography evaluation such as surface roughness analysis.

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### Hyper QV WLI 606



### Specifications

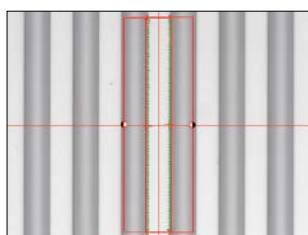
Model	Hyper QV WLI 302	Hyper QV WLI 404	Hyper QV WLI 606	
Code No.	363-713-10Y	363-714-10SY	363-715-10SY	
Measuring range	Vision measuring area	300 : 200 : 190 mm	400 : 400 : 240 mm	600 : 650 : 220 mm
	WLI measuring area*1	215 : 200 : 190 mm	315 : 400 : 240 mm	515 : 650 : 220 mm
Camera type	B&W CCD			
Accuracy*2	E1xy	±(0.8+0.2L/100) μm		
	E1z	±(1.5+0.2L/100) μm		
	E2xy	±(1.4+0.3L/100) μm		
WLI head tube lens	2X			
Magnification change system	Programmable power turret			
Repeatability (WLI head)	2σ ≤ 0.08 μm			
WLI head Z-axis scanning range*3	170 μm			
Max. stage loading	15 kg	25 kg	35 kg	
Dimensions (W x D x H)	859 x 950 x 1606 mm	1027 x 1407 x 1781 mm	1309 x 1985 x 1792 mm	
Mass*4	490 kg	1160 kg	2275 kg	

\*1 Movable range of WLI optical head.

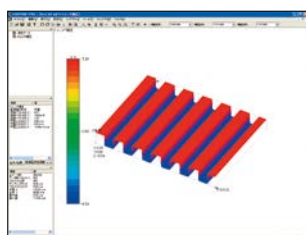
\*2 Determined by Mitutoyo's inspection method. L is the measured length (mm).

\*3 Applies to standard mode. Applicable to max. 200 μm by modifying scan pitch.

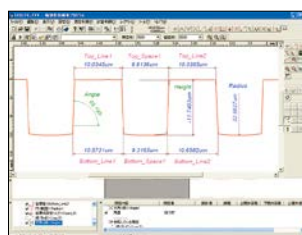
\*4 Including machine stand.



Video image of part.



3D analysis of measured part.



2D analysis of measured part.

### Technical Data

Resolution:	0.1 μm
Scale type:	Linear encoder
Illumination	
Coaxial:	White LED
Transmitted:	White LED
Programmable ring light:	4-quadrant white LED
Tube lens WLI head:	2X

### Optional Accessories

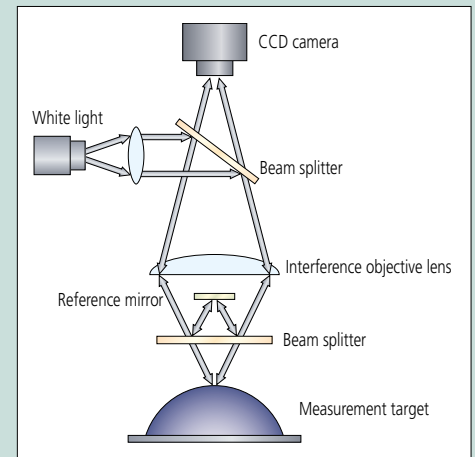
Code No.	Description
02ALT600	QV WLI 25X objective
02ALT630	QV WLI 10X objective
02ALY400	QV WLI 5X objective



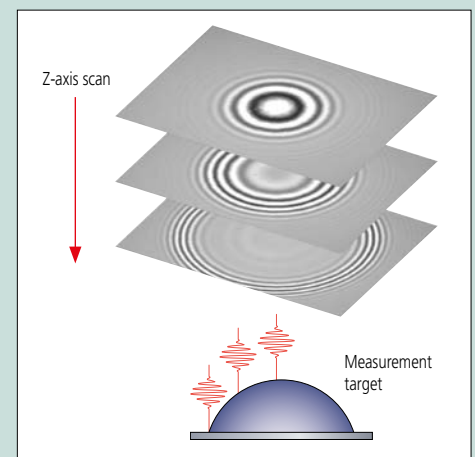
10X objective



25X objective



WLI optical system head.



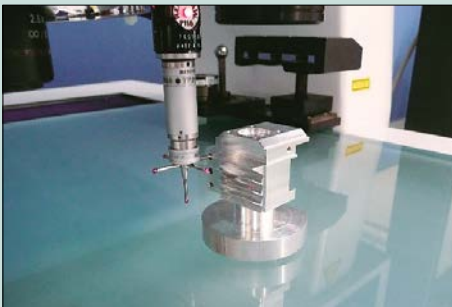
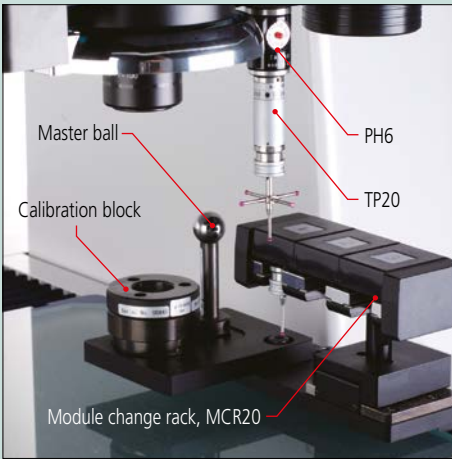
Interference fringe production and measurement by WLI.

# Quick Vision TP

## SERIES 364 – CNC Vision Measuring System equipped with a Touch Trigger Probe

- An optional touch probe (TP) is available for the following QV models: Quick Vision ACTIVE, Quick Vision APEX, Quick Vision HYPER, Quick Vision ACCEL.
- The Quick Vision TP system enables both non-contact and contact measurements using the same machine.
- Compatible with Renishaw Touch Probes TP-20 and TP-200.
- The MCR20 rack supplied as a standard accessory for storing probe modules ready for use is a powerful aid for increasing the scope of application and improving productivity.

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QV TP Apex 302



### Specifications

Model	QV TP Active 202	QV TP Active 404
Code No.	364-109-10Y	364-110-10Y
Measuring range Vision	200 : 200 : 150 mm	400 : 400 : 200 mm
(X : Y : Z)* <sup>1</sup> Touch Trigger Probe	134 : 200 : 150 mm	334 : 400 : 200 mm
Accuracy (Touch Probe) E1xyz* <sup>2</sup>	±(2.4+0.4L/100) μm	

Model	QV TP Apex 302	QV TP Apex 404	QV TP Apex 606
Code No.	364-170-10SY	364-180-10SY	364-190-10SY
Measuring range Vision	300 : 200 : 200 mm	400 : 400 : 250 mm	600 : 650 : 250 mm
(X : Y : Z)* <sup>1</sup> Touch Trigger Probe	234 : 200 : 200 mm	334 : 400 : 250 mm	534 : 650 : 250 mm
Accuracy (Touch Probe) E1xyz* <sup>2</sup>	±(1.8+0.3L/100) μm		

Model	QV TP Hyper 302	QV TP Hyper 404	QV TP Hyper 606
Code No.	364-173-10SY	364-183-10SY	364-193-10SY
Measuring range Vision	300 : 200 : 200 mm	400 : 400 : 250 mm	600 : 650 : 250 mm
(X : Y : Z)* <sup>1</sup> Touch Trigger Probe	234 : 200 : 200 mm	334 : 400 : 250 mm	534 : 650 : 250 mm
Accuracy (Touch Probe) E1xyz* <sup>2</sup>	±(1.7+0.3L/100) μm		

Model	QVTPACCEL808	QVTPACCEL1010	QVTPACCEL1212	QVTPACCEL1517
Code No.	364-315Y	364-335Y	364-355Y	364-375Y
Measuring range Vision	800 : 800 : 150 mm	1000 : 1000 : 150 mm	1250 : 1250 : 100 mm	1500 : 1750 : 100 mm
(X : Y : Z)* <sup>1</sup> Touch Trigger Probe	734 : 800 : 150 mm	934 : 1000 : 150 mm	1184 : 1250 : 100 mm	1434 : 1750 : 100 mm
Accuracy (Touch Probe) E1xyz* <sup>2</sup>	±(1.8+0.3L/100) μm	±(3+0.4L/100) μm	±(6+0.7L/100) μm	

\*<sup>1</sup> When a module change rack, a master ball, and a calibration ring are mounted, the measurement ranges are smaller than those given in the table. Other specifications are the same as those for QV Active, QV Apex, Hyper QV, and QV ACCEL. Please contact our sales office for more details.  
\*<sup>2</sup> Determined by Mitutoyo's inspection method. L is the measured length (mm).

### Laser beam safety precautions

This system uses a low-power invisible laser beam (780 nm) which corresponds to CLASS 1 (invisible radiation) of IEC60825-1 for measurement. The CLASS 1 laser warning label as shown below is attached to the main unit.

**CLASS 1 LASER PRODUCT**

# MiSCAN Vision System

## SERIES 364 – CNC Vision Measuring System equipped with the MPP-NANO Scanning Probe or SP25M Scanning Probe

- MiSCAN Vision System is available in two sizes.
- MCOSMOS and VISIONPAK-PRO software offers highest functionality for both tactile and non-contact measurements.

### MPP-NANO Scanning Probe:

- Specially designed for high accuracy scanning measurements of minute parts.

### SP25M Scanning Probe:

- Provides accurate scanning measurements with high throughput.
- Automatic stylus changing ensures flexible measurement cycles with combined non-contact and contact measurements.

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MVS Hyper 302



### Specifications

Model	MVS Hyper 302	MVS Hyper 404	MVS 404 Apex	
Code No.	364-502SY	364-512SY	364-511SY	
Measuring range (X:Y:Z)	Vision measuring area	300:200:200 mm	400:400:250 mm	
	MPP-NANO/SP25M measuring area	175:200:200 mm	275:400:250 mm	
Camera type	B&W CCD			
Scanning probe type	MPP-NANO or SP25M	SP25M only		
Accuracy* <sup>1</sup>	Vision* <sup>2</sup>	E1XY	±(0.8+0.2L/100) μm	±(1.5+0.3L/100) μm
		E1z	±(1.5+0.2L/100) μm	±(1.5+0.4L/100) μm
		EzXY	±(1.4+0.3L/100) μm	±(2.0+0.4L/100) μm
	MPP-NANO	EOMPE	±(1.9+0.4L/100) μm	—
		SP25M	EOMPE	±(1.9+0.4L/100) μm
Scanning accuracy	MPP-NANO	0.6 μm	—	
	SP25M	MPETHP	2.5 μm	2.7 μm
Probing accuracy	MPP-NANO	0.6 μm	—	
	SP25M	PFTU,MPE	1.9 μm	2.2 μm
Magnification change system	Programmable power turret			
Repeatability (MPP-NANO)	0.05 μm	—		
Stage glass size	399x271 mm	493x551 mm		
Max. stage loading	15 kg	30 kg	40 kg	
Dimensions (WxDxH)	859x951x1609 mm	1027x1407x1778 mm		
Mass* <sup>3</sup>	360 kg	579 kg		

\*<sup>1</sup> Determined by Mitutoyo's inspection method. L is the measured length (mm).

\*<sup>2</sup> Using a QV-HR 2.5X objective and 2X tube lens.

\*<sup>3</sup> Including machine stand.

### Technical Data

Resolution	MVS Hyper 302/404: 0.02 μm
	MVS 404 Apex: 0.1 μm
Scale type:	Linear encoder
Illumination	
Coaxial:	White LED
Transmitted:	White LED
Programmable ring light:	4-quadrant white LED

### MPP-NANO Stylus Dimensions

Item	Aspect ratio	Tip material
No.1	16	Ruby
No.2	13.3	Ruby
No.3		Diamond
No.4	9	Ruby
No.5	17	Ruby



MPP-NANO scanning probe.



SP25M scanning probe.



FCR25 change rack.

# UMAP Vision System Type 2

## SERIES 364 – Micro Form Measuring System

- The extremely small styli used by the Ultra Micro Accurate Probe (UMAP) system have made possible highly accurate measurement of minute features not previously possible with a contact method.
- Sophisticated, high accuracy non-contact and contact measurement capabilities with one machine.
- This unit includes the UMAP probe and the non-contact type vision head. The combination of contact and non-contact measurement methods at this scale provides a solution for previously difficult (or even impossible) applications.

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Data Management Software by Mitutoyo



### Hyper UMAP 302 Type 2

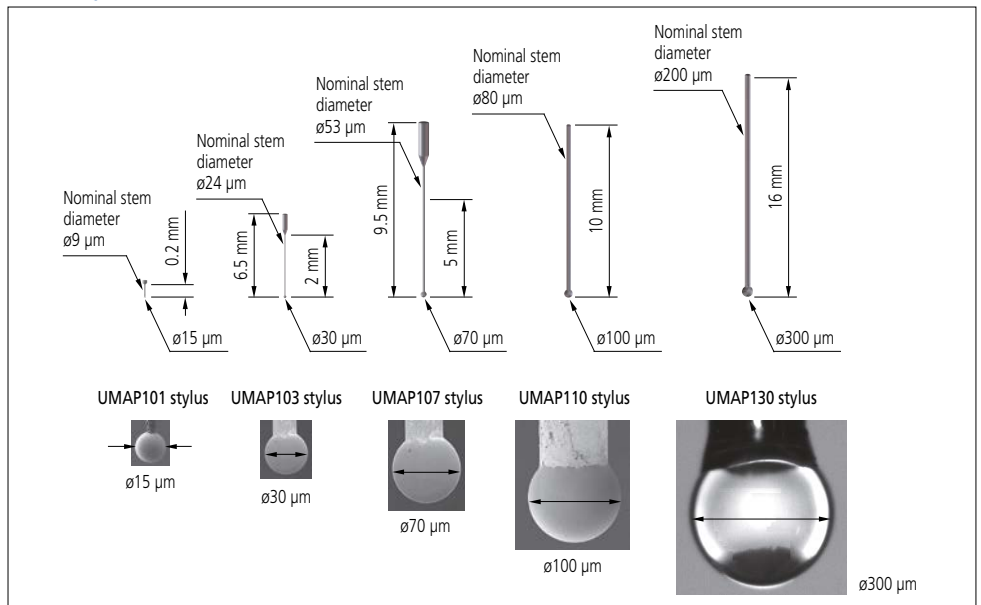


### Specifications

Model	Hyper UMAP 302 Type 2	ULTRA UMAP 404 Type 2
Code No.	364-713-10SY	364-717-10SY
Measuring range	X:Y	185:200 mm
	Z (UMAP101/103)	175 mm
	Z (UMAP107/110)	180 mm
	Z (UMAP130)	185 mm
Accuracy* (Vision)	E1xy	$\pm(0.8+0.2L/100) \mu\text{m}$
	E1z	$\pm(1.5+0.2L/100) \mu\text{m}$
Repeatability	UMAP 101/103/107	$\sigma = 0.1 \mu\text{m}$
	UMAP 110/130	$\sigma = 0.15 \mu\text{m}$

\* Inspected to a Mitutoyo standard. L = Measured length (mm).

### UMAP Stylus Dimensions

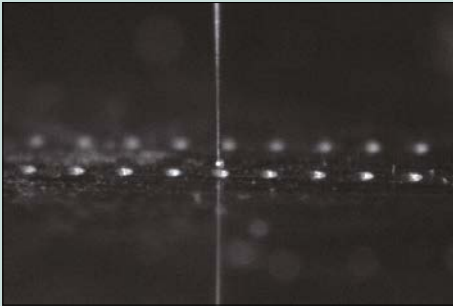


### UMAP Probe

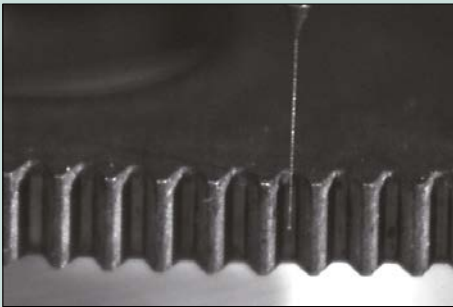


A stylus vibrating at an ultrasonic frequency enables the UMAP probe to sense contact with minute workpiece features. Five stylus tip diameters are available, from 15 to 300  $\mu\text{m}$ .

### Application Examples



Contour measurement of a  $\phi 0.125$  hole.



Measuring form accuracy of micro gear teeth.

K

# M-NanoCoord

## Micro Form Measuring System

- M-NanoCoord is an ultra-high accuracy CNC vision measuring system developed to target the micro-measurement field by applying specialised and highly sensitive sensors that enable accurate measurement of minute workpieces such as MEMS products, precision dies and moulds, and aspherical lenses.
- Vision capability is provided by the standard Quick Vision series head and this can be augmented by either of two optional, factory-fit, highly sophisticated contact sensors (UMAP or LNP).
- The extremely small styli used by the Ultrasonic Micro Probe (UMAP) have made possible highly accurate measurement of minute features not previously possible with a contact method, such as variation of diameter and straightness of a very small diameter hole.
- Touch-probe operation to a resolution of 0.25 nm over a range of 20 mm using a diamond stylus (2 µm radius) or a ruby ball (300 µm radius) in the Long-range Nano Probe (LNP) makes this sensor ideal for measurement of precision form, such as the optically polished surface of an aspherical lens.

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M-NanoCoord

### Specifications

Model	M-NanoCoord
Resolution	1 nm
Measuring range (X:Y:Z)	200:200:100 mm
Camera type	High-sensitivity CCD
Accuracy (E1XY)* <sup>1</sup>	±(0.2+L/1000) µm
Magnification changing system	Programmable power turret
Illumination	4-quadrant LED programmable ring light
Structure	XY-plane guiding structure
Guide system	Hydrostatic air bearing
Scales	Low expansion laser holoscale

\*<sup>1</sup> Determined by Mitutoyo's inspection method. L is the measured length (mm).

### Factory-Fit Options

#### UMAP Probe (Ultrasonic Micro Probe):

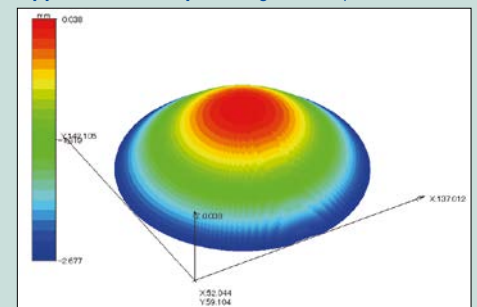
A system configured with this probe is especially suitable for measuring micro-sized holes. The stylus vibrates at an ultrasonic frequency and enables the UMAP probe to sense contact with minute workpiece features. Five stylus tip diameters are available, from 15 to 300 µm.

#### LNP Probe (Long-range Nano Probe):

LNP enables touch-probe measurement of minute workpiece features using either a conical diamond or ruby ball stylus and scanning measurement, including steeply inclined surfaces up to 80°, with the ruby ball. Measuring force is an ultra-low 10-750 µN.

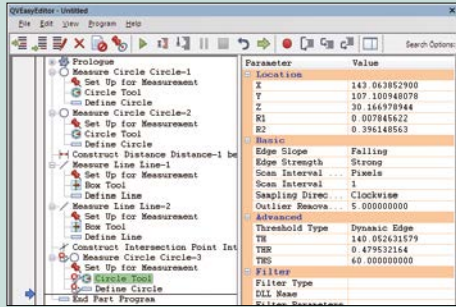


### Application Example (using the LNP probe)



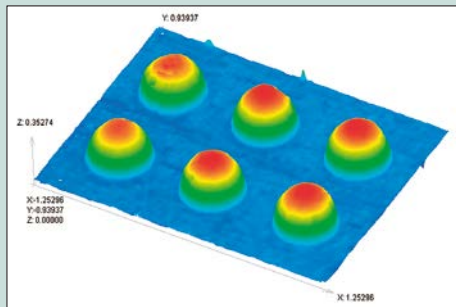
Aspherical lens measurement result in terms of deviation from the designed profile.

## QV EasyEditor



QV EasyEditor is equipped as standard, and enables simple editing of part programs. This is the most powerful software that can be created by combining QV EasyEditor, which does not require specialized knowledge, and QV Basic Editor, which provides the full functions that satisfy software developers. This software enables users to simply correct errors occurring during program execution as well as to edit, insert, and delete part programs with ease, which reduces errors caused by variations in workpieces and the man hours needed for program revision associated with design change.

## Optional PFF Function (Points From Focus)

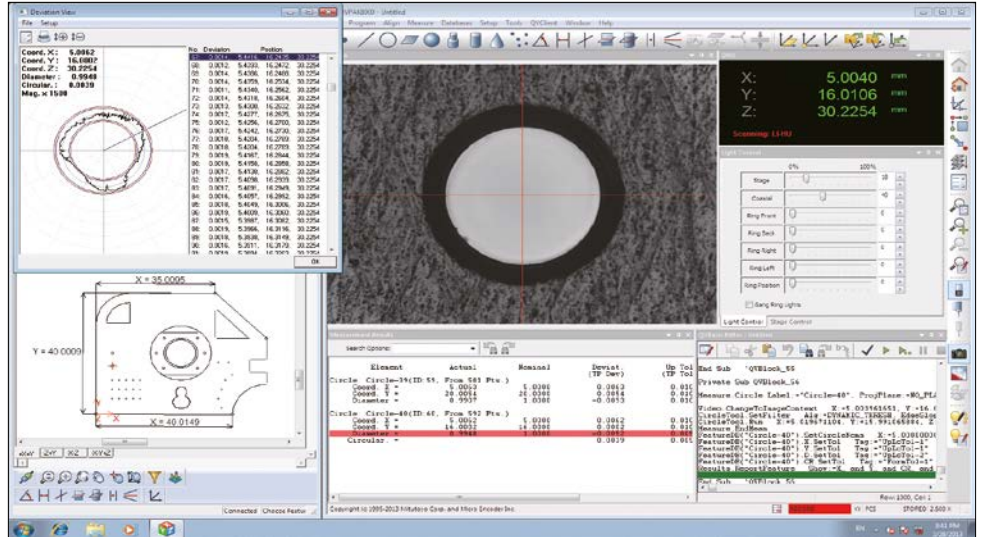


- PFF enhances the functionality of standard QV models with 3D topography measurements.
- No additional sensor necessary.
- High scanning range in Z axis from 2.7 mm up to 40.6 mm depending on the objective lens in use and in wide range mode.
- PFF is a retro-fit option for Quick Vision APEX/HYPER, Quick Vision ACCEL and Quick Vision ULTRA.
- Contact your local Mitutoyo office for more details.

# QVPAK

## Software for Quick Vision Systems

- QVPAK controls multiple sensors: CCD cameras, Touch Probes, continuous scanning devices and special probes such as UMAP and LNP.
- Powerful mathematical algorithms are provided that help detect difficult edges via noise filters (similar to morphological filters) and advanced detection tools that take into account the texture of the target surface.
- Part programming and editing is made easy with the user-friendly Easy Editor.
- 3D graphic display or measuring planes display with QVclient QVGraphic.
- QVPAK also offers various QVclients (standard), real assistants for users (programming mode) or operators (production mode) such as QVSmartEditor and QVNavigator.



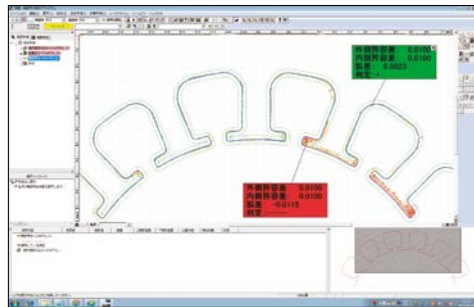
## Optional Application Software

### QV PartManager

Manages and controls part-programs operating on multiple workpieces arranged on the measuring stage.

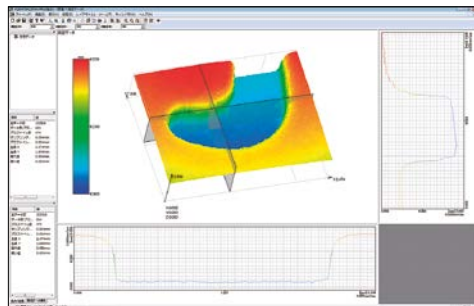
### FORMTRACEPAK-AP

Verifies designed values and performs form analysis on the basis of the contour data obtained via the QV auto trace tool, non-contact displacement sensor, PFF or WLI.



### FORMTRACEPAK-PRO

Performs 3D form analysis using data obtained via a non-contact displacement sensor on a QV Hybrid series machine.

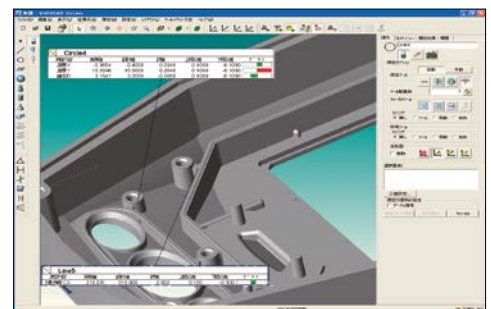


### QV3DPAK

Generates 3D models from PFF (Points From Focus) or WLI (White Light Interferometer) data.

### QV3DCAD-OnLine

Creates QVPAK measurement procedure programs using 3D CAD data. This allows a reduction of the man-hours needed to create part-programs and shortens lead times.



### QV-CAD IF

Displays CAD data in the graphic window to improve measurement operability.

### EASYPAG PRO

Creates QVPAK measurement procedure programs using 2D CAD data. This allows users to reduce program creation man-hours and shorten lead times.

### MeasureReportQV

Creates an inspection report from the QV measurement results.

### MeasurLink

Enables statistical arithmetic processing of measurement results.

### QVEio

This is a client application that can externally control QVPAK or provide the operating status of QVPAK by connecting a PLC or remote software on an external PC. QVEio can also connect an automatic transfer robot to a signal tower.

# Optional Accessories

## For Quick Vision Systems

### Tracking Auto Focus (TAF)\*<sup>1</sup>

- For Quick Vision Apex, Hyper, STREAM PLUS and ULTRA.
- The Tracking Auto Focus unit (TAF) allows stable, high-speed measurement in the Z direction due to the precision knife-edge method adopted in the detection system.
- The TAF function tracks the contours of the workpiece surface in the Z direction and enhances throughput compared with the normal measuring mode.
- TAF enables non-stop measurement when used on a Quick Vision Stream Plus system.

\*<sup>1</sup> Factory-fit option



Coaxial laser Tracking Auto Focus (TAF).

Order No.	TAF-HR1X	TAF-SL1X	TAF-HR2.5X	TAF-SL2.5X	TAF-5X
Laser source	Semiconductor laser (peak wavelength: 690 nm)				
Laser safety	Class 2 ( JIS C6802:2011, EN/IEC 60825-1:2007)				
Auto focus system	Objective coaxial autofocussing (knife-edge method)				
Applicable objectives	QV-HR1X	QV-SL1X	QV-HR2.5X	QV-SL2.5X	QV-5X
Tracking range*	±3.15 mm	±3.15 mm	±0.5 mm	±0.5 mm	±0.125 mm
Laser spot diameter	5.2 μm	8 μm	2.1 μm	3.1 μm	1.5 μm

\* The tracking range depends on the surface texture and reflectance of a workpiece.

### Objective Lenses

A wide choice of objectives enables magnification of the optical system to be specified over the range of 0.5 to 25X to provide the best match to the application. The longer working distance type is also available.



Objective	Order No.	Working distance	Turret lens magnification	Monitor magnification* <sup>3</sup>	Field of view
QV-SL0.5X	<b>02AKT199</b>	30.5 mm	1X	16X	12.54x9.4
			2X	32X	6.27x4.7
			6X	96X	2.09x1.56
QV-SL1X	<b>02ALA150</b>	52.5 mm	1X	32X	6.27x4.7
			2X	64X	3.13x2.35
			6X	192X	1.04x0.78
QV-SL2.5X	<b>02ALA170</b>	60 mm	1X	80X	2.49x1.88
			2X	160X	1.24x0.93
			6X	480X	0.41x0.31
QV-5X	<b>02ALA420</b>	33.5 mm	1X	160X	1.25x0.94
			2X	320X	0.62x0.47
			6X	960X	0.20x0.15
QV-SL10X	<b>02ALG010</b>	30.5 mm	1X	320X	0.62x0.47
			2X	640X	0.31x0.23
			6X	1920X	0.10x0.07
QV-25X	<b>02ALG020</b>	13 mm	1X	800X	0.25x0.18
			2X	1600X	0.10x0.07
			6X	4800X	0.04x0.03
QV-HR1X	<b>02AKT250</b>	40.6 mm	1X	32X	6.27x4.7
			2X	64X	3.13x2.35
			6X	192X	1.04x0.78
QV-HR2.5X	<b>02AKT300</b>	40.6 mm	1X	80X	2.49x1.88
			2X	160X	1.24x0.93
			6X	480X	0.41x0.31
QV-HR10X	<b>02AKT650</b>	20 mm	1X	320X	0.62x0.47
			2X	640X	0.31x0.23
			6X	1920X	0.10x0.07

\*<sup>3</sup> Monitor magnifications are approximate values.

### QV Index Head\*<sup>2</sup>

Using the QV Index Head to rotate the workpiece makes it possible to automatically measure multiple surfaces without having to dismount and remount the workpiece.

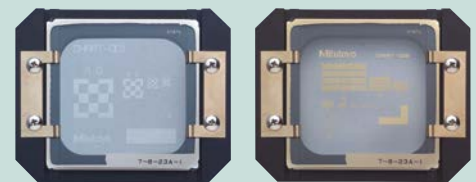
\*<sup>2</sup> Available on 302, 404 and 606 models only.



Model	QV-INDEX
Minimum rotation angle	0.1°
Maximum rotation speed	10 rpm
Positional accuracy	±0.5°
Maximum workpiece diameter	140 mm
Maximum workpiece mass	2 kg

### Calibration and Compensation Charts

These glass charts are used to compensate for differences in the pixel size of the CCD chip, autofocus accuracy and the optical axis offset at each magnification of the Programmable Power Turret (PPT).



Order No.	Description
<b>02ATN695</b>	Calibration chart with holder
<b>02ATN697</b>	Compensation chart with holder



# OPTI-FIX

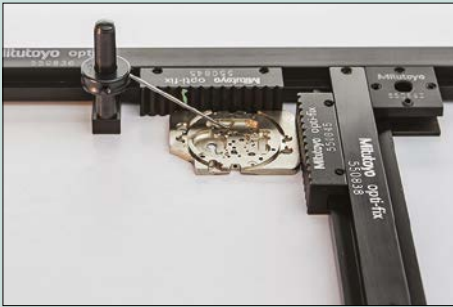
## The Modular Clamping System for Vision Measuring Systems

- The system's highly compact components are designed to enable firm retention of a workpiece in the required position during a measurement cycle without obstructing the target surface.
- Enables reliable, repeated measurements on a batch of parts or in particular positions.
- Dovetail joints are used to connect the clamping and support elements to the rails for ease of assembly and handling.
- A wide choice of set contents offers various configurations to enable adaptation to practically any part.

### Application Examples



Holding a cylindrical part between centres.



Toothed location elements provide access to edges for the camera while one or more spring clips lightly clamp a part in the measurement position.



Batch measurement of identical parts simply located against connected rails.



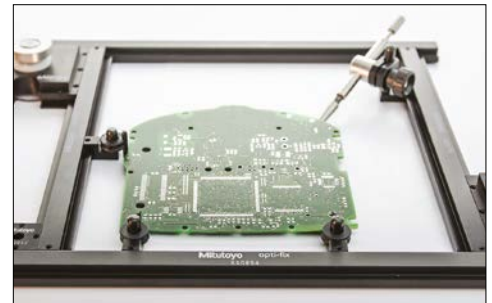
Opti-Set Round

### Specifications

Order No.	Set	Elements	Description
K550298	Opti-Set Round	18	Allows aerial positioning of complex parts (supplied in a case)
K551056	Opti-Set Start	16	Construction of a right-angled frame: 250 x 100 mm
K551057	Opti-Set Basic	26	Construction of a frame: 200 x 100 mm
K551058	Opti-Set Rotation	23	Construction of a frame: 250 x 200 mm (includes accessories for holding cylindrical parts)
K551059	Opti-Set Advanced	51	Construction of a frame: 400 x 250 mm (allows aerial positioning of parts)
K551060	Opti-Set Professional	115	Construction of a frame: 400 x 250 mm (complete and highly versatile kit)

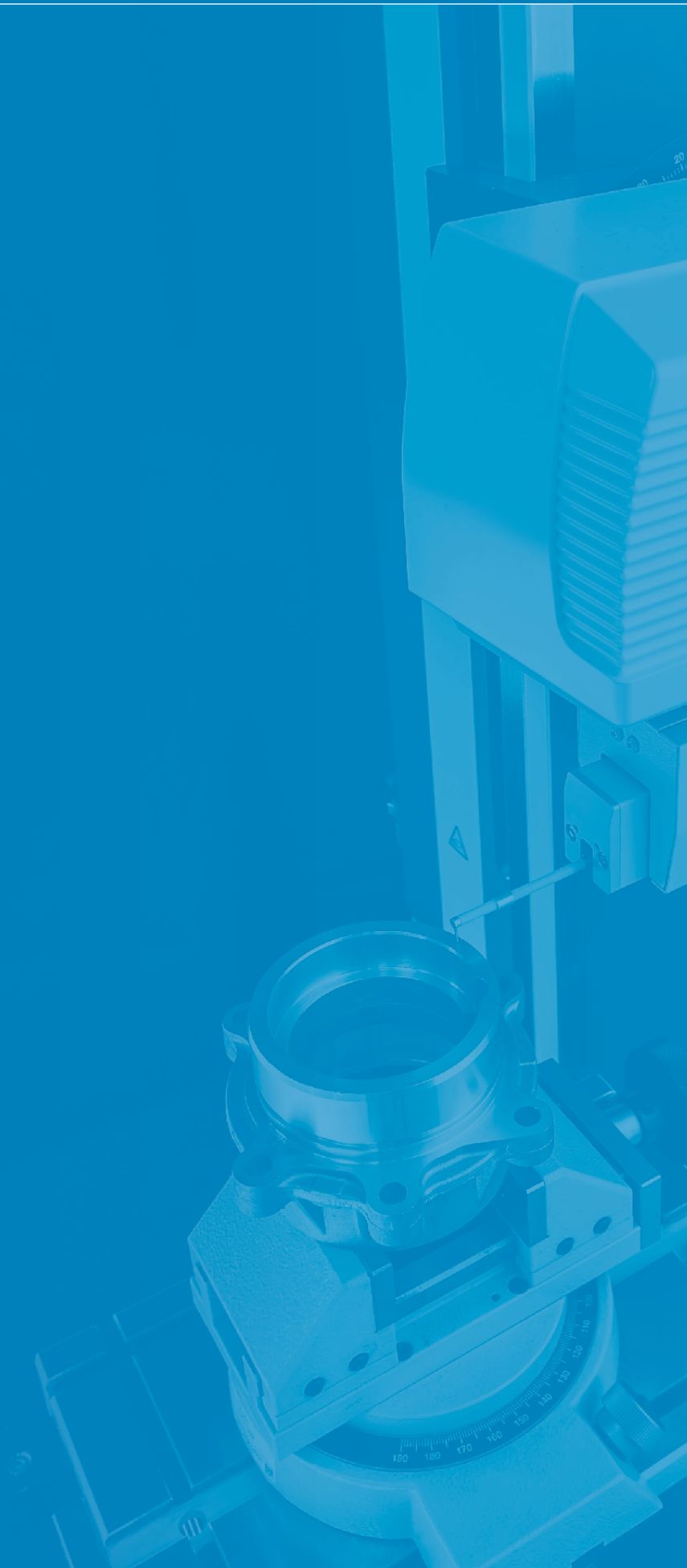


Dissimilar parts located and clamped ready for measurement within the same cycle.



Support and clamping of a PCB at three points to enable positive location of the irregular profile at the measurement position.

# FORM MEASUREMENT





Surftest



Conracer



Formtracer



Roundtest



Contents

<b>Surftest</b>	
Surftest SJ-210	L-03
Surftest SJ-310	L-04
Optional Accessories for SJ-210/SJ-310	L-05
Surftest SJ-410	L-07
Surftest SJ-500	L-09
Surftest SJ-500P	L-10
Surftest SV-3200	L-11
Surftest Extreme SV-3000CNC	L-13
Surftest Extreme SV-M3000CNC	L-14
Optional Styli	L-15
<b>Conracer</b>	
Conracer CV-2100N4	L-17
Conracer CV-2100M4	L-18
Conracer CV-3200	L-19
Conracer CV-4500	L-20
Optional Arms and Styli	L-21
<b>Formtracer</b>	
Formtracer SV-C3200/SV-C4500	L-23
Formtracer Extreme SV-C4500CNC	L-25
Formtracer CS-3200	L-27
Formtracer Extreme CS-5000CNC/CS-H5000CNC	L-28
Optional Styli	L-29
Optional Accessories for Surftest, Conracer, Formtracer	L-33
<b>Roundtest</b>	
Roundtest RA-10	L-37
Roundtest RA-120	L-38
Roundtest RA-120P	L-39
Roundtest RA-1600	L-40
Roundtest RA-2200	L-41
Roundtest RA-H5200	L-42
Roundtest Extreme RA-2200CNC	L-43
Roundtest Extreme RA-H5200CNC	L-44
Optional Styli	L-45
Optional Accessories	L-47

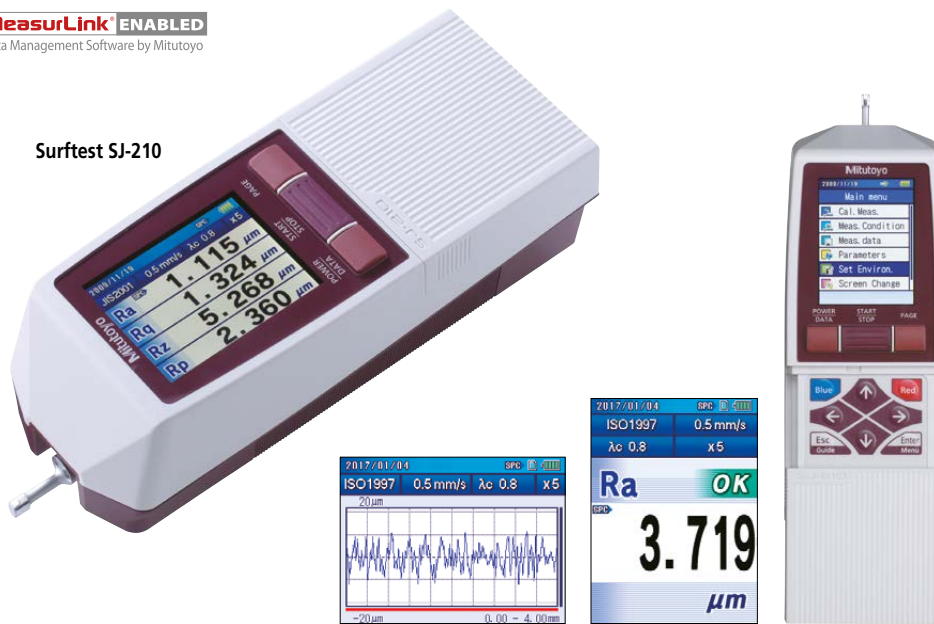


# Surftest SJ-210

## SERIES 178 – Portable Surface Roughness Tester

- The 2.4-inch colour graphic LCD provides excellent readability and an intuitive display that is easy to navigate. The LCD also includes a backlight for improved visibility in dark environments.
- The Surftest SJ-210 can be operated easily using the buttons on the front of the unit and under the sliding cover.
- Up to 10 setups and one measured profile can be stored in the internal memory.
- An optional memory card can be used as an extended memory to store large quantities of measured profiles and conditions.
- Access to each feature can be password-protected, which prevents unintended operations and enables established settings to be protected.
- The display interface supports 16 languages, which can be freely switched.
- An alarm warns when the cumulative measurement distance exceeds a preset limit so the stylus can be replaced in good time.
- The Surftest SJ-210 complies with the following standards: JIS (JIS-B0601-2001, JIS-B0601-1994, JIS B0601-1982), VDA, ISO-1997, and ANSI.
- In addition to calculation results, the Surftest SJ-210 can display sectional calculation results and assessed profiles, load curves, and amplitude distribution curves.

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Data Management Software by Mitutoyo



### Specifications / Configuration

Model	SJ-210						
Code No. (inch/mm)	178-561-01E	178-561-02E	178-563-01E	178-563-02E	178-565-01E	178-565-02E	
Drive unit	Standard		Retractable		Transverse tracing		
Type	Standard		Retractable		Transverse tracing		
Code No.	178-230-2		178-235		178-233-2		
Measuring range	17.5 mm						
Measuring speed	0.25, 0.5, 0.75 mm/s (returning: 1 mm/s)						
Measuring method	Skidded						
Stylus tip	Angle	60°	90°	60°	90°	60°	90°
	Radius	2 µm	5 µm	2 µm	5 µm	2 µm	5 µm
Detector	Range	360 µm (-200 µm to +160 µm)					
	Measuring force	0.75 mN	4 mN	0.75 mN	4 mN	0.75 mN	4 mN
	Code No.	178-296	178-390	178-296	178-390	178-387	178-386
Assessed profiles	P (primary profile), R (roughness profile), DF (DF profile), roughness profile-motif						
Evaluation parameters	Ra, Rc, Ry, Rz, Rq, Rt, Rmax, Rp, Rv, Rz, Rsk, Rku, Rc, Rpc, Rsm, Rz1max, S, HSC, Rz1S, Rppi, RΔa, RΔq, Rlr, Rmr, Rmr(c), RΔc, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Vo, Rpm, tp, Htp, R, Rx, AR, possible to customize						
Analysis graphs	Bearing area curve (BAC), amplitude distribution curve (ADC)						
Power supply	Via AC adapter or rechargeable battery						
Battery	Charge time	Approx. 4 hours (may vary due to ambient temperature)					
	Endurance	Approx. 1000 measurements (differs slightly due to usage and environmental conditions)					
Dimensions (WxDxH)	Display unit	52.1 x 65.8 x 160 mm					
	Drive unit	115 x 23 x 26 mm					
Mass	Approx. 0.5 kg						
Price	£1530.00	£1530.00	£1810.00	£1810.00	£2830.00	£2830.00	

### Technical Data

Detector	
Skid radius of curvature:	40 mm
Skid force:	Less than 400 mN
Type:	Differential inductance
External I/O:	USB, Digimatic output, printer output, RS-232C, footswitch
Data storage:	Memory card (option <b>12AAL069</b> )

### Evaluation Capability

Applicable standards:	JIS'82, JIS'94, JIS'01, ISO'97, ANSI, VDA
Digital filters:	Gaussian, 2CR75, PC75
Cutoff length:	lc: 0.08, 0.25, 0.8, 2.5 mm
	ls: 2.5, 8 µm
Sampling length:	0.08, 0.25, 0.8, 2.5 mm
Number of sampling lengths (x n):	x1, x2, x3, x4, x5, x6, x7, x8, x9, x10 arbitrary length (0.3 to 16 mm: 0.01 mm interval)
	x1, x2, x3, x4, x5, x6, x7, x8, x9, x10 arbitrary length (0.3 to 5.6 mm: 0.01 mm interval)*

\*Only for transverse tracing drive unit type

### Functions

Customization:	Desired parameters can be selected for calculation and display
GO/±NG judgement:	By max value / 16% / standard deviation
Storage of setups:	Save the setup at power OFF
Storage	
Internal memory:	Setups (10 sets), Measured profile (1 set)
Memory card (option):	500 setups, 10,000 measured profiles, 500 display images, text file (setups / measured profile / assessed profile / bearing area curve / amplitude distribution curve)
Calibration:	Auto-calibration with the entry of numerical value / average calibration with multiple measurement (max. 5 times) is available

### Optional Accessories

Refer to pages L-05 to L-06.



# Surftest SJ-310

## SERIES 178 – Portable Surface Roughness Tester

### Technical Data

Detector	
Skid radius of curvature:	40 mm
Skid force:	Less than 400 mN
Type:	Differential inductance
External I/O:	USB, Digimatic output, RS-232C, external software interface
Data storage:	Memory card (option <b>12AAL069</b> )

### Evaluation Capability

Applicable standards:	JIS'82, JIS'94, JIS'01, ISO'97, ANSI, VDA
Digital filter:	2CR, PC75, Gaussian
Cutoff length:	lc: 0.08, 0.25, 0.8, 2.5, 8 mm ls: 2.5, 8 µm
Sampling length:	0.08, 0.25, 0.8, 2.5, 8 mm
Number of sampling lengths (x n):	x1, x2, x3, x4, x5, x6, x7, x8, x9, x10 arbitrary length (0.3 to 16.0 mm: 0.01 mm interval) x1, x2, x3, x4, x5, x6, x7, x8, x9, x10 arbitrary length (0.3 to 5.6 mm: 0.01 mm interval)*
Printer:	Thermal type
Printing width:	48 mm (paper width: 58 mm)
Recording magnification	
Vertical:	10X to 100,000X, auto
Horizontal:	1X to 1,000X, auto

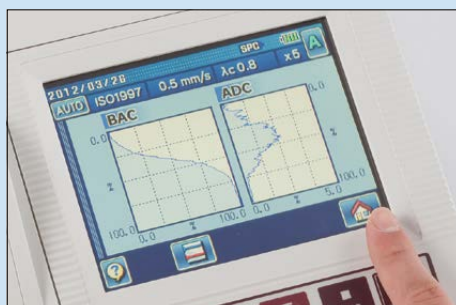
\* Only for transverse tracing drive unit type.

### Functions

Customization:	Desired parameters can be selected for calculation and display
Statistical processing:	Maximum value, minimum value, mean value, standard deviation, pass rate, histogram of each parameter
GO/±NG judgement:	Maximum value rule, 16% rule, average value rule, standard deviation (1σ, 2σ, 3σ)
Storage	
Internal memory:	Setups (10 sets)
Memory card (option):	500 setups, 10,000 measured profiles, 500 display images, text file (setups / measured profile / assessed profile / bearing area curve / amplitude distribution curve), 500 statistical data, etc.
Calibration:	Auto-calibration with the entry of numerical value / average calibration with multiple measurement (max.12 times) is available
Power saving function:	Auto-sleep-function, auto shutdown of backlight by ECO mode

### Optional Accessories

Refer to pages L-05 to L-06.



- The handheld data processing unit and the 5.7-inch colour graphic LCD touch-panel provide superior readability and operability. The LCD also includes a backlight for improved visibility in dark environments.
- The excellent user interface provides intuitive and easy-to-understand operability.
- Complies with the following standards: JIS (JIS-B0601-2001, JIS-B0601-1994, JIS B0601-1982), VDA, ISO- 1997, and ANSI.
- The Measure-Start and other frequently used buttons are strengthened to resist wear and the detrimental effects of workshop contaminants.
- Equipped with a large-capacity battery allowing approximately 1500 measurements when fully charged.
- Includes convenient carrying case for protection in the field.
- A high-speed printer is built into the main unit. Either landscape or portfolio mode can be selected according to the application. Paper saving mode is supported.
- The display interface supports 16 languages, which can be freely switched.
- 10 setups can be saved in the measurement unit. An optional memory card can save setups and the measured profile.

**MeasurLink** ENABLED  
Data Management Software by Mitutoyo



Surftest SJ-310

### Specifications/Configuration

Model	SJ-310						
Code No. (inch/mm)	178-571-01E	178-571-02E	178-573-01E	178-573-02E	178-575-01E	178-575-02E	
Drive unit	Type	Standard		Retractable		Transverse tracing	
	Code No.	178-230-2		178-235		178-233-2	
Measuring range	17.5 mm					5.6 mm	
Measuring speed	0.25, 0.5, 0.75 mm/s (returning: 1 mm/s)						
Measuring method	Skidded						
Stylus tip	Angle	60°	90°	60°	90°	60°	
	Radius	2 µm	5 µm	2 µm	5 µm	2 µm	
Detector	Range	360 µm (-200 µm to +160 µm)					
	Measuring force	0.75 mN	4 mN	0.75 mN	4 mN	0.75 mN	
	Code No.	178-296	178-390	178-296	178-390	178-387	
Assessed profiles	P (primary profile), R (roughness profile), DIN4776, roughness motif, waviness motif						
Evaluation parameters	Ra, Ry, Rz, Rt, Rp, Rq, Rv, Rsk, Rku, Rc, RSm, S, RPa, R3z, Rmr (c), Rpk, Rvk, Rδc, Rk, Mr1, Mr2, Lo, Rppi, R, AR, Rx, A1, A2, Vo, HSC, Rmr, SK, Ku, RΔa, RΔq, Rlr, λa, λq, Rpm, RzJIS (JIS'01), tp (ANSI), Htp (ANSI), Wte, Wx, W, AW, Rz1max (ISO), Rmax (VDA, ANSI, JIS'82), possible to customize						
Analysis graphs	Bearing area curve (BAC), amplitude distribution curve (ADC)						
Power supply	AC adapter and rechargeable battery						
Battery	Charge time	Max. 4 hours					
	Endurance	Approx. 1500 measurements (differs slightly due to usage and environmental conditions)					
Dimensions (WxDxH)	Display unit	275 x 109 x 198 mm					
	Drive unit	115 x 23 x 26 mm					
Mass	Display unit	Approx. 1.7 kg					
	Drive unit	0.2 kg					
Price	£2940.00	£2940.00	£3080.00	£3080.00	£4330.00	£4330.00	

# Optional Accessories

## For Surftest SJ-210 and SJ-310

### Detectors

#### Standard detectors

Code No.	Measuring force	Stylus profiles*	Applicable drive unit	Price
178-296	0.75 mN	R2 $\mu\text{m}/60^\circ$	Standard or retractable	£375.00
178-390	4 mN	R5 $\mu\text{m}/90^\circ$		£490.00
178-387	0.75 mN	R2 $\mu\text{m}/60^\circ$	Transverse	£392.00
178-386	4 mN	R5 $\mu\text{m}/90^\circ$		£375.00
178-391	4 mN	R10 $\mu\text{m}/90^\circ$	Standard or retractable	£490.00

\* Tip radius / tip angles

#### Small hole detectors

Code No.	Measuring force	Stylus profiles*	Min. measurable hole	Price
178-383	0.75 mN	R2 $\mu\text{m}/60^\circ$	$\varnothing 4.5 \text{ mm}$	£534.00
178-392	4 mN	R5 $\mu\text{m}/90^\circ$		£478.00

\* Tip radius / tip angles

#### Extra small hole detectors

Code No.	Measuring force	Stylus profiles*	Min. measurable hole	Price
178-384	0.75 mN	R2 $\mu\text{m}/60^\circ$	$\varnothing 2.8 \text{ mm}$	£501.00
178-393	4 mN	R5 $\mu\text{m}/90^\circ$		£438.00

\* Tip radius / tip angles

#### Gear-tooth surface detectors

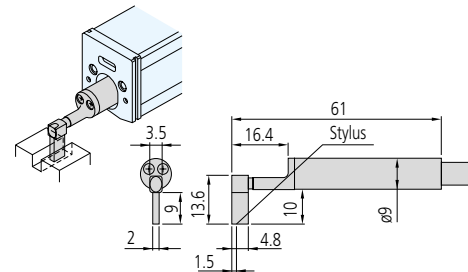
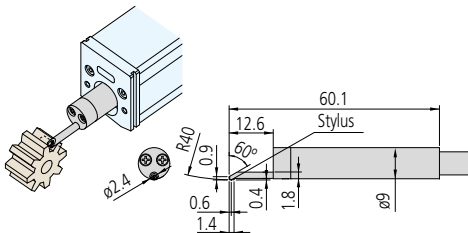
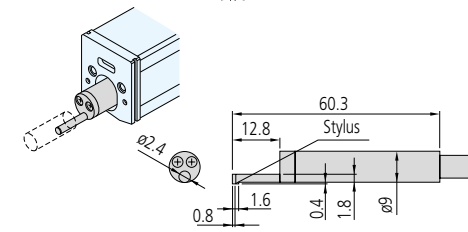
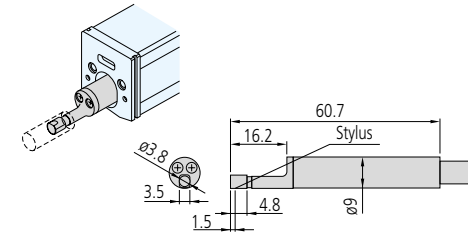
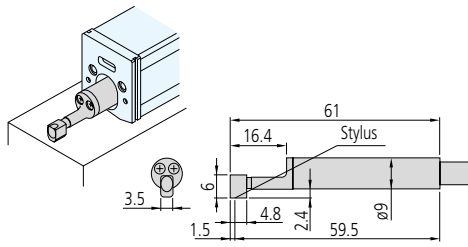
Code No.	Measuring force	Stylus profiles*	Price
178-388	0.75 mN	R2 $\mu\text{m}/60^\circ$	£890.00
178-398	4 mN	R5 $\mu\text{m}/90^\circ$	£840.00

\* Tip radius / tip angles

#### Deep groove detectors

Code No.	Measuring force	Stylus profiles*	Applicable drive unit	Price
178-385	0.75 mN	R2 $\mu\text{m}/60^\circ$	Standard or retractable	£510.00
178-394	4 mN	R5 $\mu\text{m}/90^\circ$		£478.00

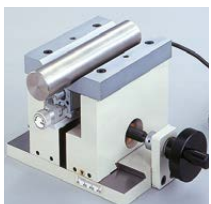
\* Tip radius / tip angles



### Setting Attachments (for standard and retractable drive units only)

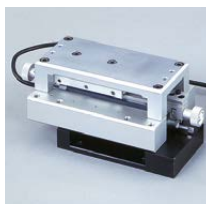
Improves measurement efficiency by allowing the setup of multiple workpieces of the same type and the positioning of hard-to-access features of a workpiece.

Code No.	Description	Price
178-033	V-type for measuring in the cylinder axis direction	£2130.00
178-034	Magnetic slider type	£1730.00
178-035	Inside diameter type	£2020.00



The V-width is adjustable to the cylinder diameter facilitating axial measurement of a wide range of cylinder diameters.

- Adjustable range:  $\varnothing 5 - \varnothing 150 \text{ mm}$



The magnet attached to the bottom surface of the frame allows hands-free measurements to be made.



Greatly facilitates measurement of internal wall surfaces of, for example, cylinder-block bores.

- Applicable diameter:  $\varnothing 75 - \varnothing 95 \text{ mm}$
- Accessible depth: 30 - 135 mm

### SJ-Printer for SJ-210

Assessed profiles and calculation results and curves can be printed out by connecting the SJ-210-dedicated printer, which is palm sized (WxDxH: 93x125x70 mm) and can run on an internal battery.

- Power supply can be selected. (AC adapter or optional battery pack)
- Printable items: Setups, calculation results, assessed profile, bearing area curve (BAC), amplitude distribution curve (ADC), and environment settings



178-421UK

Code No.	Description	Price
178-421UK	SJ-Printer for SJ-210	£350.00
270732	Printer paper (5 packs)	£20.30



Example of the connection with SJ-210.

### DP-1VA LOGGER

It is possible to process Digimatic data output from the Surftest SJ series with the DP-1VA LOGGER. This compact, hand-held device can provide printouts of measurement data and various statistical analysis results such as histograms, D-charts, and X-bar R control charts. With optional output cables, DP-1VA LOGGER is also capable of RS-232C output of measurement data to a PC (cable **09EAA084**) and GO/ $\pm$ NG judgement output (cable **965516**).



264-505E

Code No.	Description	Price
264-505E	DP-1VA LOGGER Digimatic Mini-Processor	£406.00
936937	Connecting cable (1 m)	£33.90
965014	Connecting cable (2 m)	£49.80

## Optional Software

### SJ-Tools

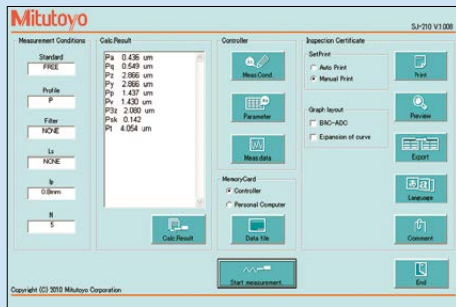
Output software based on Microsoft Excel\* for controlling instruments and reproducing and storing measurement data. Complete with exclusive accessories.

- Measurement device control
- Definition of measurement variables
- Graphic representation of the profile
- Storage of measurement records
- Documentation of measurement results
- Connecting cable

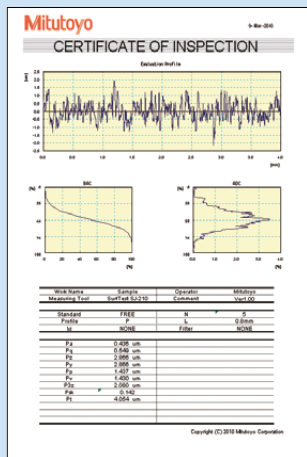
\*Microsoft Excel is not included. To be supplied by the customer.

Cables required:

Code No.	Description	Price
<b>12AAL068</b>	USB PC connecting cable (USB cable) for SJ-210	<b>£27.20</b>
<b>12AAD510</b>	USB PC connecting cable (USB cable) for SJ-310	<b>£46.90</b>
<b>12AAL067</b>	RS-232C cable for SJ-210	<b>£64.60</b>
<b>12AAA882D</b>	RS-232C cable for SJ-310	<b>£56.10</b>



SJ-Tools input mask for SurfTest SJ series.

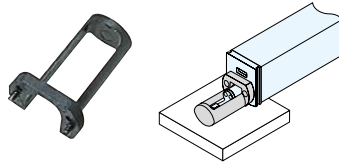


SJ-Tools output record from MS-Excel (This program can be downloaded for free from the Mitutoyo website [www.mitutoyo.co.uk](http://www.mitutoyo.co.uk)).

## Attachments

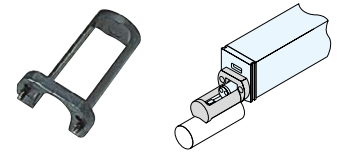
### Nosepiece for flat surfaces

- SJ-310 standard accessory (not for transverse tracing type)



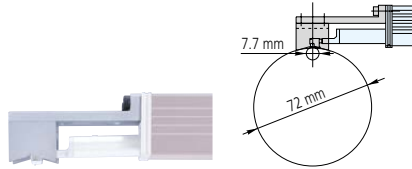
### Nosepiece for cylindrical surfaces

- SJ-310 standard accessory (not for transverse tracing type)



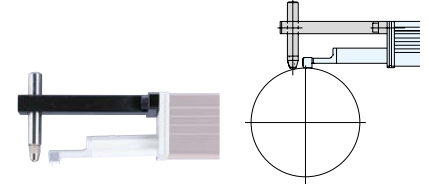
### V-type adapter

- SJ-310 Transverse tracing type standard accessory



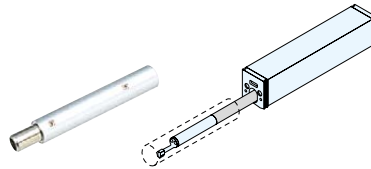
### Point-contact adapter

- SJ-310 Transverse tracing type standard accessory



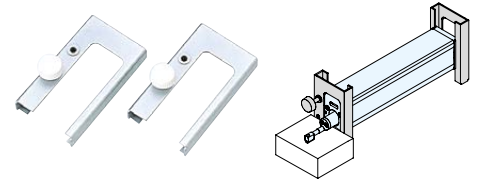
### Extension rod (50 mm)

- Not available for the transverse tracing drive unit (Note: Only one rod can be used)



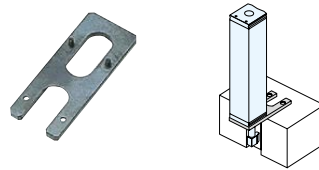
### Support feet set

- SJ-301/301R standard accessory
- Not available for the detector end of the transverse tracing drive unit

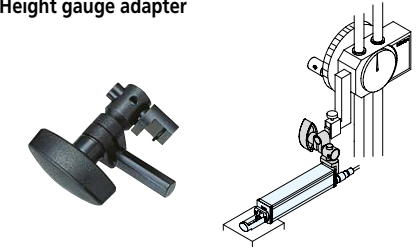


### Vertical positioning adapter

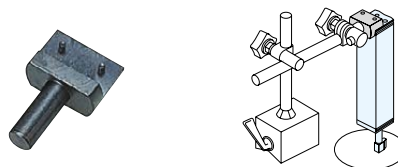
- Not available for the transverse tracing drive unit



### Height gauge adapter



### Magnetic stand adapter



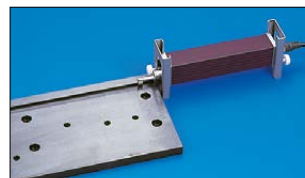
### Extension cable (1 m)

- Only one cable can be used



Code No.	Description	Price
<b>12AAA210</b>	Extension rod (50 mm)	<b>£126.00</b>
<b>12AAA216</b>	Support feet set	<b>£80.30</b>
<b>12AAA217</b>	Nosepiece for flat surfaces	<b>£80.30</b>
<b>12AAA218</b>	Nosepiece for cylindrical surfaces	<b>£80.30</b>
<b>12AAA219</b>	Vertical positioning adapter	<b>£25.70</b>
<b>12AAA220</b>	Magnetic stand adapter (ø9.5 mm)	<b>£28.90</b>

Code No.	Description	Price
<b>12AAA221</b>	Magnetic stand adapter (ø8 mm)	<b>£28.90</b>
<b>12AAA222</b>	Height gauge adapter (9 x 9 mm)	<b>£54.90</b>
<b>12AAA223</b>	Height gauge adapter (1/4 x 1/2")	<b>£54.90</b>
<b>12AAE643</b>	Point-contact adapter	<b>£129.00</b>
<b>12AAE644</b>	V-type adapter	<b>£140.00</b>
<b>12BAA303</b>	Extension cable (1 m)	<b>£58.20</b>

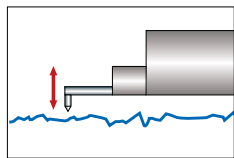


# Surftest SJ-410

## SERIES 178 – Portable Surface Roughness Tester

- Skidded and skidless measurements are both possible with this series. Measures 46 roughness parameters that conform to the latest ISO, DIN, ANSI, and JIS standards.
- A wide range, high-resolution detector and efficient drive unit provide superior high-accuracy measurement.
- A skidless detector and a curved surface compensation function provide efficient evaluation of cylinder surface roughness.
- Ultra-fine steps, straightness and waviness can be measured by using the skidless measurement function.
- The handheld data processing unit and the 5.7-inch colour graphic LCD touch-panel provides superior readability and operability. The LCD also includes a backlight for improved visibility in dark environments.
- The excellent user interface provides intuitive and easy-to-understand operability.
- Measured data can be output to a PC with an optional RS-232C or USB cable.
- Digital filter function for accurate roughness profiles.
- GO/±NG judgement function.
- Auto-calibration function.
- The display interface supports 16 languages, which can be freely switched.
- Simplified contour analysis function supports four types of measurement: step, level change, area and coordinate difference.
- Access to each feature can be password protected, which prevents unintended operations and enables established settings to be protected.
- The optional attachments for mounting on a column stand significantly increase the application range.

**MeasurLink** ENABLED  
Data Management Software by Mitutoyo



Skidless measurement.



Surftest SJ-411

### Specifications

Model	SJ-411		SJ-412	
Code No. (inch/mm)	178-581-01E	178-581-02E	178-583-01E	178-583-02E
Measuring range	25 mm		50 mm	
Speed	Measuring: 0.05, 0.1, 0.2, 0.5, 1.0 mm/s, returning: 0.5, 1, 2, 5 mm/s			
Range/resolution	800 µm/0.0125 µm, 80 µm/0.00125 µm, 8 µm/0.000125 µm (up to 2400 µm with an optional stylus)			
Measurement method	Skidless/skidded			
Stylus tip	Angle	60°	90°	60°
	Radius	2 µm	5 µm	2 µm
Detector measuring force	0.75 mN	4 mN	0.75 mN	4 mN
Assessed profiles	P (primary profile), R (roughness profile), DF (DF profile), W (filtered waviness profile), roughness motif, waviness motif			
Evaluation parameters	Ra, Rq, Rz, Ry, Rp, Rv, Rt, R3z, Rsk, Rku, Rc, RPl, RSm, Rmax(VDA, ANSI), Rz1max(ISO'97), S, HSC, RzJIS(JIS'01), Rppi, RΔa, RΔq, Rlr, Rmr, Rmr(c), Rδc, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Vo, δq, Lo, Rpm, tp(ANSI), Htp(ANSI), R, Rx, AR, W, AW, Wx, Wte			
Analysis graphs	Bearing Area Curve (BAC), Amplitude Distribution Curve (ADC)			
Power supply	Via AC adapter or rechargeable battery			
Rechargeable battery	Recharge time: 4 hours (for a maximum 1000 measurements without printing)			
Price	£6100.00	£6100.00	£7330.00	£7330.00

### Technical Data

X axis (drive unit)	
Traverse direction:	Backward
Traverse straightness:	0.3 µm/25 mm (SJ-411), 0.5 µm/50 mm (SJ-412)
Positioning:	±1.5° (tilting), 10 mm (up/down)
Detector	
Skid radius of curvature:	40 mm
Type:	Differential inductance
Storage	
Internal memory:	Setups (10 sets)
Memory card (option):	500 setups, 10,000 measured profiles, 500 display images, text file (setups / measured profile / assessed profile / bearing area curve / amplitude distribution curve), 500 statistical data, etc.
Dimensions (WxDxH)	
Display unit:	275x109x198 mm
Height-tilt adjustment unit:	131x63x99 mm
Drive unit:	128x36x47 mm (SJ-411), 155x36x47 mm (SJ-412)
Control unit mass:	Approx. 1.7 kg
Height-tilt adjustment unit:	Approx. 0.4 kg
Drive unit:	0.6 kg (SJ-411), 0.7 kg (SJ-412)

### Evaluation Capability

Applicable standards:	JIS'82, JIS'94, JIS'01, ISO'97, ANSI, VDA, Free
Digital filter:	2CR, PC75, Gaussian
Cutoff length:	λc: 0.08, 0.25, 0.8, 2.5, 8 mm λs: 2.5, 8, 25 µm (availability of switching depends on the selected standard)
Sampling length:	0.08, 0.25, 0.8, 2.5, 8, 25*mm; or an arbitrary length in the range 0.1 to 25 mm (0.1 to 50 mm: SJ-412) in 0.01 mm increments
Number of sampling lengths:	1, 2, 3, ~20 (limited by traverse range)
Printer:	Thermal type
Printing width:	48 mm (paper width: 58 mm)
Recording magnification	
Vertical:	10X to 100,000X, auto
Horizontal:	1X to 1,000X, auto
Function	
Customize:	Selection of display/evaluation parameter
Data compensation:	R-surface, tilt compensation
Ruler function:	Step, level change, area and coordinate difference
DAT function:	Helps to level workpiece prior to skidless measurement. Displacement detection mode enables the stylus displacement to be input while the drive unit is stopped.
Statistical processing:	Max. value, min. value, mean value, standard deviation (s), pass ratio, histogram
GO/±NG judgement:	Maximum value rule, 16% rule, average value rule, standard deviation (1σ, 2σ, 3σ)
Calibration:	Auto-calibration with the entry of numerical value/average calibration with multiple measurement (max. 12 times) is available
Power saving function:	Auto-sleep-function, auto shutdown of backlight by ECO mode

\*Only for SJ-412.



### Optional Software

#### SJ-Tools

Output software based on Microsoft Excel\* for controlling instruments and reproducing and storing measurement data. Complete with exclusive accessories.

- Measurement device control
- Definition of measurement variables
- Graphic representation of the profile
- Storage of measurement records
- Documentation of measurement results
- Connecting cable

\*Microsoft Excel is not included. To be supplied by the customer.

#### Surfstand (optional accessory)

Mounted on the same large surface plate as the workpiece to be inspected, this substantially built stand can be manoeuvred and adjusted to position the detector on practically any surface of the workpiece desired. The SJ-400 Series detector is carried on an adjustable-length tube mounted on an extendable arm carried by a vertically travelling carriage on the column, thus enabling positioning of the detector anywhere in the vertical plane within reach.



Model	Measuring range				Depth into bore
	Z axis	X axis	Ø1 axis	Ø2 axis	
Standard	660 mm	375 mm	180°	—	270 mm
Depth pole	620 mm			360°	515 mm
Long arm	660 mm	650 mm	180°	—	270 mm
Long arm & depth pole	620 mm			360°	515 mm

### Optional Accessories

Code No.	Description	Price
178-010	Auto-set unit for 178-039	£2280.00
178-016	Levelling table (tilting: $\pm 1.5^\circ$ , max. loading: 15 kg)	£650.00
178-019	Precision vice for XY levelling table (jaw opening: 36 mm)	£721.00
178-020	X-axis adjustment unit for 178-039	£1180.00
178-030	Tilting adjustment unit (Inclination adjustment unit) for 178-039	£1800.00
178-039	Manual column stand (granite base, vertical travel: 250 mm)	£515.00
178-042-1	Digital XY levelling table (25 x 25 mm) (tilting: $\pm 1.5^\circ$ , max. loading: 15 kg, swivelling: $\pm 3^\circ$ )	£3170.00
178-043-1	XY levelling table (25 x 25 mm) (tilting: $\pm 1.5^\circ$ , max. loading: 15 kg, swivelling: $\pm 3^\circ$ )	£2450.00
178-048	Levelling table with DAT function (mm) (tilting: $\pm 1.5^\circ$ , max. loading: 15 kg)	£1370.00
178-049	Digital XY levelling table (25 x 25 mm) (max. loading: 15 kg)	£1450.00
178-052-1	Digital XY levelling table (1 x 1") (tilting: $\pm 1.5^\circ$ , max. loading: 15 kg, swivelling: $\pm 3^\circ$ )	£2350.00
178-053-1	XY levelling table (1 x 1") (tilting: $\pm 1.5^\circ$ , max. loading: 15 kg, swivelling: $\pm 3^\circ$ )	£2100.00
178-058	Levelling table with DAT function (inch) (tilting: $\pm 1.5^\circ$ , max. loading: 15 kg)	£1370.00
178-059	Digimatic XY levelling table (1 x 1") (max. loading: 15 kg)	£1360.00
178-610	Step gauge (step: 1 $\mu\text{m}$ , 2 $\mu\text{m}$ , 5 $\mu\text{m}$ , 10 $\mu\text{m}$ )	£470.00
178-611	Reference step specimen (mm)	£403.00
178-612	Reference step specimen (mm/inch)	£408.00
264-016-10	Input tool (USB type)	£220.00
264-505E	DP-1VA LOGGER Digimatic Mini-Processor	£406.00
965014	SPC cable (2 m)	£49.80
998291	Precision V-block for XY levelling table (workpiece $\phi 1 - \phi 160$ mm)	£659.00
12AAA882D	PC connecting cable (RS-232C cable)	£56.10
12AAB358	Cylindrical surface adapter (workpiece $\phi 15 - 60$ mm)	£137.00
12AAD510	USB PC connecting cable (USB cable)	£46.90
12AAJ088	Footswitch	£252.00
12AAL069	Memory card	£28.40
12AAM556	Height/tilt adjustment unit	£428.00

Styli refer to pages L-15 to L-16.

### Consumables

Code No.	Description	Price
270732	Durable printer paper (25 m, 5 rolls/set)	£20.30
12AAN040	LCD protective sheet (10 sheets/set)	£158.00
12AAN046	Replacement battery	£148.00

### Measurement Applications



Measurement example with optional accessories.



Measurement example with Surfstand (optional accessory).

# Surftest SJ-500

## SERIES 178 – Surface Roughness Tester with Dedicated Control/Display Unit

- High-precision/performance surface roughness tester with a dedicated control unit, featuring user-friendly display and simple operation.
- Equipped with a 7.5-inch, colour TFT LCD with backlight, large colour icons and touch-panel buttons for easy control of machine function.
- Feed-knobs on the main unit allow fine positioning of a small stylus for measuring small holes.
- Simple setup for surface roughness measuring conditions.
- A simple input function is used to calculate according to ISO/JIS roughness standard drawing instruction symbols. Complicated setups can easily be entered by selecting a drawing instruction symbol from the surface roughness menu.
- Built-in thermal printer.

**MeasurLink** ENABLED  
Data Management Software by Mitutoyo

Surftest SJ-500



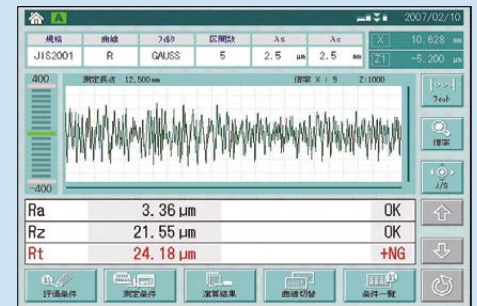
### Specifications

Model	SJ-500	
Code No. (mm)	178-532-01E	178-532-02E
Code No. (inch/mm)	178-533-01E	178-533-02E
Measuring range	50 mm	
Resolution	0.05 µm	
Scale	Linear encoder	
Drive speed	0-20 mm/s	
Measuring speed	0.02-5 mm/s	
Traverse direction	Backward	
Traverse straightness	0.2 µm/50 mm	
Positioning	±1.5° (tilting, with DAT function) 30 mm (up/down)	
Detector range/resolution	800 µm/0.01 µm, 80 µm/0.001 µm, 8 µm/0.0001 µm	
Measurement method	Skidless/skidded	
Stylus tip	Angle	60°
	Radius	2 µm
Detector measuring force	0.75 mN	4 mN
Skid radius of curvature	40 mm	
Detector type	Differential inductance	
Drive unit control	Joystick operation with manual adjustment knob	
Display magnification	Horizontal: X0.5 to X10,000 auto, vertical: X10 to X500,000 auto	
Mass	6.7 kg (drive unit: 2.7 kg, control unit: 4 kg)	

### Evaluation Capability

Assessed profiles:	P (primary profile), R (roughness profile), WC, WCA, WE, WEA, envelope residual profile, roughness motif, waviness motif
Evaluation parameters:	Ra, Rc, Ry, Rz, Rq, Rt, Rmax, Rp, Rv, R3z, Sm, S, Pc, mr(c), δc, mr, tp, Htp, Lo, lr, Ppi, HSC, Δa, Δq, Ku, Sk, Rpk, Rvk, Rk, Mr1, Mr2, A1, A2, Vo, λa, λq
Roughness motif parameters:	R, AR, Rx
Waviness motif parameters:	W, AW, Wx, Wte
Analysis graphs:	ADC, BAC, power spectrum chart
Digital filter:	2CR-75%, PC-75%, Gaussian, robust spline
Cutoff length:	λs: 0.25, 0.8, 2.5, 8, 25, 80, 250 µm, no filter λc*: 0.025, 0.08, 0.25, 0.8, 2.5, 8, 25 mm λf: 0.08, 0.25, 0.8, 2.5, 8, 25 mm, no filter
Sampling length*:	0.025, 0.08, 0.25, 0.8, 2.5, 8, 25 mm
Data compensation functions:	Parabola compensation, hyperbola compensation, ellipse compensation, R-plane (curved surface) compensation, conic compensation, tilt compensation

\*An arbitrary length can also be specified in the range from 0.025 mm to the maximum traverse length.



### Optional Accessories

Styler refer to pages L-15 to L-16.

Fixture and stage accessories refer to pages L-33 to L-36.

### Consumable

Code No.	Description	Price
270732	Durable printer paper (25 m, 5 rolls/set)	£20.30



The SJ-500 can also be mounted on a manual column stand.

## Evaluation Capability: FORMTRACEPAK

- Assessed profiles: P (primary profile), R (roughness profile), WC, WCA, WE, WEA, DIN4776 profile, envelope residual profile, roughness motif, waviness motif
- Evaluation parameters: Ra, Rq, Rz, Ry, Rz(JIS), Ry(DIN), Rc, Rp, Rpmax, Rpi, Rv, Rvmax, Rvi, Rt, Rti, R3z, R3zi, R3y, S, Pc (Ppi), Sm, HSC, mr, δc, plateau ratio, mrd, Rk, Rpk, Rvk, Mr1, Mr2, Δa, Δq, λa, λq, Sk, Ku, Lo, Lr, A1, A2
- Roughness motif parameters: Rx, R, AR, SR, SAR, NR, NCRX, CPM
- Waviness motif parameters: Wte, Wx, W, AW, SW, SAW, NW
- Analysis graphs: ADC, BAC1, BAC2, power spectrum chart, auto-correlation chart, Walsh power spectrum chart, Walsh auto-correlation chart, slope distribution chart, local peak distribution chart, parameter distribution chart, digital filter 2CR-75%, 2CR-50%, 2CR-75% (phase corrected), 2CR-50% (phase corrected), Gaussian-50%
- Cutoff length\*: λc: 0.025, 0.08, 0.25, 0.8, 2.5, 8, 25 mm  
 fl: 0.08, 0.25, 0.8, 2.5, 8, 25 mm  
 fh: 0.08, 0.25, 0.8, 2.5, 8 mm
- Sampling length\*: 0.025, 0.08, 0.25, 0.8, 2.5, 8, 25 mm
- Data compensation functions: Tilt compensation, R-plane (curved surface) compensation, ellipse compensation, parabola compensation, hyperbola compensation, quadric curve automatic compensation, polynomial compensation, polynomial automatic compensation

\*An arbitrary length can also be specified in the range from 0.025 mm to the maximum traverse length.

## Optional Accessories

Styli refer to pages L-15 to L-16.

Fixture and stage accessories refer to pages L-33 to L-36.

# Surftest SJ-500P

## SERIES 178 – Surface Roughness Tester with PC

- High-precision/performance surface roughness tester that runs under the FORMTRACEPAK sophisticated analysis software package.
- Software icons enable easy control of machine function.
- Feed-knobs on the main unit allow fine positioning of a small stylus for measuring small holes.
- Simple setup for surface roughness measuring conditions.
- A simple input function is used to calculate according to ISO/JIS roughness standard drawing instruction symbols. Complicated setups can easily be entered by selecting a drawing instruction symbol from the surface roughness menu.

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Surftest SJ-500P



## Specifications

Model	SJ-500P	
Code No. (mm)	178-530-01E	178-530-02E
Code No. (inch/mm)	178-531-01E	178-531-02E
Measuring range	50 mm	
Resolution	0.05 μm	
Scale	Linear encoder	
Drive speed	0 - 20 mm/s	
Measuring speed	0.02 - 5 mm/s	
Traverse direction	Backward	
Traverse straightness	0.2 μm/50 mm	
Positioning	±1.5° (tilting, with DAT function) 30 mm (up/down)	
Detector range/resolution	800 μm/0.01 μm, 80 μm/0.001 μm, 8 μm/0.0001 μm	
Measurement method	Skidless/skidded	
Stylus tip	Angle	60°
	Radius	2 μm
Detector measuring force	0.75 mN	4 mN
Skid radius of curvature	40 mm	
Detector type	Differential inductance	
Drive unit control	PC	
Display magnification	Horizontal: X0.5 to X10,000 auto, vertical: X10 to X500,000 auto	
Mass	6.5 kg (main unit 2.7 kg; PC interface unit 3.8 kg)	

# Surftest SV-3200

## SERIES 178 – Surface Roughness Tester

- Mitutoyo's Surftest SV-3200 Series provides highly accurate, high level, multi-functional analysis and measurement of fine contour, as well as conventional surface roughness measurement.
- Peripheral devices such as the auto-levelling table are available to enhance operability and enable automatic measurement.
- Includes FORMTRACEPAK data analysis software. FORMTRACEPAK provides data management in a consistent format, from the work site to the laboratory.
- The X1-axis drive unit guide is made of superbly anti-abrasive ceramic and provides a choice of traverse distance of 100 or 200 mm, according to model. No lubrication is required.
- High-accuracy glass scales, built-in on the X1 axis (resolution: 0.05  $\mu\text{m}$ ) and Z2 axis (column, resolution: 1  $\mu\text{m}$ ) ensure high-accuracy positioning. The SV-3200 series produces highly reliable measurement, particularly in horizontal roughness parameters (S, Sm) that require high-accuracy X1-axis travel.
- Equipped with a highly accurate detector for which optional holders are available that enable manual change of detector orientation for measurement applications such as crankshaft journals (or similar workpiece features) in the axial direction, or the upper and lower surfaces of deep holes at one setup.
- Capabilities include a *straightness compensation* function, which improves the straightness of the X1-axis; a *circular compensation* function for the vertical movement of the stylus; and a *stylus-tip-radius compensation* function.
- The stylus and the skid are easily replaced. Optional styli and skids are available for a wide variety of roughness measurement applications, such as measurement of small holes, deep holes, etc.
- Supplied with an easy-to-operate remote box independent of the main unit allowing positioning, measurement start/stop, retraction, and other operations to be performed remotely. The Drive Unit up/down position and the X1-axis traverse can be finely controlled manually.

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Surftest SV-3200H4 with PC



S-3000CR holder enables upward detector orientation (optional accessory).

### Technical Data

X1 axis (drive unit)	
Resolution:	0.05 $\mu\text{m}$
Scale:	Linear encoder
Drive speed:	0 - 80 mm/s
Measuring speed:	0.02 - 5 mm/s
Inclination range:	$\pm 45^\circ$ (with X1-axis inclination unit)
Z2 axis (column)	
Resolution:	1 $\mu\text{m}$
Scale:	ABSOLUTE linear encoder
Drive speed:	0 - 30 mm/s
Measurement method:	Skidless/skidded
Type:	Differential inductance

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### Evaluation Capability: FORMTRACEPAK

Conformable standards: JIS1982/JIS1994/JIS2001/ISO1997/  
ANSI/VDA

Assessed profiles: Primary profile, roughness profile, envelope residual curve, filtered waviness curve, band pass waviness curve, waviness curve, rolling circle waviness curve, roughness motif, waviness motif, DIN4776 curve

Parameters: Ra, Rq, Sk, Ku, Rp, Rv, Ry, RyDIN, RzDIN, Rt, Rc, Rz, R3z, R3y, S,  $\Delta a$ ,  $\Delta q$ ,  $\lambda a$ ,  $\lambda q$ , Lo, lr, Rk, Rpk, Rvk, Mr1, Mr2, A1, A2, Sm, Pc, HSC, mr, mrd,  $\delta c$ , Vo, Rx, AR, R, NR, NCRX, CPM, SR, SAR, Wx, AW, W, Wte, NW, SW, SAW

Graphs: Amplitude distribution graphs, BAC1, BAC2, power spectrum curve, auto correlation curve, inclination angle distribution curve, peak point height distribution curve, parameter distribution curve

Waviness motif

parameters: Wte, Wx, W, AW, SW, SAW, NW

Analysis graphs: ADC, BAC1, BAC2, power spectrum chart, autocorrelation chart, Walsh power spectrum chart, Walsh auto-correlation chart, slope distribution chart, local peak distribution chart, parameter distribution chart

Digital filter: 2CR-75%, 2CR-50%, 2CR-75% (phase corrected), 2CR-50% (phase corrected), Gaussian-50%

Data compensation: Tilt compensation, R-surface compensation, ellipse compensation, parabola compensation, hyperbolic compensation, polynomial compensation, conic automatic compensation

Filters: Gaussian filter, 2CRPC75, 2CRPC50, 2CR75, 2CR50, robust spline filter

Cutoff length:  $\lambda c$ : 0.025, 0.08, 0.25, 0.8, 2.5, 8, 25, 80 mm or an arbitrary length up to the maximum traverse length  
 $\lambda s$ : 0.8, 2.5, 8, 25, 80, 250, 800  $\mu\text{m}$  or an arbitrary length within this range

Supported languages: Japanese, English, German, French, Italian, Spanish, Polish, Hungarian, Swedish, Czech, Simplified Chinese, Traditional Chinese, Korean, Turkish, Portuguese

## Optional Accessories

Code No.	Description	Price
166-215	Workbench (with drawers)	£1850.00
178-016	Levelling table	£650.00
178-019	Precision vice*	£721.00
178-023	Vibration isolator	£3000.00
178-024	Stand for vibration isolator	£767.00
178-042-1	Digimatic XY levelling table (25x25 mm)	£3170.00
178-043-1	XY levelling table (25x25 mm)	£2450.00
178-047	Three-axis adjustment table (998291 is included)	£3760.00
178-052-1	Digimatic XY levelling table (1x1")	£2350.00
178-053-1	XY levelling table (1x1")	£2100.00
178-074	S-3000C detector holder (crank orientation)	£2390.00
178-075	S-3000CR detector holder (crank and upward/downward orientation)	£3480.00
178-076	S-3000MR detector holder (upward/downward orientation, 100mm longer reach)	£6350.00
178-610	Metric 4-step gauge (1 µm, 2 µm, 5 µm, 10 µm)	£470.00
178-611	Step gauge (2 µm, 10 µm)	£403.00
178-612	Step gauge (2 µm, 10 µm, 79 µinch, 394 µinch)	£408.00
181-902-10	V-block set with clamp (max. workpiece ø25 mm)	£165.00
181-901-10	V-block set with clamp (max. workpiece ø1")	£165.00
218-007	Workbench	£1450.00
218-008	Auxiliary desk	£600.00
218-010	Auxiliary desk	£690.00
998291	Precision V-block*	£659.00

Styli refer to pages L-15 to L-16.

\* Use with an XY levelling table.

## Simplified CNC Function

Support for a wide range of optional peripherals designed for use with the CNC models enables automatic measurement.



Using Y-axis table.



Using rotary table Ø1.



Using rotary table Ø2.

## Specifications

Model	SV-3200S4		SV-3200H4			
	Code No. (mm)	Code No. (inch)	Code No. (mm)	Code No. (inch)		
Without X-axis tilting mechanism	178-414-11E	178-414-12E	178-415-11E	178-415-12E		
With X-axis tilting mechanism	178-434-11E	178-434-12E	178-435-11E	178-435-12E		
	Code No. (mm)	Code No. (inch)	Code No. (mm)	Code No. (inch)		
Stylus tip	Angle	60°	90°	60°	90°	
	Radius	2 µm	5 µm	2 µm	5 µm	
Detector measuring force	0.75 mN		4 mN		0.75 mN	4 mN
Detector range/resolution	800 µm/0.01 µm, 80 µm/0.001 µm, 8 µm/0.0001 µm (up to 2400 µm with an optional stylus)					
X1-axis measuring range	100 mm					
X1-axis traverse straightness*	(0.05+1L/1000) µm, L = measured length (mm)					
Dimensions (main unit, WxDxH)	1016x575x966 mm		1016x575x1166 mm			
Mass (main unit)	140 kg		150 kg			

Model	SV-3200W4		SV-C3200L4			
	Code No. (mm)	Code No. (inch)	Code No. (mm)	Code No. (inch)		
Without X-axis tilting mechanism	178-416-11E	178-416-12E	178-454-11E	178-454-12E		
With X-axis tilting mechanism	178-436-11E	178-436-12E	178-474-11E	178-474-12E		
	Code No. (mm)	Code No. (inch)	Code No. (mm)	Code No. (inch)		
Stylus tip	Angle	60°	90°	60°	90°	
	Radius	2 µm	5 µm	2 µm	5 µm	
Detector measuring force	0.75 mN		4 mN		0.75 mN	4 mN
Detector range/resolution	800 µm/0.01 µm, 80 µm/0.001 µm, 8 µm/0.0001 µm (up to 2400 µm with an optional stylus)					
X1-axis measuring range	100 mm					
X1-axis traverse straightness*	(0.05+1L/1000) µm, L = measured length (mm)					
Dimensions (main unit, WxDxH)	1416x575x1176 mm		1416x575x1436 mm			
Mass (main unit)	220 kg		270 kg			

Model	SV-3200S8		SV-3200H8			
	Code No. (mm)	Code No. (inch)	Code No. (mm)	Code No. (inch)		
Without X-axis tilting mechanism	178-417-11E	178-417-12E	178-418-11E	178-418-12E		
With X-axis tilting mechanism	178-437-11E	178-437-12E	178-438-11E	178-438-12E		
	Code No. (mm)	Code No. (inch)	Code No. (mm)	Code No. (inch)		
Stylus tip	Angle	60°	90°	60°	90°	
	Radius	2 µm	5 µm	2 µm	5 µm	
Detector measuring force	0.75 mN		4 mN		0.75 mN	4 mN
Detector range/resolution	800 µm/0.01 µm, 80 µm/0.001 µm, 8 µm/0.0001 µm (up to 2400 µm with an optional stylus)					
X1-axis measuring range	200 mm					
X1-axis traverse straightness*	(0.1+2L/1000) µm, L = measured length (mm)					
Dimensions (main unit, WxDxH)	1026x575x966 mm		1026x575x1166 mm			
Mass (main unit)	140 kg		150 kg			

Model	SV-3200W8		SV-3200L8			
	Code No. (mm)	Code No. (inch)	Code No. (mm)	Code No. (inch)		
Without X-axis tilting mechanism	178-419-11E	178-419-12E	178-455-11E	178-455-12E		
With X-axis tilting mechanism	178-439-11E	178-439-12E	178-475-11E	178-475-12E		
	Code No. (mm)	Code No. (inch)	Code No. (mm)	Code No. (inch)		
Stylus tip	Angle	60°	90°	60°	90°	
	Radius	2 µm	5 µm	2 µm	5 µm	
Detector measuring force	0.75 mN		4 mN		0.75 mN	4 mN
Detector range/resolution	800 µm/0.01 µm, 80 µm/0.001 µm, 8 µm/0.0001 µm (up to 2400 µm with an optional stylus)					
X1-axis measuring range	200 mm					
X1-axis traverse straightness*	(0.1+2L/1000) µm, L = measured length (mm)					
Dimensions (main unit, WxDxH)	1426x575x1176 mm		1426x575x1436 mm			
Mass (main unit)	220 kg		270 kg			

\* With the X1 axis in the horizontal orientation.

# Surftest Extreme SV-3000CNC

## SERIES 178 – CNC Surface Roughness Testers

- A highly accurate measuring instrument that allows CNC measurement of surface roughness and fine contour.
- Each axis has a maximum drive speed of 200 mm/s, permitting high-speed positioning for increased throughput of multiple-profile/multiple-workpiece measurement tasks.
- For models equipped with the  $\alpha$  axis, it is possible to perform continuous measurement over horizontal and inclined surfaces by power-tilting the drive unit.
- It is possible to expand the measuring range for multiple workpieces etc., through positioning in the Y-axis direction.
- With optional rotary tables for axes  $\theta 1$  and  $\theta 2$ , designed for use with the CNC models, it is possible to expand the CNC measurement application range.
- Inclined plane measurement is possible through simultaneous control of the X1 and Z2-axes.
- The Z1 axis incorporates an anti-collision safety device to automatically stop the detector unit if it collides with a workpiece or jig.
- An easy-to-operate Remote Box enables the user to make any movement by selecting the required axis using the two joysticks. The current axis selection is easily identified by the icon on the key top.
- Communication with the data processing/analysis section is via USB.

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Surftest Extreme SV-3000CNC



### Specifications

Model		SV-3000CNC			
Code No.		178-508-12E	178-509-12E	178-528-12E	178-529-12E
X1-axis	Measuring range	200 mm			
	Resolution	0.05 $\mu\text{m}$			
	Scale	Reflective-type linear encoder			
	Drive speed	Max. 200 mm/s (CNC), 0 - 60 mm/s (joystick)			
	Measuring speed	0.02 - 2 mm/s			
	Traverse straightness	0.5 $\mu\text{m}/200$ mm			
Detector range/resolution		800 $\mu\text{m}/0.01$ $\mu\text{m}$ , 80 $\mu\text{m}/0.001$ $\mu\text{m}$ , 8 $\mu\text{m}/0.0001$ $\mu\text{m}$			
Z2-axis	Vertical travel	300 mm		500 mm	
	Resolution	0.05 $\mu\text{m}$			
	Scale	Reflective-type linear encoder			
	Drive speed	Max. 200 mm/s (CNC), 0 - 60 mm/s (joystick)			
	Base size (WxD)	750 x 600 mm			
Y-axis table unit	Measuring range	200 mm			
	Resolution	0.05 $\mu\text{m}$			
	Scale unit	Reflective-type linear encoder			
	Drive speed	200 mm/s (max., CNC), 0-60 mm/s (joystick)			
	Loading capacity	Max. 20 kg			
	Traverse straightness	0.5 $\mu\text{m}/200$ mm			
	Accuracy (at 20°C)	$\pm(2+2L/100)$ , L = dimension between two measured points (mm)			
	Table size	200 x 200 mm			
	Dimensions (WxDxH)	320 x 646 x 105 mm			
Mass	35 kg				
$\alpha$ -axis unit	—	Installed	—	Installed	
Dimensions (WxDxH)		800 x 651 x 1000 mm		800 x 651 x 1200 mm	
Mass		240 kg		250 kg	

### Technical Data

Measuring force:	4 mN (178-397-2) 0.75 mN (low force type 178-396-2)
Stylus tip:	Diamond, 90°/SR5 $\mu\text{m}$ (60°/SR2 $\mu\text{m}$ : low force type)
$\alpha$ axis	
Inclination angle:	-45° to +10°
Resolution:	0.000225°
Rotation speed:	1 rpm

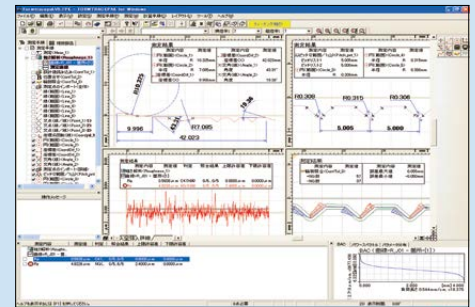
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### Standard Software

#### FORMTRACEPAK

Enables control of the optional motor-driven Y-axis table and rotary table for realizing efficient measurement automation. Contour evaluation can be performed such as analysis of level differences, angle, pitch, area and other characteristics based on surface roughness data. In addition, an original inspection certificate can be created by setting the print format to suit your particular requirements.



### Optional Accessories

#### Vibration isolation stand

Vibration isolation mechanism:	Diaphragm air spring
Natural frequency :	2.5 - 3.5 Hz
Damping mechanism:	Orifice
Levelling mechanism:	Automatic control with mechanical valves
Air supply pressure:	0.4 MPa
Allowable loading capacity:	350 kg
Dimensions (WxDxH):	1000 x 895 x 715 mm
Mass:	315 kg

Fixture and stage accessories refer to pages L-33 to L-36.

# Surftest Extreme SV-M3000CNC

## SERIES 178 – CNC Surface Roughness Testers

- A CNC Surface Roughness Tester that handles measurement of large/heavy workpieces such as engine blocks, crankshafts and similar components.
- Combined with the surface roughness detector swivelling unit, S-3000AR (optional), continuous measurement over the bottom, top and side surfaces of a workpiece is possible.
- With an optional large table for supporting a load of 100 kg, or a large Ø2 table, continuous automatic measurement of larger workpieces is possible.
- Suitable for automatic surface roughness measurement on large and heavy workpieces.
- A moving column configuration eliminates workpiece size constrictions. Advantageous for measuring large and/or heavy workpieces.
- An 800 mm Y-axis stroke makes measurement of multiple profiles on large workpieces possible.
- The load table has a self-contained structure ensuring that variously sized workpieces, and standard and custom jigs, auto-feed devices, etc., are easily accommodated.

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### Surftest Extreme SV-M3000CNC



### Specifications

Model	SV-M3000CNC			
Code No.	178-549-2E			
X1-axis measuring range	200 mm			
Detector holder*	Type	Standard S-3000	Long-type S-3000L	Rotary-type S-3000
	Code No.	178-071	178-072	178-073
X1-axis	Measuring range	200 mm		
	Resolution	0.05 µm		
	Scale	Reflective-type linear encoder		
	Drive speed	Max. 200 mm/s (CNC), 0-50 mm/s (joystick)		
	Measuring speed	0.02 - 2 mm/s		
Traverse straightness		0.5 µm/200 mm	0.7 µm/200 mm	0.5 µm/200 mm (up/down) 0.7 µm/200 mm (forward/backward)
Detector range/resolution	800 µm/0.01 µm, 80 µm/0.001 µm, 8 µm/0.0001 µm (up to 2400 µm with an optional stylus)			
Z2-axis vertical travel	500 mm			
Y-axis	Travel range	800 mm		
	Resolution	0.05 µm		
	Scale	Reflective-type linear encoder		
	Traverse straightness	0.5 µm/50 mm, 2 µm/800 mm	0.7 µm/50 mm, 3 µm/800 mm	0.7 µm/50 mm, 3 µm/800 mm (up/down)
α-axis	Inclination angle	-45° (CCW), +10° (CW)		
	Resolution	0.000225°		
	Rotation speed	1 rpm		
Steel base size (WxD)	600 x 1500 mm			
Base unit loading capacity:	300 kg			
Dimensions (WxDxH)	1085 x 1695 x 1922 mm			
Mass (main unit)	1600 kg (including vibration isolation unit)			

\* Required option.

### Technical Data

Measuring force: 4 mN (178-397-2)  
0.75 mN (low force type 178-396-2)  
Stylus tip: Diamond, 90° / SR5 µm  
(60° / SR2 µm: low force type)  
Type: Differential inductance

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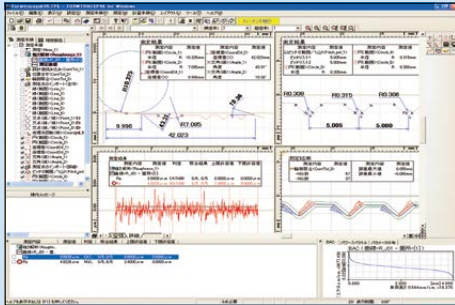
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### Standard Software

#### FORMTRACEPAK

Enables control of the optional motor-driven Y-axis table and rotary table for realizing efficient measurement automation. Contour evaluation can be performed such as analysis of level differences, angle, pitch, area and other characteristics based on surface roughness data. In addition, an original inspection certificate can be created by setting the print format to suit your particular requirements.

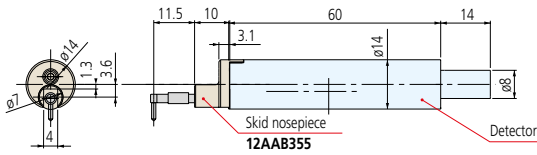


### Optional Accessories

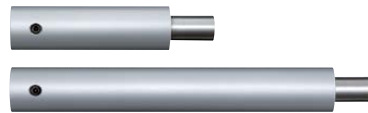
Fixture and stage accessories refer to pages L-33 to L-36.

# Optional Styli

Compatible with SJ-410, SJ-500, SV-2100, SV-3200 Models



178-396-2 Detector (0.75 mN)  
178-397-2 Detector (4 mN)



12AAG202 50 mm extension rod  
12AAG203 100 mm extension rod

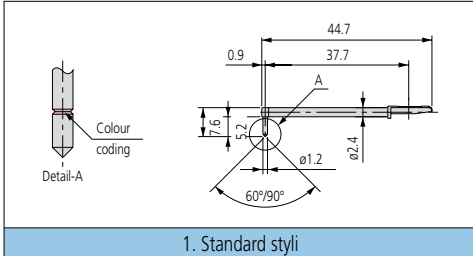
## Specifications

Code No.	Stylus tip radius	Stylus tip angle
<b>1. Standard styli</b>		
12AAE882	1 μm	60°
12AAE924	1 μm	90°
12AAC731	2 μm	60°
12AAB403	5 μm	90°
12AAB415	10 μm	90°
12AAE883	250 μm	60°
<b>2. For deep hole (double length)<sup>*1</sup></b>		
12AAE898	2 μm	60°
12AAE914	5 μm	90°
<b>3. For small hole</b>		
12AAC732	2 μm	60°
12AAB404	5 μm	90°
12AAB416	10 μm	90°
<b>4. For small hole/deep hole (double length)<sup>*1</sup></b>		
12AAE892	2 μm	60°
12AAE908	5 μm	90°
<b>5. For very small hole</b>		
12AAC733	2 μm	60°
12AAB405	5 μm	90°
12AAB417	10 μm	90°
<b>6. For small hole<sup>*1*2</sup></b>		
12AAE884	0.8 mm	—
<b>7. For extra-small hole</b>		
12AAC734	2 μm	60°
12AAB406	5 μm	90°
12AAB418	10 μm	90°
<b>8. For ultra-small hole<sup>*1*2</sup></b>		
12AAJ662	250 μm	—
<b>9. For deep hole (double length)<sup>*1</sup></b>		
12AAC740	2 μm	60°
12AAB413	5 μm	90°
12AAB425	10 μm	90°
<b>10. For deep hole (triple length)<sup>*1</sup></b>		
12AAC741	2 μm	60°
12AAB414	5 μm	90°
12AAB426	10 μm	90°
<b>11. For small slotted hole<sup>*1</sup></b>		
12AAE938	2 μm	60°
12AAE940	5 μm	90°

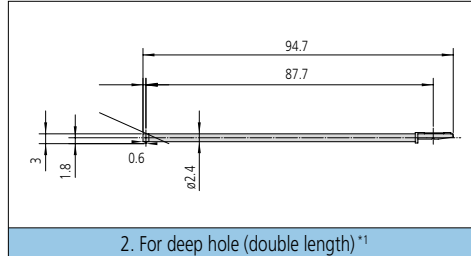
<sup>\*1</sup> For downward-facing measurement only.

<sup>\*2</sup> Used for calibration, a standard step gauge (178-611 optional accessory) is also required.

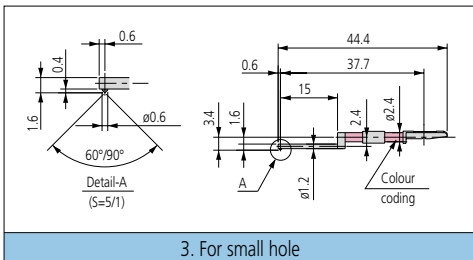
Tip radius	1 μm	2 μm	5 μm	10 μm	250 μm
Colour coding	White	Black	No colour	Yellow	No notch or colour



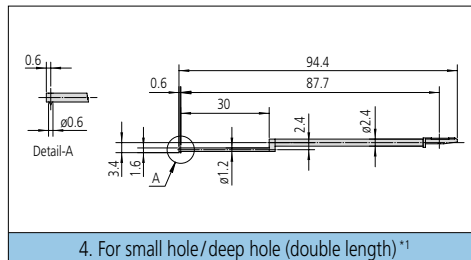
1. Standard styli



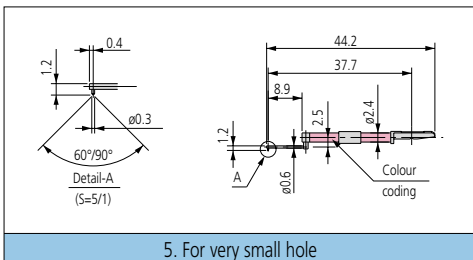
2. For deep hole (double length)<sup>\*1</sup>



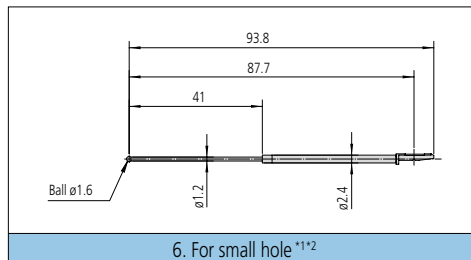
3. For small hole



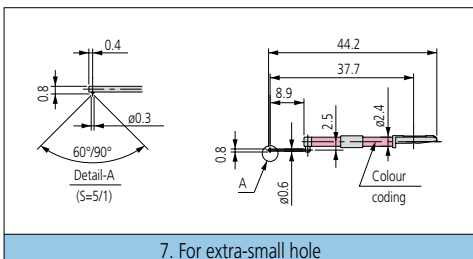
4. For small hole/deep hole (double length)<sup>\*1</sup>



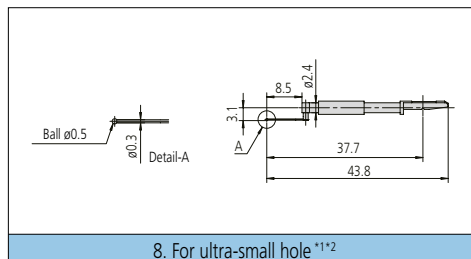
5. For very small hole



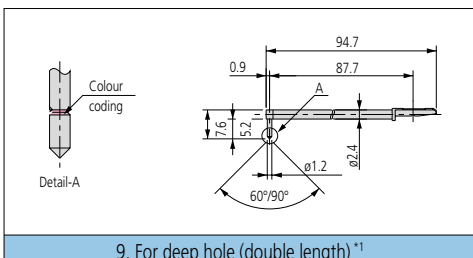
6. For small hole<sup>\*1\*2</sup>



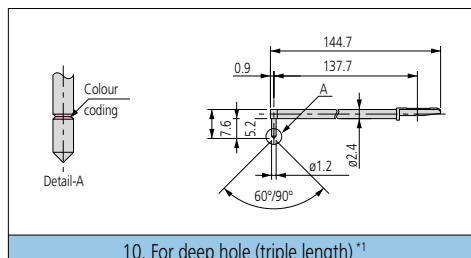
7. For extra-small hole



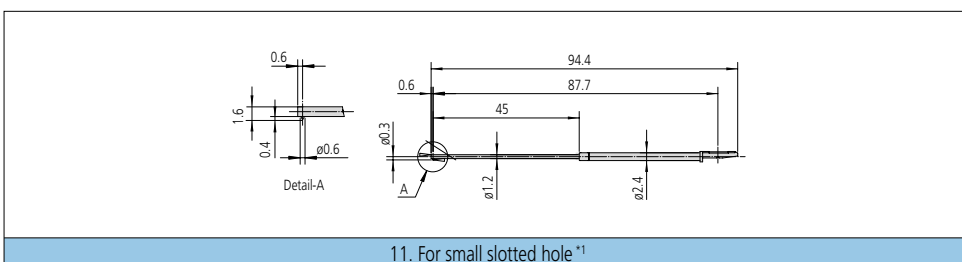
8. For ultra-small hole<sup>\*1\*2</sup>



9. For deep hole (double length)<sup>\*1</sup>



10. For deep hole (triple length)<sup>\*1</sup>



11. For small slotted hole<sup>\*1</sup>



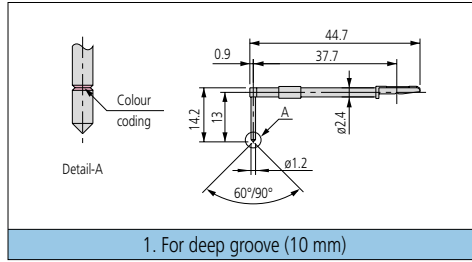
## Specifications

Code No.	Stylus tip radius	Stylus tip angle
<b>1. For deep groove (10 mm)</b>		
12AAC735	2 µm	60°
12AAB409	5 µm	90°
12AAB421	10 µm	90°
<b>2. For deep groove (20 mm)/deep hole (double length) *2</b>		
12AAE893	2 µm	60°
12AAE909	5 µm	90°
<b>3. For deep groove (20 mm) *1</b>		
12AAC736	2 µm	60°
12AAB408	5 µm	90°
12AAB420	10 µm	90°
<b>4. For deep groove (40 mm) *1</b>		
12AAE895	2 µm	60°
12AAE911	5 µm	90°
<b>5. For deep groove (30 mm) *1</b>		
12AAC737	2 µm	60°
12AAB407	5 µm	90°
12AAB419	10 µm	90°
<b>6. For deep groove (30 mm) *1 / deep hole (double length)</b>		
12AAE894	2 µm	60°
12AAE910	5 µm	90°
<b>7. For gear tooth</b>		
12AAB339	2 µm	60°
12AAB410	5 µm	60°
12AAB422	10 µm	60°
<b>8. For gear tooth *1 / deep hole (double length)</b>		
12AAE896	2 µm	60°
12AAE912	5 µm	60°
<b>9. For rolling circle waviness surface *2</b>		
12AAB338	0.8 mm	—
<b>10. For rolling circle waviness *1 / deep hole (double length) *2</b>		
12AAE886	250 µm	—
<b>11. For knife-edge detector</b>		
12AAC738	2 µm	60°
12AAB411	5 µm	90°
12AAB423	10 µm	90°
<b>12. For corner hole *1 / deep hole (double length)</b>		
12AAM601	2 µm	60°
12AAM603	5 µm	60°
<b>13. For eccentric arm *1</b>		
12AAC739	2 µm	60°
12AAB412	5 µm	90°
12AAB424	10 µm	90°

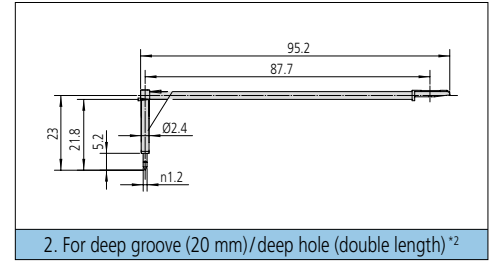
\*1 For downward-facing measurement only.

\*2 Used for calibration, a standard step gauge (178-611 optional accessory) is also required.

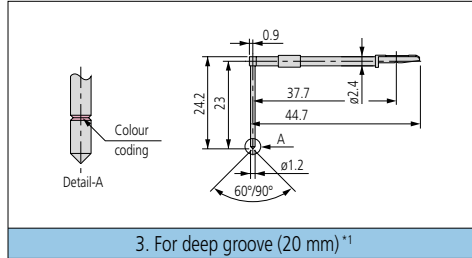
Tip radius	1 µm	2 µm	5 µm	10 µm	250 µm
Colour coding	White	Black	No colour	Yellow	No notch or colour



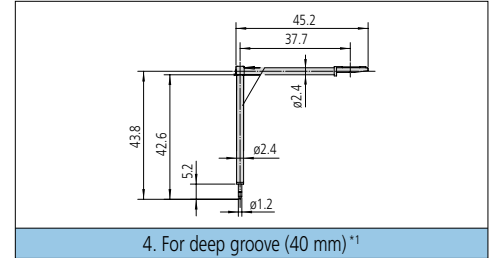
1. For deep groove (10 mm)



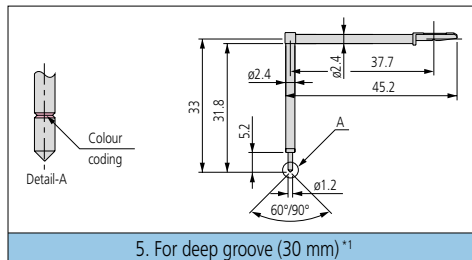
2. For deep groove (20 mm)/deep hole (double length) \*2



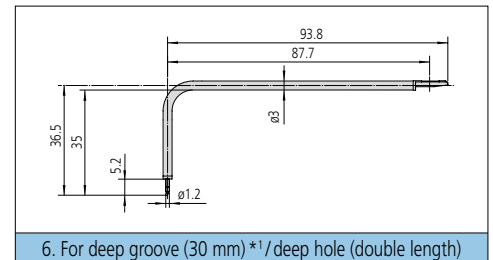
3. For deep groove (20 mm) \*1



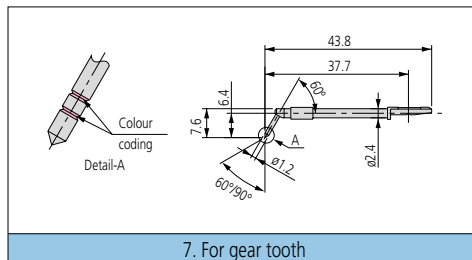
4. For deep groove (40 mm) \*1



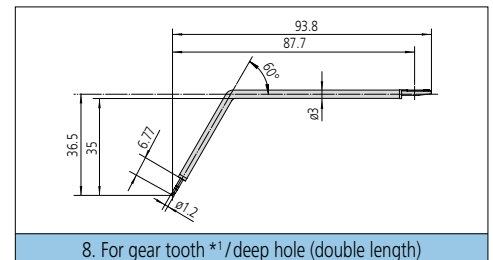
5. For deep groove (30 mm) \*1



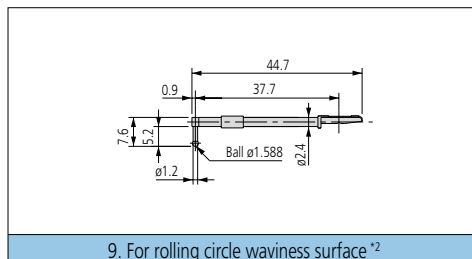
6. For deep groove (30 mm) \*1 / deep hole (double length)



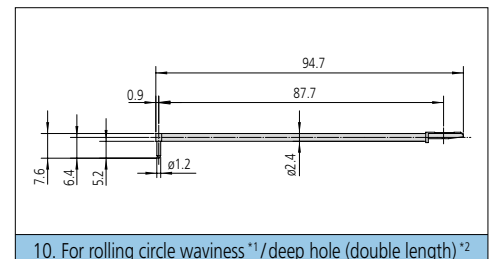
7. For gear tooth



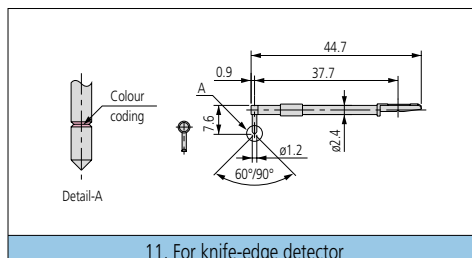
8. For gear tooth \*1 / deep hole (double length)



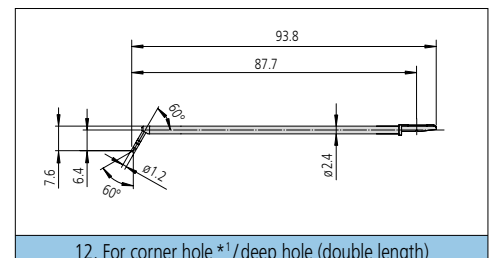
9. For rolling circle waviness surface \*2



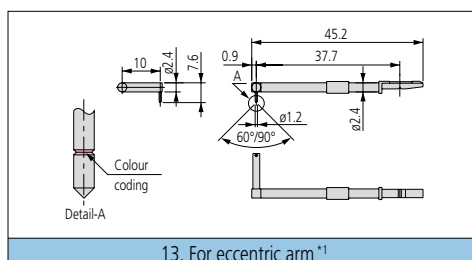
10. For rolling circle waviness \*1 / deep hole (double length) \*2



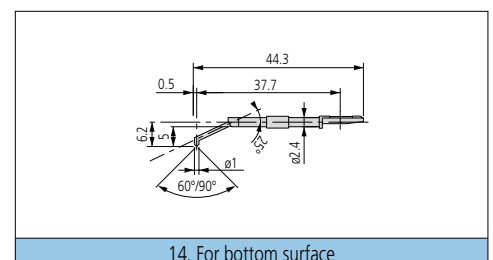
11. For knife-edge detector



12. For corner hole \*1 / deep hole (double length)



13. For eccentric arm \*1



14. For bottom surface

# Contracer CV-2100N4

## SERIES 218 – Contour Measuring Instruments

- A digital arc-scale is equipped in the Z-axis detecting unit. This gives a wider range of measurement with higher resolution. No more reliance on measurement magnification.
- A data analysis system (PC system and FORMTRACEPAK software) is available.
- The CV-2100N4 is portable and can be carried to the machine shop for measurement of large workpieces.

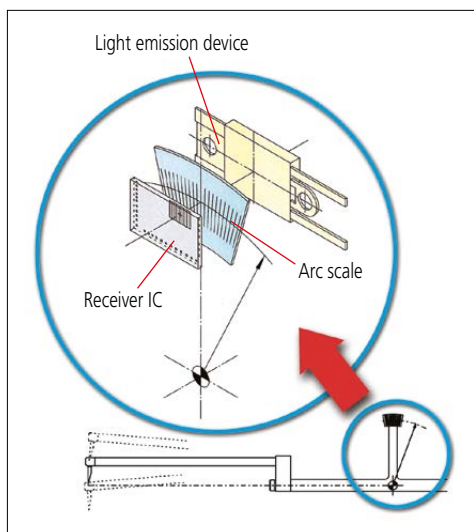
**MeasurLink** ENABLED  
Data Management Software by Mitutoyo

Contracer CV-2100N4



### Specifications

<b>Model</b>	<b>CV-2100N4</b>	
<b>Code No. (mm)</b>	<b>218-613E</b>	
<b>Code No. (inch/mm)</b>	<b>218-623E</b>	
X1 axis	Measuring range	100 mm
	Resolution	0.1 μm
	Scale type	Reflective-type linear encoder
	Drive speed	0.2, 1 mm/s and manual
	Measuring speed	0.2, 0.5 mm/s
	Measuring direction	Forward and backward
	Traverse straightness	2.5 μm/100 mm
	Accuracy (at 20°C)	±(2.5+2L/100) μm, L = Drive length (mm)
Stylus tip	Carbide, SR25 μm	
Mass (main unit)	146 kg	



Arc scale on the Z axis.

### Technical Data

Z1 axis (detector unit)

Measuring range:	50 mm
Resolution:	0.1 μm
Scale type:	Arc encoder
Accuracy (at 20°C):	±(2.5+0.2H) μm
H: measurement height from the horizontal position (mm)	
Stylus movement:	Arc
Stylus orientation:	Downward
Measuring force:	30±10 mN
Traceable angle:	Ascent: 77°, descent: 87° using the standard stylus provided and depending on the surface roughness
Power supply:	240VAC ±10%, 50/60Hz

### Optional Accessories

Code No.	Description	Price
<b>172-142</b>	Centre support	<b>£604.00</b>
<b>172-143</b>	Centre support riser	<b>£265.00</b>
<b>172-144</b>	Rotary vice	<b>£632.00</b>
<b>172-197</b>	Swivel centre support	<b>£476.00</b>
<b>172-234</b>	V-block with clamp (max. workpiece ø50 mm)	<b>£325.00</b>
<b>172-378</b>	V-block with clamp (max. workpiece ø25 mm)	<b>£231.00</b>
<b>176-107</b>	Holder with clamp	<b>£177.00</b>
<b>178-023</b>	Vibration isolator	<b>£3000.00</b>
<b>178-024</b>	Vibration isolator stand	<b>£767.00</b>
<b>218-001</b>	Cross-travel table (XY range: 100 x 50 mm)	<b>£1980.00</b>
<b>218-002</b>	Rugged table	<b>£1240.00</b>
<b>218-003</b>	Rotary vice (heavy-duty type)	<b>£1140.00</b>
<b>218-011</b>	Cross-travel table (XY range: 4 x 2")	<b>£2170.00</b>
<b>218-024</b>	Column stand (vertical travel: 320 mm, inclination: ±45°)	<b>£3410.00</b>
<b>218-041</b>	Cross-travel table (XY range: 50 x 25 mm)	<b>£2280.00</b>
<b>218-051</b>	Cross-travel table (XY range: 2 x 1")	<b>£2130.00</b>
<b>998861</b>	Pin gauge unit for calibration (inch)	<b>£243.00</b>
<b>998862</b>	Pin gauge unit for calibration (mm)	<b>£243.00</b>

Arms and styli refer to page L-21.



CV-2100N4 can be attached to the optional column stand.

# Contracer CV-2100M4

## SERIES 218 – Contour Measuring Instruments

- A digital arc-scale is equipped in the Z-axis detecting unit. This gives a wider range of measurement with higher resolution. No more reliance on measurement magnification.
- A data analysis system (PC system and FORMTRACEPAK software) is available.

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Contracer CV-2100M4



### Specifications

Model	CV-2100M4	
Code No. (mm)	218-633E	
Code No. (inch/mm)	218-643E	
X1 axis	Measuring range	100 mm
	Resolution	0.1 µm
	Scale type	Reflective-type linear encoder
	Drive speed	0.2, 1 mm/s and manual
	Measuring speed	0.2, 0.5 mm/s
	Measuring direction	Forward and backward
	Traverse straightness	2.5 µm/100 mm
	Accuracy (at 20°C)	±(2.5+2L/100) µm, L = Drive length (mm)
Z2 axis (column)	Column type	Manual
	Vertical travel	350 mm
	Drive speed	1 - 5 mm/s and manual
Stylus tip	Carbide, SR25 µm	
Mass (main unit)	146 kg	

### Technical Data

Z1 axis (detector unit)  
 Measuring range: 50 mm  
 Resolution: 0.1 µm  
 Scale type: Arc encoder  
 Accuracy (at 20°C): ±(2.5+(0.2H)) µm  
 H: measurement height from the horizontal position (mm)  
 Stylus movement: Arc  
 Stylus orientation: Downward  
 Measuring force: 30±10 mN  
 Traceable angle: Ascent: 77°, descent: 87° using the standard stylus provided and depending on the surface roughness  
 Base size (W x H): 600 x 450 mm  
 Base material: Granite  
 Power supply: 240VAC ±10%, 50/60Hz

### Optional Accessories

Code No.	Description	Price
172-142	Centre support	£604.00
172-143	Centre support riser	£265.00
172-144	Rotary vice	£632.00
172-197	Swivel centre support	£476.00
172-234	V-block with clamp (max. workpiece ø50 mm)	£325.00
172-378	V-block with clamp (max. workpiece ø25 mm)	£231.00
176-107	Holder with clamp	£177.00
178-023	Vibration isolator	£3000.00
178-024	Vibration isolator stand	£767.00
218-001	Cross-travel table (XY range: 100x50 mm)	£1980.00
218-002	Rugged table	£1240.00
218-003	Rotary vice (heavy-duty type)	£1140.00
218-011	Cross-travel table (XY range: 4x2")	£2170.00
218-041	Cross-travel table (XY range: 50 x 25 mm)	£2280.00
218-051	Cross-travel table (XY range: 2x1")	£2130.00
998861	Pin gauge unit for calibration (inch)	£243.00
998862	Pin gauge unit for calibration (mm)	£243.00

Arms and styli refer to page L-21.



Motor-driven jog shuttle.



Motor-driven jog shuttle.



Centralised front control panel.

# Contracer CV-3200

## SERIES 218 – Contour Measuring Instruments

- Dramatically increased drive speed (X1 axis: 80 mm/s, Z2 axis: 30 mm/s) further reduces total measurement time.
- In order to maintain the traverse straightness specification for an extended period of time, Mitutoyo has adopted highly rigid ceramic guides that combine the characteristics of smallest secular change and remarkable resistance to abrasion.
- The drive unit (X1 axis) and column (Z2 axis) are equipped with high-accuracy linear encoders (ABS type on Z2 axis). This improves reproducibility of continuous automatic measurement of small holes in the vertical direction and repeated measurement of parts which are difficult to position.
- A newly designed straight arm has reduced interference with the workpiece and expanded the measurement range in the Z1 axis (height) direction.
- One-touch mounting and removal of the arm.
- Designed to handle workpieces calling for high accuracy.

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Contracer CV-3200S4

### Technical Data

X1 axis	
Resolution:	0.05 $\mu\text{m}$
Scale type:	Linear encoder
Drive speed:	0-80 mm/s and manual
Measuring speed:	0.02-5 mm/s
Measuring direction:	Forward/backward
Inclination range:	$\pm 45^\circ$
Z2 axis (column)	
Resolution:	1 $\mu\text{m}$
Scale type:	ABSOLUTE linear encoder
Drive speed:	0-30 mm/s and manual
Z1 axis (detector unit)	
Measuring range:	$\pm 30$ mm
Resolution:	0.04 $\mu\text{m}$
Scale type:	Rotary arc encoder
Accuracy (at 20°C):	$\pm(1.4+2H/100)$ $\mu\text{m}$ , H: measurement height from the horizontal position (mm)
Stylus orientation:	Upward/downward
Measuring force:	30 mN
Traceable angle:	Ascent: $77^\circ$ , descent: $83^\circ$ using the standard stylus provided and depending on the surface roughness
Stylus tip:	Carbide, SR25 $\mu\text{m}$
Base material:	Granite
Mass	
Main unit:	See table
Controller unit:	14 kg
Remote control box:	0.9 kg
Power supply:	240VAC $\pm 10\%$ , 50/60 Hz
Power consumption:	400 W (main unit only)

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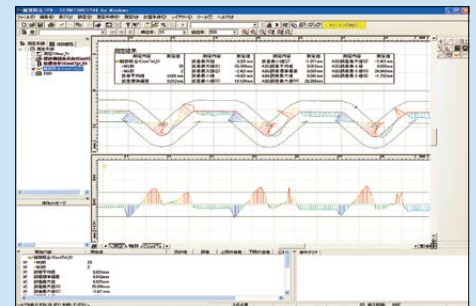
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**FORM**

### Standard Software

#### FORMTRACEPAK

Enables control of the optional motor-driven Y-axis table and rotary table for realizing efficient measurement automation. Contour evaluation can be performed such as analysis of level differences, angle, pitch, area and other characteristics based on surface roughness data. In addition, an original inspection certificate can be created by setting the print format to suit your particular requirements.



### Optional Accessories

Arms and styli refer to page L-22.

Fixture and stage accessories refer to pages L-33 to L-36.

### Specifications

Model	CV-3200S4	CV-3200H4	CV-3200W4	CV-3200L4
Code No. (mm)	218-481-10E	218-482-10E	218-483-10E	218-484-10E
Code No. (inch/mm)	218-491-10E	218-492-10E	218-493-10E	218-494-10E
X1 axis	Measuring range			
	100 mm			
	Traverse straightness			
0.8 $\mu\text{m}/100$ mm (X1 axis in horizontal orientation)				
Accuracy (at 20°C)				
$\pm(0.8+0.01L)$ $\mu\text{m}$ , L = drive length (mm)				
Z2-axis vertical travel	300 mm	500 mm	700 mm	
Dimensions (main unit, WxDxH)	756 x 482 x 966 mm	756 x 482 x 1166 mm	1156 x 482 x 1176 mm	1156 x 492 x 1436 mm
Mass (main unit)	140 kg	150 kg	220 kg	270 kg

Model	CV-3200S8	CV-3200H8	CV-3200W8	CV-3200L8
Code No. (mm)	218-486-10E	218-487-10E	218-488-10E	218-489-10E
Code No. (inch/mm)	218-496-10E	218-497-10E	218-498-10E	218-499-10E
X1 axis	Measuring range			
	200 mm			
	Traverse straightness			
2 $\mu\text{m}/200$ mm (X1 axis in horizontal orientation)				
Accuracy (at 20°C)				
$\pm(0.8+0.02L)$ $\mu\text{m}$ , L = drive length (mm)				
Z2-axis vertical travel	300 mm	500 mm	700 mm	
Dimensions (main unit, WxDxH)	766 x 482 x 966 mm	766 x 482 x 1166 mm	1166 x 482 x 1176 mm	1166 x 492 x 1436 mm
Mass (main unit)	140 kg	150 kg	220 kg	270 kg

# Contracer CV-4500

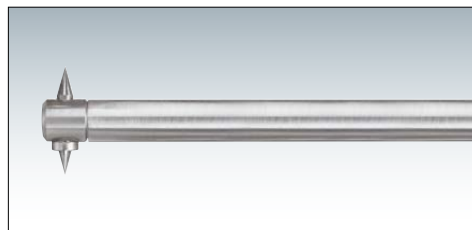
## SERIES 218 – Contour Measuring Instruments

- With the addition of a new function for continuously measuring top and bottom faces the variable measuring force function has become more useful, enabling a wide variety of efficient, high-precision measurements.
- When combined with the double-cone stylus (a new product with diametrically opposed contact points), the instrument can continuously measure in the upward and downward directions without the need to change the arm orientation or reset the workpiece fixturing.
- The measuring force can be switched among five levels (upward and downward) from the data-processing program (FORMTRACEPAK).

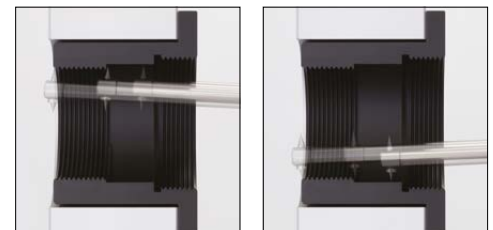
**MeasurLink** ENABLED  
Data Management Software by Mitutoyo



Contracer CV-4500S4



CV-4500 double-cone stylus.



Upward/downward measurement direction is switchable.

### Specifications

Model	CV-4500S4	CV-4500H4	CV-4500W4	CV-4500L4
Code No. (mm)	218-441-10E	218-442-10E	218-443-10E	218-444-10E
Code No. (inch/mm)	218-451-10E	218-452-10E	218-453-10E	218-454-10E
X1 axis	Measuring range			
	100 mm			
	Traverse straightness			
0.8 μm/100 mm (X1 axis in horizontal orientation)				
Accuracy (at 20°C)				
±(0.8+0.01L) μm, L = drive length (mm)				
Z2-axis vertical travel	300 mm	500 mm	700 mm	
Dimensions (main unit, W x D x H)	756 x 482 x 966 mm	756 x 482 x 1166 mm	1156 x 482 x 1176 mm	1156 x 492 x 1436 mm
Mass (main unit)	140 kg	150 kg	220 kg	270 kg

Model	CV-4500S8	CV-4500H8	CV-4500W8	CV-4500L8
Code No. (mm)	218-446-10E	218-447-10E	218-448-10E	218-449-10E
Code No. (inch/mm)	218-456-10E	218-457-10E	218-458-10E	218-459-10E
X1 axis	Measuring range			
	200 mm			
	Traverse straightness			
2 μm/200 mm (X1 axis in horizontal orientation)				
Accuracy (at 20°C)				
±(0.8+0.02L) μm, L = drive length (mm)				
Z2-axis vertical travel	300 mm	500 mm	700 mm	
Dimensions (main unit, W x D x H)	766 x 482 x 966 mm	766 x 482 x 1166 mm	1166 x 482 x 1176 mm	1166 x 492 x 1436 mm
Mass (main unit)	140 kg	150 kg	220 kg	270 kg

### Technical Data

- X1 axis**
- Resolution: 0.05 μm
  - Scale type: Linear encoder
  - Drive speed: 0 - 80 mm/s and manual
  - Measuring speed: 0.02 - 5 mm/s
  - Measuring direction: Forward/backward
  - Inclination range: ±45°
- Z2 axis (column)**
- Resolution: 1 μm
  - Scale type: ABSOLUTE linear encoder
  - Drive speed: 0 - 30 mm/s and manual
- Z1 axis (detector unit)**
- Measuring range: ±30 mm
  - Resolution: 0.02 μm
  - Scale type: Rotary arc encoder
  - Accuracy (at 20°C): ±(0.8+12HI/100) μm, H: measurement height from the horizontal position (mm)
  - Stylus orientation: Upward/downward
  - Measuring force: 10, 20, 30, 40, 50 mN (specified from the data-processing program FORMTRACEPAK)
  - Traceable angle: Ascent: 77°, descent: 83° using the standard stylus provided and depending on the surface roughness
- Base material:** Granite
- Mass**
- Main unit: See table
  - Controller unit: 14 kg
  - Remote control box: 0.9 kg
- Power supply:** 240VAC ±10%, 50/60 Hz
- Power consumption:** 400 W (main unit only)

**MiCAT**

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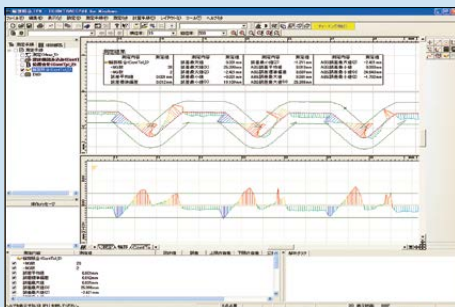
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**FORM**

### Standard Software

#### FORMTRACEPAK

Enables control of the optional motor-driven Y-axis table and rotary table for realizing efficient measurement automation. Contour evaluation can be performed such as analysis of level differences, angle, pitch, area and other characteristics based on surface roughness data. In addition, an original inspection certificate can be created by setting the print format to suit your particular requirements.



### Optional Accessories

Arms and styli refer to page L-22.

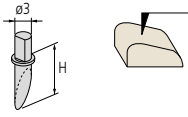
Fixture and stage accessories refer to pages L-33 to L-36.

# Optional Arms and Styli

For CV-2100 Models

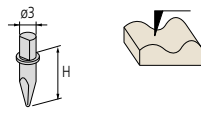
## Styli

### Single bevel



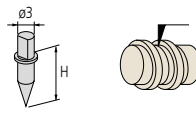
Tip angle: 12°  
Tip radius: 25 µm  
Tip material: Carbide

### Cross ground



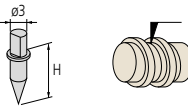
Tip angle: 20°  
Tip radius: 25 µm  
Tip material: Carbide

### Cone



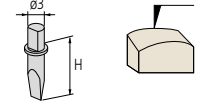
Tip angle: 20°  
Tip radius: 25 µm  
Tip material: Carbide

### Cone



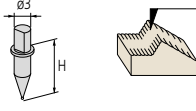
Tip angle: 30° (SPH-79: 50°)  
Tip radius: 25 µm  
Tip material: Carbide, Sapphire (SPH-79: Diamond)

### Knife edge



Tip angle: 20°  
Edge width: 3 mm  
Tip radius: 25 µm  
Tip material: Carbide

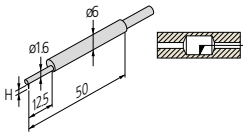
### Ball



Ball diameter: 1 mm  
Tip material: Carbide

### Small hole:

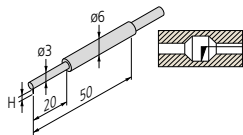
932693/12AAE873



**932693 12AAE873**  
Tip shape: Single Bevel cone  
Tip angle: 20° 30°  
Tip radius: 25 µm 25 µm  
Tip material: Carbide Carbide

### Small hole:

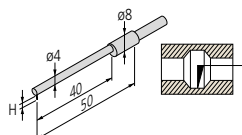
932694/12AAE874



**932694 12AAE874**  
Tip shape: Single Bevel cone  
Tip angle: 20° 30°  
Tip radius: 25 µm 25 µm  
Tip material: Carbide Carbide

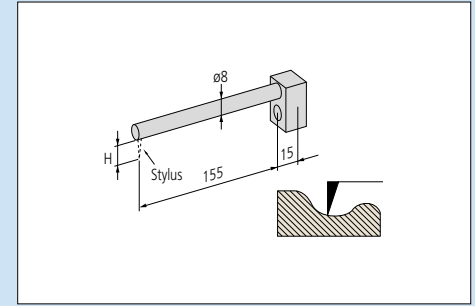
### Small hole:

932695/12AAE875

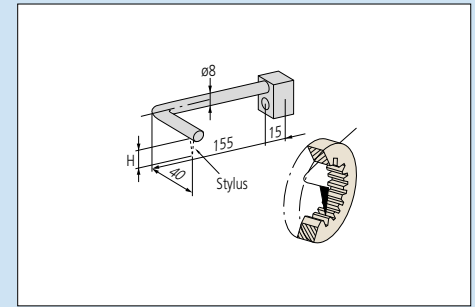


**932695 12AAE875**  
Tip shape: Single Bevel cone  
Tip angle: 20° 30°  
Tip radius: 25 µm 25 µm  
Tip material: Carbide Carbide

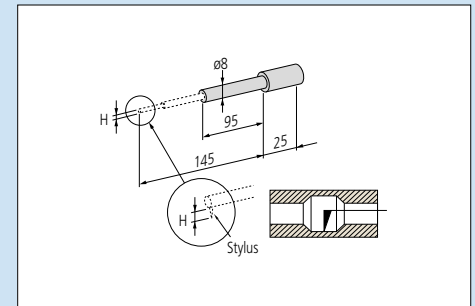
## Arms



Straight type.



Eccentric type.



For small-hole stylus.

Stylus No.	Code No.	Compatible arm No.	H (mm)
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### Single-bevel stylus carbide-tipped

SPH-51	<b>354882</b>	AB-51, 52	6
SPH-61	<b>354883</b>	AB-61, 62	12
SPH-71*	<b>354884</b>	AB-71, 72	20
SPH-81	<b>354885</b>	AB-81, 82	30
SPH-91	<b>354886</b>	AB-91, 92	42

### Cross-ground stylus carbide-tipped

SPH-52	<b>354887</b>	AB-51, 52	6
SPH-62	<b>354888</b>	AB-61, 62	12
SPH-72	<b>354889</b>	AB-71, 72	20
SPH-82	<b>354890</b>	AB-81, 82	30
SPH-92	<b>354891</b>	AB-91, 92	42

### Cone stylus carbide-tipped tip angle 20°

SPH-57	<b>12AAE865</b>	AB-51, 52	6
SPH-67	<b>12AAE866</b>	AB-61, 62	12
SPH-77	<b>12AAE867</b>	AB-71, 72	20
SPH-87	<b>12AAE868</b>	AB-81, 82	30
SPH-97	<b>12AAE869</b>	AB-91, 92	42

### Cone stylus sapphire-tipped tip angle 30°

SPH-53	<b>354892</b>	AB-51, 52	6
SPH-63	<b>354893</b>	AB-61, 62	12
SPH-73	<b>354894</b>	AB-71, 72	20
SPH-83	<b>354895</b>	AB-81, 82	30
SPH-93	<b>354896</b>	AB-91, 92	42

### Cone stylus diamond-tipped tip angle 50°

SPH-79	<b>355129</b>	AB-71, 72	20
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\*Supplied as standard.

Stylus No.	Code No.	Compatible arm No.	H (mm)
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### Cone stylus carbide-tipped tip angle 30°

SPH-56	<b>12AAA566</b>	AB-51, 52	6
SPH-66	<b>12AAA567</b>	AB-61, 62	12
SPH-76	<b>12AAA568</b>	AB-71, 72	20
SPH-86	<b>12AAA569</b>	AB-81, 82	30
SPH-96	<b>12AAA570</b>	AB-91, 92	42

### Knife-edge stylus carbide-tipped

SPH-54	<b>354897</b>	AB-51, 52	6
SPH-64	<b>354898</b>	AB-61, 62	12
SPH-74	<b>354899</b>	AB-71, 72	20
SPH-84	<b>354900</b>	AB-81, 82	30
SPH-94	<b>354901</b>	AB-91, 92	42

### Ball stylus carbide-tipped

SPH-55	<b>354902</b>	AB-51, 52	6
SPH-65	<b>354903</b>	AB-61, 62	12
SPH-75	<b>354904</b>	AB-71, 72	20
SPH-85	<b>354905</b>	AB-81, 82	30
SPH-95	<b>354906</b>	AB-91, 92	42

### Small-hole stylus carbide-tipped one-sided cut

SP-11	<b>932693</b>	AB-11	0.4
SP-12	<b>932694</b>		1
SP-13	<b>932695</b>		2.5

### Small-hole stylus carbide-tipped cone

SP-31	<b>12AAE873</b>	AB-11	0.4
SP-32	<b>12AAE874</b>		1
SP-33	<b>12AAE875</b>		2.5

Arm No.	Code No.	Compatible stylus No.	H (mm)
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### Straight type

AB-51	<b>935111</b>	SPH-5x	6
AB-61	<b>935112</b>	SPH-6x	12
AB-71*	<b>935113</b>	SPH-7x	20
AB-81	<b>935114</b>	SPH-8x	30
AB-91	<b>935115</b>	SPH-9x	42

### Eccentric type

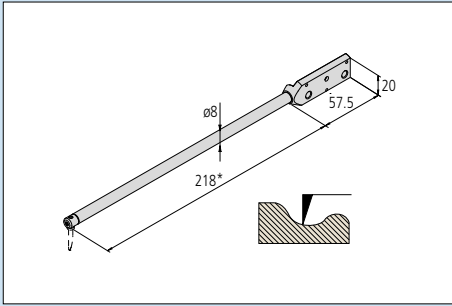
AB-52	<b>935116</b>	SPH-5x	6
AB-62	<b>935117</b>	SPH-6x	12
AB-72	<b>935118</b>	SPH-7x	20
AB-82	<b>935119</b>	SPH-8x	30
AB-92	<b>935120</b>	SPH-9x	42

### Small hole

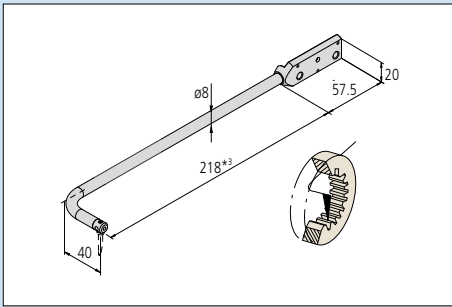
AB-11	<b>9351216</b>	SP-11, 31	0.4
		SP-12, 32	1
		SP-13, 33	2.5

\*Supplied as standard.

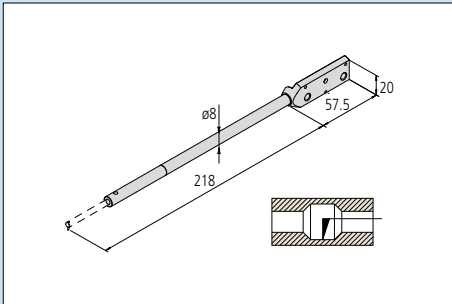
## Arms



Straight type.



Eccentric type.



For small-hole stylus.

Arm No.	Code No.	Compatible stylus No.
<b>Straight type</b>		
AB-31* <sup>1</sup>	<b>12AAM101</b>	SPH-5x, 6x, 7x, 8x, 9x SPHW* <sup>2</sup> -56, 66, 76
<b>Eccentric type</b>		
AB-32* <sup>3</sup>	<b>12AAM102</b>	SPH-5x, 6x, 7x, 8x, 9x SPHW* <sup>2</sup> -56, 66, 76
<b>Small hole</b>		
AB-33	<b>12AAM103</b>	SPH-41, 41, 43

\*<sup>1</sup> Supplied as standard.

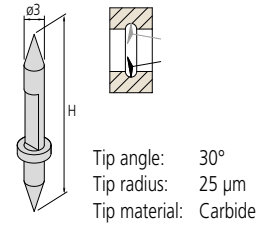
\*<sup>2</sup> Stylus for CV-4500 series.

\*<sup>3</sup> One-sided cut stylus SPH-71(standard accessory) mounting.

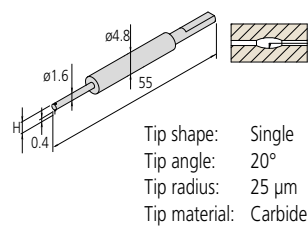
## For CV-3200 and CV-4500 Models

### Styli

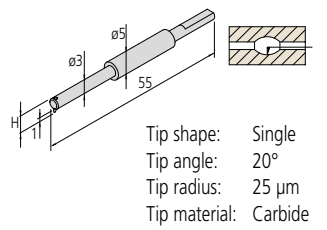
#### Double cone



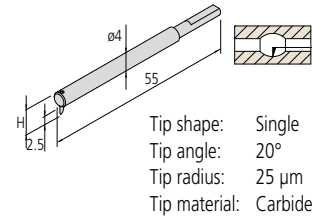
#### Small hole: SPH-41



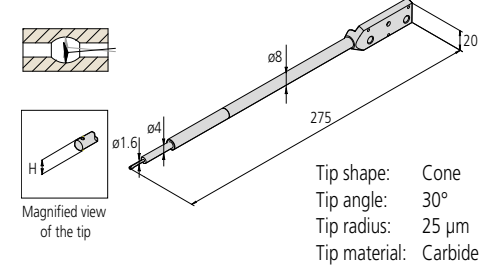
#### Small hole: SPH-42



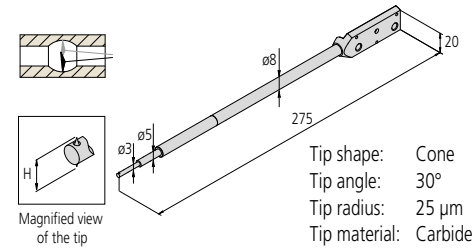
#### Small hole: SPH-43



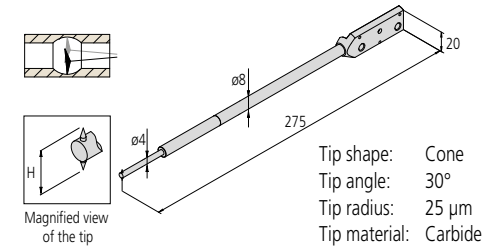
#### Double small-hole arm stylus: SPHW-31



#### Double small-hole arm stylus: SPHW-32



#### Double small-hole arm stylus: SPHW-33



Stylus No.	Code No.	Compatible arm No.	H (mm)
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#### Double-cone stylus \*<sup>4</sup>

SPHW-56	<b>12AAM095</b> * <sup>5</sup>	AB-31, 32	20
SPHW-66	<b>12AAM096</b>		32
SPHW-76	<b>12AAM097</b>		48

#### Single-bevel stylus carbide-tipped

SPH-51	<b>354882</b>	AB-31, 32	6
SPH-61	<b>354883</b>		12
SPH-71	<b>354884</b> * <sup>6</sup>		20
SPH-81	<b>354885</b>		30
SPH-91	<b>354886</b>		42

#### Cross-ground stylus carbide-tipped (see page opposite)

SPH-52	<b>354887</b>	AB-31, 32	6
SPH-62	<b>354888</b>		12
SPH-72	<b>354889</b>		20
SPH-82	<b>354890</b>		30
SPH-92	<b>354891</b>		42

#### Cone stylus sapphire-tipped tip angle 30° (see page opposite)

SPH-53	<b>354892</b>	AB-31, 32	6
SPH-63	<b>354893</b>		12
SPH-73	<b>354894</b>		20
SPH-83	<b>354895</b>		30
SPH-93	<b>354896</b>		42

#### Cone stylus carbide-tipped tip angle 30° (see page opposite)

SPH-56	<b>12AAA566</b>	AB-31, 32	6
SPH-66	<b>12AAA567</b>		12
SPH-76	<b>12AAA568</b>		20
SPH-86	<b>12AAA569</b>		30
SPH-96	<b>12AAA570</b>		42

\*<sup>4</sup> Stylus for CV-4500 series.

\*<sup>5</sup> Standard accessory of CV-4500 series.

\*<sup>6</sup> Standard accessory of CV-3200 series.

Stylus No.	Code No.	Compatible arm No.	H (mm)
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#### Cone stylus carbide-tipped tip angle 20° (see page opposite)

SPH-57	<b>12AAE865</b>	AB-31, 32	6
SPH-67	<b>12AAE866</b>		12
SPH-77	<b>12AAE867</b>		20
SPH-87	<b>12AAE868</b>		30
SPH-97	<b>12AAE869</b>		42

#### Cone stylus diamond-tipped tip angle 50° (see page opposite)

SPH-79	<b>355129</b>	AB-31, 32	20
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#### Knife-edge stylus carbide-tipped (see page opposite)

SPH-54	<b>354897</b>	AB-31, 32	6
SPH-64	<b>354898</b>		12
SPH-74	<b>354899</b>		20
SPH-84	<b>354900</b>		30
SPH-94	<b>354901</b>		42

#### Ball stylus carbide-tipped (see page opposite)

SPH-55	<b>354902</b>	AB-31, 32	6
SPH-65	<b>354903</b>		12
SPH-75	<b>354904</b>		20
SPH-85	<b>354905</b>		30
SPH-95	<b>354906</b>		42

#### Small-hole stylus

SPH-41	<b>12AAM104</b>	AB-33	2
SPH-42	<b>12AAM105</b>		4
SPH-43	<b>12AAM106</b>		6.5

#### Double small-hole arm stylus\*<sup>7</sup> (integrated arm and stylus) only for CV-4500

SPHW-31	<b>12AAM108</b>	—	2.4
SPHW-32	<b>12AAM109</b>		5
SPHW-33	<b>12AAM110</b>		9

\*<sup>7</sup> Arm stylus for CV-4500 series.

# Formtracer SV-C3200/SV-C4500

## SERIES 525 – Surface Roughness/Contour Measuring System

- A highly accurate measuring system that allows measurement of surface roughness and contour with just one instrument.
- Dramatically increased drive speed (X1 axis: 80 mm/s, Z2 axis column: 30 mm/s) further reduces total measurement time.
- Mitutoyo has adopted highly rigid ceramic guides, combining small secular change and remarkable resistance to abrasion, to maintain the outstanding traverse straightness specification for an extended period of time.
- The drive unit (X1 axis) and column (Z2 axis) are equipped with highly accurate linear encoders (ABS type on the Z2 axis). This improves reproducibility of continuous automatic measurement of small holes in the vertical direction and repeated measurement of parts which are difficult to position.
- Measurement accuracy specifications for the drive unit and column are exceptional, as is that for the drive unit traverse straightness – all excellent characteristics for handling workpieces calling for high accuracy.

**MeasurLink** ENABLED  
Data Management Software by Mitutoyo



Formtracer SV-C3200S4

### Surface Roughness Detector



- Compliant with JIS '82/94/01, ISO, ANSI, DIN, VDA, and other international surface roughness standards.
- The standard surface roughness detector supplied is the high-accuracy model (0.75 mN/4 mN measuring force) that provides a resolution down to 0.0001  $\mu\text{m}$ .

### Contour Detector



- The contour detector of the SV-C4500 series instruments can continuously measure in the upward and downward directions without the need to change the arm orientation or reposition the workpiece when combined with the double-cone stylus (a new product with contact points in the upward and downward directions).

### Technical Data

X1 axis (drive unit)	Resolution: 0.05 $\mu\text{m}$
	Scale: Reflective-type linear encoder
	Drive speed: 0 - 80 mm/s and manual
	Measuring speed: 0.02 - 5 mm/s
	Measuring direction: Forward/backward
	Note: As for SV-C4500, set the measurement force with FORMTRACEPAK
Inclination range:	$\pm 45^\circ$ (with X1 axis inclination unit)
Z1 axis (contour detector)	Measuring range: $\pm 30$ mm
	Resolution: 0.04 $\mu\text{m}$ (SV-C3200), 0.02 $\mu\text{m}$ (SV-C4500)
	Scale: Rotary arc encoder
	Accuracy (at 20°C): $\pm(1.4+ 2H /100)$ $\mu\text{m}$ (SV-C3200) $\pm(0.8+ 2H /100)$ $\mu\text{m}$ (SV-C4500)
	Note: H = measurement height from the horizontal position (mm)
Stylus up/down operation:	Arc movement
Face of stylus:	Upward/downward (SV-C3200), Upward/downward, direction switch by FORMTRACEPAK (SV-C4500)
Measuring force:	30 mN (SV-C3200) 10, 20, 30, 40, 50 mN (SV-C4500)
	Note: As for SV-C4500, set the measurement force with FORMTRACEPAK
Traceable angle:	Ascent: $77^\circ$ , descent: $83^\circ$ (using the standard stylus provided and depending on the surface roughness)
Stylus tip:	Carbide, SR25 $\mu\text{m}$
Z1 axis (surface roughness detector)	Range / resolution: 800 $\mu\text{m}/0.01$ $\mu\text{m}$ , 80 $\mu\text{m}/0.001$ $\mu\text{m}$ , 8 $\mu\text{m}/0.0001$ $\mu\text{m}$ (up to 2400 $\mu\text{m}$ with an optional stylus)
	Stylus tip: Diamond, $90^\circ$ /SR5 $\mu\text{m}$ ( $60^\circ$ /SR2 $\mu\text{m}$ : low force type)
	Type: Differential inductance
Z2 axis (column)	Resolution: 1 $\mu\text{m}$
	Scale: ABSOLUTE linear encoder
	Drive speed: 0 - 30 mm/s and manual
Mass	Controller unit: 14 kg
	Remote control box: 0.9 kg
	Power supply: 240VAC $\pm 10\%$ , 50/60Hz
	Power consumption: 400 W (main unit only)

### Optional Accessories

Styli refer to pages L-29 to L-30.

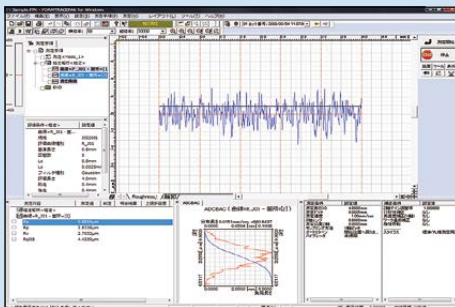
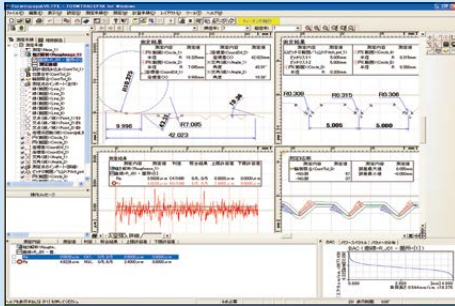
Fixture and stage accessories refer to pages L-33 to L-36.



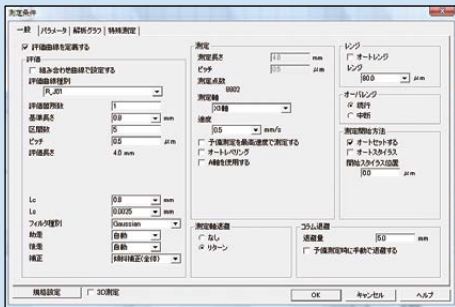
### Standard Software

#### FORMTRACEPAK

Enables control of the optional motor-driven Y-axis table and rotary table for realizing efficient measurement automation. Contour evaluation can be performed such as analysis of level differences, angle, pitch, area and other characteristics based on surface roughness data. In addition, an original inspection certificate can be created by setting the print format to suit your particular requirements.



Contour measurement screen.



Surface roughness measurement screen.

### Simplified CNC Function

Support for a wide range of optional peripherals designed for use with the CNC models enables automatic measurement.



Using Y-axis table.



Using rotary table θ1.



Using rotary table θ2.

### Specifications

Model	SV-C3200S4		SV-C3200H4	
Code No. (mm)	525-481-11E	525-481-12E	525-482-11E	525-482-12E
Code No. (inch)	525-491-11E	525-491-12E	525-492-11E	525-492-12E

Model	SV-C4500S4		SV-C4500H4	
Code No. (mm)	525-441-11E	525-441-12E	525-442-11E	525-442-12E
Code No. (inch)	525-451-11E	525-451-12E	525-452-11E	525-452-12E
Stylus tip	Angle	60°	90°	60°
	Radius	2 μm	5 μm	2 μm
Detector measuring force	0.75 mN	4 mN	0.75 mN	4 mN
X1 axis	Measuring range	100 mm		
	Traverse straightness*	(0.05+1L/1000) μm, L = measured length (mm)		
	Accuracy (at 20°C):	±(0.8+L/100) μm, L = drive length (mm)		
Z2-axis vertical travel	300 mm	500 mm		
Dimensions (main unit, WxDxH)	1016x575x966 mm		1016x575x1166 mm	
Mass (main unit)	140 kg		150 kg	

Model	SV-C3200W4		SV-C3200L4	
Code No. (mm)	525-483-11E	525-483-12E	525-484-11E	525-484-12E
Code No. (inch)	525-493-11E	525-493-12E	525-494-11E	525-494-12E

Model	SV-C4500W4		SV-C4500L4	
Code No. (mm)	525-443-11E	525-443-12E	525-444-11E	525-444-12E
Code No. (inch)	525-453-11E	525-453-12E	525-454-11E	525-454-12E
Stylus tip	Angle	60°	90°	60°
	Radius	2 μm	5 μm	2 μm
Detector measuring force	0.75 mN	4 mN	0.75 mN	4 mN
X1 axis	Measuring range	100 mm		
	Traverse straightness*	(0.05+1L/1000) μm, L = measured length (mm)		
	Accuracy (at 20°C):	±(0.8+L/100) μm, L = drive length (mm)		
Z2-axis vertical travel	500 mm	700 mm		
Dimensions (main unit, WxDxH)	1416x575x1176 mm		1416x575x1436 mm	
Mass (main unit)	220 kg		270 kg	

Model	SV-C3200S8		SV-C3200H8	
Code No. (mm)	525-486-11E	525-486-12E	525-487-11E	525-487-12E
Code No. (inch)	525-496-11E	525-496-12E	525-497-11E	525-497-12E

Model	SV-C4500S8		SV-C4500H8	
Code No. (mm)	525-446-11E	525-446-12E	525-447-11E	525-447-12E
Code No. (inch)	525-456-11E	525-456-12E	525-457-11E	525-457-12E
Stylus tip	Angle	60°	90°	60°
	Radius	2 μm	5 μm	2 μm
Detector measuring force	0.75 mN	4 mN	0.75 mN	4 mN
X1 axis	Measuring range	200 mm		
	Traverse straightness*	(0.1+2L/1000) μm, L = measured length (mm)		
	Accuracy (at 20°C):	±(0.8+2L/100) μm, L = drive length (mm)		
Z2-axis vertical travel	300 mm	500 mm		
Dimensions (main unit, WxDxH)	1026x575x966 mm		1026x575x1166 mm	
Mass (main unit)	140 kg		150 kg	

Model	SV-C3200W8		SV-C3200L8	
Code No. (mm)	525-488-11E	525-488-12E	525-489-11E	525-489-12E
Code No. (inch)	525-498-11E	525-498-12E	525-499-11E	525-499-12E

Model	SV-C4500W8		SV-C4500L8	
Code No. (mm)	525-448-11E	525-448-12E	525-449-11E	525-449-12E
Code No. (inch)	525-458-11E	525-458-12E	525-459-11E	525-459-12E
Stylus tip	Angle	60°	90°	60°
	Radius	2 μm	5 μm	2 μm
Detector measuring force	0.75 mN	4 mN	0.75 mN	4 mN
X1 axis	Measuring range	200 mm		
	Traverse straightness*	(0.1+2L/1000) μm, L = measured length (mm)		
	Accuracy (at 20°C):	±(0.8+2L/100) μm, L = drive length (mm)		
Z2-axis vertical travel	500 mm	700 mm		
Dimensions (main unit, WxDxH)	1426x575x1176 mm		1426x575x1436 mm	
Mass (main unit)	220 kg		270 kg	

\* With the X1 axis in the horizontal orientation.

# Formtracer Extreme SV-C4500CNC

## SERIES 525 – Surface Roughness/Contour Measuring System

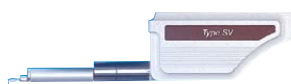
- A high-accuracy CNC measuring system that enables measurement of surface roughness and form/contour with just one instrument.
- Each axis has a maximum drive speed of 200 mm/s, which permits high-speed positioning that potentially offers a large increase in the throughput of multiple-profile / multiple-workpiece measurement tasks.
- For models with the  $\alpha$  axis, it is possible to perform continuous measurement over horizontal and inclined surfaces by power-tilting the drive unit.
- For models with the Y-axis table, it is possible to expand the measuring range for multiple workpieces through positioning in the Y-axis direction.
- The contour drive unit is equipped with a Laser Hologage detector giving excellent narrow- and wide-range accuracy and resolution in the Z1 axis.
- Enables inclined plane measurements through simultaneous control of the X1 and Z2 axes.
- If the contour detector is replaced with that for surface roughness measurement, or vice versa, it is a simple, one-touch replacement without rerouting of the connecting cables.
- The Z1 axis incorporates an anti-collision safety device to automatically stop the detector if it collides with a workpiece or jig.
- Supplied with an easy-to-operate Remote Box, from which the user can make any movement by selecting the required axis using the two joysticks. The current axis selection is easily identified by the icon on the key top.
- Communication with the Data Processing/Analysis Unit is via USB.

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Formtracer Extreme SV-C4500CNC



Surface Roughness Detector



Contour Detector



### Technical Data

Z1 axis (contour detector)	
Measuring range:	60 mm ( $\pm 30$ mm from the horizontal position)
Resolution:	0.02 $\mu$ m
Scale type:	Laser Hologage
Accuracy (at 20°C):	$\pm(0.8+2H/100)$ $\mu$ m, H = measured height from the horizontal position (mm)
Stylus up/down operation:	Circular movement
Face of stylus:	Downward
Measuring force:	0.75 mN
Traceable angle:	Ascent: 70°, descent: 70° (using the standard chisel-cut stylus and depending on the surface roughness)
Stylus tip:	Carbide, 30°
Z1 axis (surface roughness detector)	
Range / resolution:	800 $\mu$ m/0.01 $\mu$ m, 80 $\mu$ m/0.001 $\mu$ m, 8 $\mu$ m/0.0001 $\mu$ m
Measuring force:	0.75 mN
Stylus tip:	60°, SR2 $\mu$ m
Detecting method:	Differential inductance
$\alpha$ axis	
Inclination angle:	-45° (CCW), +10° (CW)
Resolution:	0.000225°
Rotation speed:	1 rpm
Power supply:	240VAC $\pm 10\%$ , 50/60Hz
Power consumption:	500 W (main unit only)

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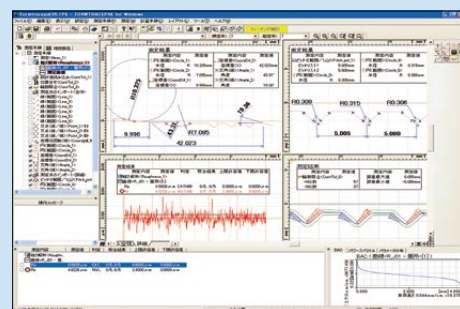
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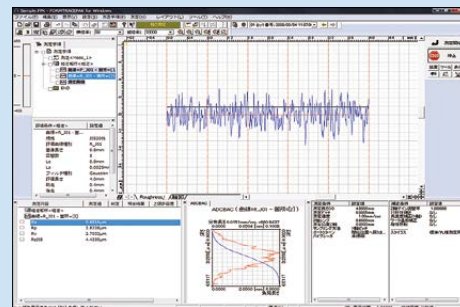
### Standard Software

#### FORMTRACEPAK

Enables control of the optional motor-driven Y-axis table and rotary table for realizing efficient measurement automation. Contour evaluation can be performed such as analysis of level differences, angle, pitch, area and other characteristics based on surface roughness data. In addition, an original inspection certificate can be created by setting the print format to suit your particular requirements.



Contour measurement screen.



Surface roughness measurement screen.

## Optional Accessories

### Vibration isolation stand

Vibration isolation

mechanism: Diaphragm air spring

Natural frequency: 2.5-3.5 Hz

Damping

mechanism: Orifice

Levelling

mechanism: Automatic control with mechanical valves

Air supply pressure: 0.4 MPa

Allowable loading

capacity: 350 kg

Dimensions

(WxDxH): 1000x895x715 mm

Mass: 315 kg

### Y-axis table unit

Measuring range: 200 mm

Resolution: 0.05  $\mu\text{m}$

Scale unit: Reflective-type linear encoder

Drive speed: 200 mm/s (max., CNC),  
0-50 mm/s (joystick)

Maximum loading

capacity: 20 kg

Traverse straightness: 0.5  $\mu\text{m}/200\text{ mm}$

Accuracy (at 20°C):  $\pm(2+2L/100)\ \mu\text{m}$ ,  
L = measured length (mm)

Table size: 200 x 200 mm

Dimensions

(WxDxH): 320 x 646 x 105 mm

Mass: 35 kg

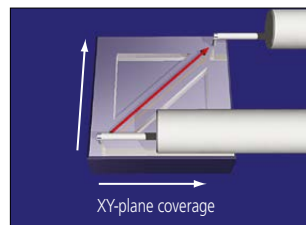
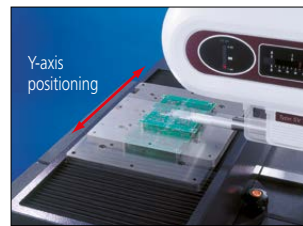
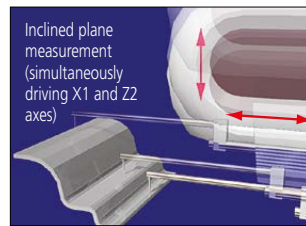
Styli refer to pages L-29 to L-30.

Fixture and stage accessories refer to pages L-33 to L-36.

## Specifications

Model		SV-C4500CNC							
Code No. (mm)		525-661E	525-662E	525-663E	525-664E	525-681E	525-682E	525-683E	525-684E
Code No. (inch)		525-671E	525-672E	525-673E	525-674E	525-691E	525-692E	525-693E	525-694E
X1 axis (drive unit)	Measuring range	200 mm							
	Resolution	0.05 $\mu\text{m}$							
	Scale	Reflective-type linear encoder							
	Accuracy (at 20°C)	$\pm(0.8+4L/200)\ \mu\text{m}$ , L = drive length (mm)							
	Drive speed	Max. 200 mm/s (CNC), 0-50 mm/s (joystick)							
	Measuring speed	0.02 - 2 mm/s							
	Measuring direction	Forward/backward							
Z2 axis (column)	Traverse straightness	0.5 $\mu\text{m}/200\text{ mm}$							
	Vertical travel	300 mm				500 mm			
	Resolution	0.05 $\mu\text{m}$							
	Scale	Reflective-type linear encoder							
Drive speed		Max. 200 mm/s (CNC), 0-50 mm/s (joystick)							
Y-axis table unit		—		Installed		—		Installed	
$\alpha$ -axis unit		—		Installed		—		Installed	
Granite base size (WxD)		200 x 200 mm							
Main unit dimensions (WxD x H)		800 x 620 x 1000 mm				800 x 620 x 1200 mm			
Mass	Main unit	240 kg				250 kg			
	Controller unit	28 kg							
	Remote control box	1.5 kg							

## Measurement Applications



# Formtracer CS-3200

## SERIES 525 – Surface Roughness/Contour Measuring System

- High-accuracy measuring system that enables measurement of surface roughness and form/contour with just one instrument using a single detector.
- The drive unit (X1 axis) and column (Z2 axis) are equipped with high-accuracy linear scales (ABS type) enabling fully automatic measurement combining vertical and horizontal movement. This improves reproducibility of continuous automatic measurement of small holes in the vertical direction and repeated measurement of parts which are difficult to position.
- Dramatically increased drive speed (X1 axis: 80 mm/s, Z2 axis: 20 mm/s) further reduces total measurement time. Small holes can be efficiently measured using the fine-feed knobs on the X and Z2 axes.
- The detector unit can be extended to avoid interference between the drive unit and workpiece. All detector and drive unit cables are housed inside the main unit to eliminate any risk of abrasion and guarantee trouble free, high-speed operation.
- Measuring range in the Z1-axis (height) direction is dramatically increased from 5 mm to 50 mm when contour detector units 3000 or 4000 are specified. (Both are factory-fit options.)
- The drive unit (X1 axis) tilting function is a great help with measurements on inclined planes and when working with heavy workpieces that are not easily moved.

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Formtracer CS-3200S4



### Specifications

<b>Model</b>	<b>CS-3200S4</b>	
<b>Code No. (mm)</b>	<b>525-401E</b>	
<b>Code No. (inch)</b>	<b>525-411E</b>	
X1 axis	Measuring range	100 mm
	Resolution	0.05 $\mu\text{m}$
	Drive speed	0 - 80 mm/s and manual
	Measuring speed	0.02, 0.05, 0.1, 0.2 mm/s (surface roughness measurement), 0.02, 0.05, 0.1, 0.2, 0.5, 1, 2 mm/s (contour measurement)
	Measuring direction	Forward/backward
	Traverse straightness	0.2 $\mu\text{m}$ /100 mm (0.4 $\mu\text{m}$ /100 mm: at the extended detector position) with the X1 axis in horizontal orientation
	Accuracy (at 20°C)	$\pm(0.8+L/100)$ $\mu\text{m}$ , L = drive length (mm)
Z2 axis (column)	Inclination range	$\pm 45^\circ$
	Vertical travel	300 mm
	Resolution	1 $\mu\text{m}$
Y-axis travel range	Optional	
Dimensions (main unit, WxDxH)	756 x 482 x 966 mm	
Mass (main unit)	140 kg	

### Technical Data

Z1 axis	
Measuring range:	5 mm
Resolution:	80 nm (5 mm range) 8 nm (0.5 mm range) 0.8 nm (0.05 mm range)
Accuracy (at 20°C):	$\pm(1.5+2H/100)$ $\mu\text{m}$ , H = measured height from the horizontal position (mm)
Measuring force:	0.75 mN
Traceable angle:	Ascent: 65°, descent: 65° (using the standard chisel-cut stylus and depending on the surface roughness)
Stylus tip (standard):	Diamond, 60°/SR2 $\mu\text{m}$
Stylus tip (cone):	Sapphire, 30°/SR25 $\mu\text{m}$
Face of stylus:	Downward
Base size (WxD):	600 x 450 mm
Base material:	Granite
Power supply:	240VAC $\pm 10\%$ , 50/60Hz
Power consumption:	400 W (main unit only)

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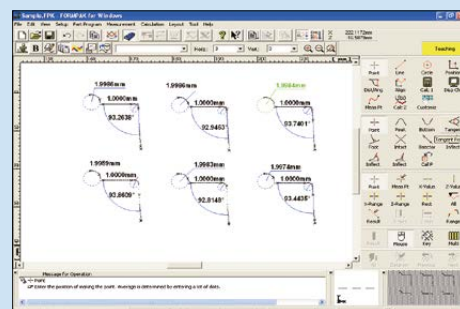
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### Standard Software

#### FORMTRACEPAK

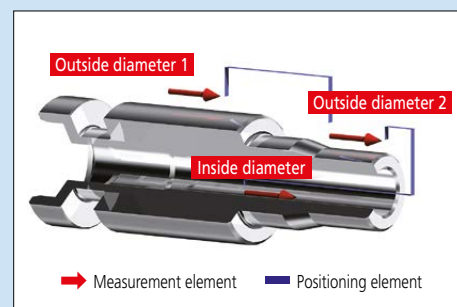
Enables control of the optional motor-driven Y-axis table and rotary table for realizing efficient measurement automation. Contour evaluation can be performed such as analysis of level differences, angle, pitch, area and other characteristics based on surface roughness data. In addition, an original inspection certificate can be created by setting the print format to suit your particular requirements.



### Optional Accessories

Styli refer to page L-31.

Fixture and stage accessories refer to pages L-33 to L-36.



Continuous measurement example:

Outside diameter 1 → Outside diameter 2 → Inside diameter

**Main Unit Startup System**

A start-up system (relocation detection sensor) is an integral security feature of this machine and will disable its operation if subject to relocation or strong vibration. Please be advised to contact your nearest Mitutoyo Service Centre as soon as possible or in advance of such circumstance.

# Formtracer Extreme CS-5000CNC/CS-H5000CNC

## SERIES 525 – CNC Form Measuring Instruments

- High-accuracy stylus type CNC Surface Measuring Instrument that allows simultaneous measurement of surface roughness and form/contour.
- The X1 and Z2 axes have maximum drive speeds of 40 mm/s and 200 mm/s, respectively. This permits high-speed positioning that potentially offers a large increase in the throughput of multiple-profile/multiple-workpiece measurement tasks.
- Mitutoyo Laser HoloScales are incorporated in the X1 and Z1 axes to provide sufficiently high resolution for simultaneous measurement of form/contour and surface roughness, which is vital for batch working.
- The active control method is employed for the Z1-axis detector to implement a wide-range measurement capability wherein the variation in dynamic measuring force is restricted.
- The Z1 axis incorporates an anti-collision safety device to automatically stop the detector unit if it collides with a workpiece or jig.
- The CS-5000CNC model has an  $\alpha$  axis, enabling continuous measurement over horizontal and inclined surfaces by power-tilting the detector unit.
- Models with the Y-axis table installed allow greater coverage of larger workpieces and enable multiple workpieces to be measured at one setup.
- Supplied with the easy-to-operate Remote Box by which the user can control any movement by selecting the required axis using the two joysticks.
- Uses USB for communicating with the Data Processing/Analysis Unit (optional).

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Formtracer Extreme CS-H5000CNC

### Specifications

Model	CS-5000CNC			
Code No.	525-727-12E	525-729-12E	525-747-12E	525-749-12E
Model	CS-H5000CNC			
Code No.	525-776-12E	525-777-12E	525-706-12E	525-707-12E
X1 axis	Measuring range	200 mm		
	Resolution	0.00625 $\mu$ m		
	Scale type:	Laser HoloScale		
	Drive speed:	Max. 40 mm/s (CNC), 0-40 mm/s (joystick)		
	Measuring speed	0.02 - 0.2 mm/s (surface roughness), 0.02 - 2 mm/s (form/contour)		
	Measuring direction	Forward / backward direction		
Z2 axis (column unit)	Vertical travel	300 mm	500 mm	
	Resolution	0.05 $\mu$ m		
	Scale type	Reflective-type linear encoder		
	Drive speed	Max. 200 mm/s (CNC), 0-50 mm/s (joystick)		
Y-axis table unit	—	Installed	—	Installed
$\alpha$ -axis unit	Installed			
Dimensions (main unit, WxDxH)	800x620x1000 mm		800x620x1200 mm	
Mass (main unit)	240 kg		250 kg	

### Technical Data

#### X1 axis

Traverse straightness: CS-5000CNC:  
(0.1+0.0015L)  $\mu$ m - standard stylus  
(0.2+0.0015L)  $\mu$ m - 2X-long stylus  
CS-H5000CNC:  
(0.05+0.0003L)  $\mu$ m - standard stylus  
(0.1+0.0015L)  $\mu$ m - 2X-long stylus  
Accuracy (at 20°C): CS-5000CNC:  $\pm(0.3+0.002L)$   $\mu$ m  
CS-H5000CNC:  $\pm(0.16+0.001L)$   $\mu$ m  
L = measured length (mm)

#### Z1 axis

Measuring range: 12 mm (with standard stylus)  
24 mm (with 2X-long stylus)  
Resolution: 0.0008  $\mu$ m (with standard stylus)  
0.0016  $\mu$ m (with 2X-long stylus)  
Stylus movement: Arc  
Scale type: Laser HoloScale  
Accuracy (at 20°C): CS-5000CNC:  $\pm(0.3+|0.02H|)$   $\mu$ m  
CS-H5000CNC:  $\pm(0.07+|0.02H|)$   $\mu$ m  
H = measured height (mm)

Measuring force: 4 mN (with standard stylus)  
0.75 mN (with 2X-long stylus)

Traceable angle: 60° for ascent, 60° for descent  
(Depending on the workpiece surface condition)

Face of stylus: Downward

Base size (WxD): 750x600 mm

Base material: Granite

#### Y axis

Measuring range: 200 mm  
Resolution: 0.05  $\mu$ m  
Drive speed: Max. 200 mm/s (in CNC mode)  
0~50 mm/s (in joystick control mode)

Max. table load: 20 kg

Traverse linearity: 0.5  $\mu$ m/200 mm

Accuracy (at 20°C):  $\pm(2+2L/100)$   $\mu$ m  
L = measured length (mm)

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### Standard Software

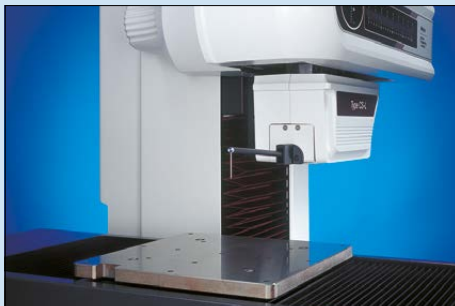
#### FORMTRACEPAK

Enables control of the optional motor-driven Y-axis table and rotary table for realizing efficient measurement automation. Contour evaluation can be performed such as analysis of level differences, angle, pitch, area and other characteristics based on surface roughness data. In addition, an original inspection certificate can be created by setting the print format to suit your particular requirements.

### Optional Accessories

Styli refer to page L-32.

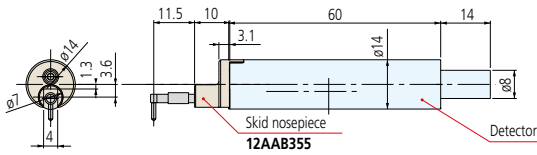
Fixture and stage accessories refer to pages L-33 to L-36.



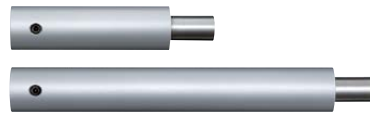
Wide-range detector employing active control technology.

# Optional Styli

Compatible with SV-C3200, SV-C4500 Models



178-396-2 Detector (0.75 mN)  
178-397-2 Detector (4 mN)



12AAG202 50 mm extension rod  
12AAG203 100 mm extension rod

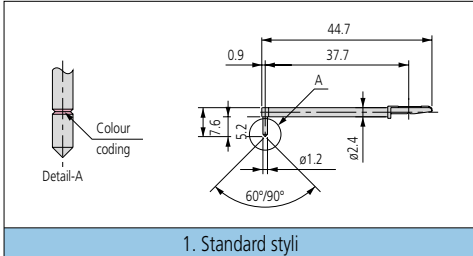
## Specifications

Code No.	Stylus tip radius	Stylus tip angle
<b>1. Standard styli</b>		
12AAE882	1 μm	60°
12AAE924	1 μm	90°
12AAC731	2 μm	60°
12AAB403	5 μm	90°
12AAB415	10 μm	90°
12AAE883	250 μm	60°
<b>2. For deep hole (double length)<sup>*1</sup></b>		
12AAE898	2 μm	60°
12AAE914	5 μm	90°
<b>3. For small hole</b>		
12AAC732	2 μm	60°
12AAB404	5 μm	90°
12AAB416	10 μm	90°
<b>4. For small hole/deep hole (double length)<sup>*1</sup></b>		
12AAE892	2 μm	60°
12AAE908	5 μm	90°
<b>5. For very small hole</b>		
12AAC733	2 μm	60°
12AAB405	5 μm	90°
12AAB417	10 μm	90°
<b>6. For small hole<sup>*1*2</sup></b>		
12AAE884	0.8 mm	—
<b>7. For extra-small hole</b>		
12AAC734	2 μm	60°
12AAB406	5 μm	90°
12AAB418	10 μm	90°
<b>8. For ultra-small hole<sup>*1*2</sup></b>		
12AAJ662	250 μm	—
<b>9. For deep hole (double length)<sup>*1</sup></b>		
12AAC740	2 μm	60°
12AAB413	5 μm	90°
12AAB425	10 μm	90°
<b>10. For deep hole (triple length)<sup>*1</sup></b>		
12AAC741	2 μm	60°
12AAB414	5 μm	90°
12AAB426	10 μm	90°
<b>11. For small slotted hole<sup>*1</sup></b>		
12AAE938	2 μm	60°
12AAE940	5 μm	90°

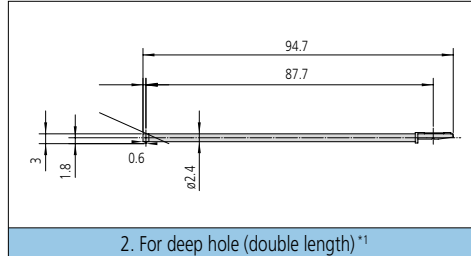
<sup>\*1</sup> For downward-facing measurement only.

<sup>\*2</sup> Used for calibration, a standard step gauge (178-611 optional accessory) is also required.

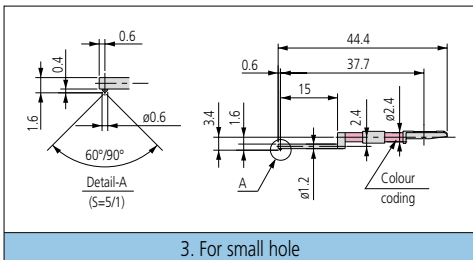
Tip radius	1 μm	2 μm	5 μm	10 μm	250 μm
Colour coding	White	Black	No colour	Yellow	No notch or colour



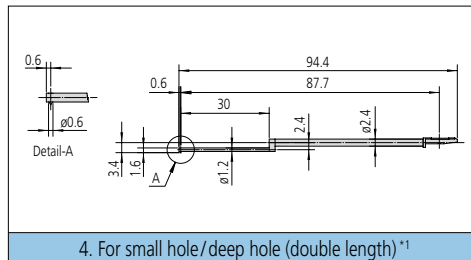
1. Standard styli



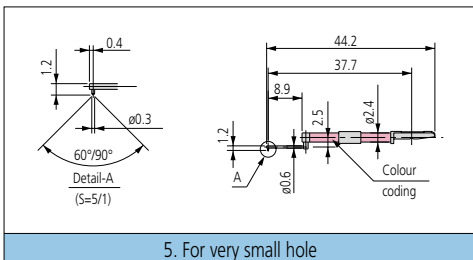
2. For deep hole (double length)<sup>\*1</sup>



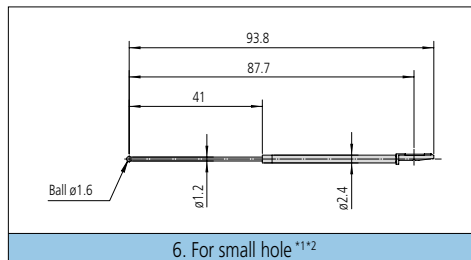
3. For small hole



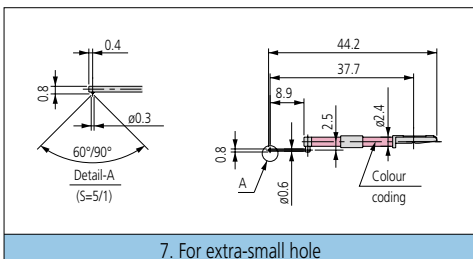
4. For small hole/deep hole (double length)<sup>\*1</sup>



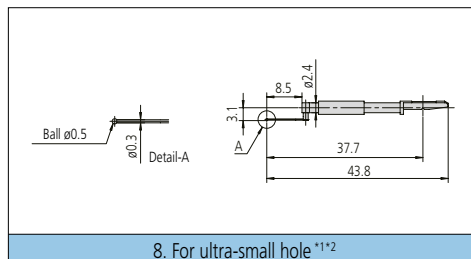
5. For very small hole



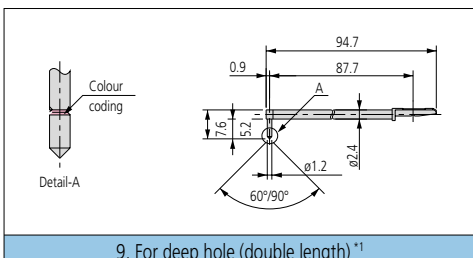
6. For small hole<sup>\*1\*2</sup>



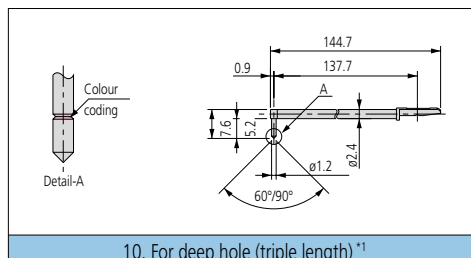
7. For extra-small hole



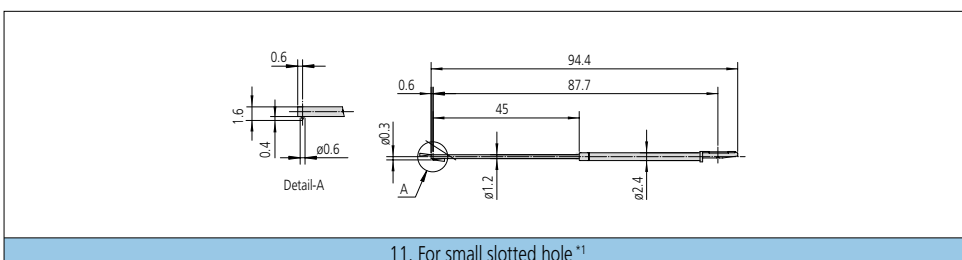
8. For ultra-small hole<sup>\*1\*2</sup>



9. For deep hole (double length)<sup>\*1</sup>



10. For deep hole (triple length)<sup>\*1</sup>



11. For small slotted hole<sup>\*1</sup>

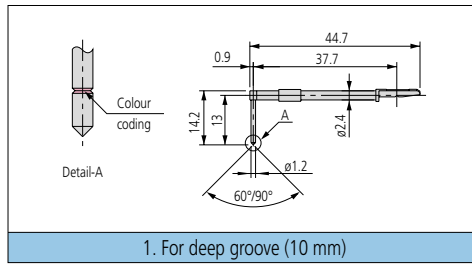
## Specifications

Code No.	Stylus tip radius	Stylus tip angle
<b>1. For deep groove (10 mm)</b>		
12AAC735	2 µm	60°
12AAB409	5 µm	90°
12AAB421	10 µm	90°
<b>2. For deep groove (20 mm)/deep hole (double length) *2</b>		
12AAE893	2 µm	60°
12AAE909	5 µm	90°
<b>3. For deep groove (20 mm) *1</b>		
12AAC736	2 µm	60°
12AAB408	5 µm	90°
12AAB420	10 µm	90°
<b>4. For deep groove (40 mm) *1</b>		
12AAE895	2 µm	60°
12AAE911	5 µm	90°
<b>5. For deep groove (30 mm) *1</b>		
12AAC737	2 µm	60°
12AAB407	5 µm	90°
12AAB419	10 µm	90°
<b>6. For deep groove (30 mm) *1 / deep hole (double length)</b>		
12AAE894	2 µm	60°
12AAE910	5 µm	90°
<b>7. For gear tooth</b>		
12AAB339	2 µm	60°
12AAB410	5 µm	60°
12AAB422	10 µm	60°
<b>8. For gear tooth *1 / deep hole (double length)</b>		
12AAE896	2 µm	60°
12AAE912	5 µm	60°
<b>9. For rolling circle waviness surface *2</b>		
12AAB338	0.8 mm	—
<b>10. For rolling circle waviness *1 / deep hole (double length) *2</b>		
12AAE886	250 µm	—
<b>11. For knife-edge detector</b>		
12AAC738	2 µm	60°
12AAB411	5 µm	90°
12AAB423	10 µm	90°
<b>12. For corner hole *1 / deep hole (double length)</b>		
12AAM601	2 µm	60°
12AAM603	5 µm	60°
<b>13. For eccentric arm *1</b>		
12AAC739	2 µm	60°
12AAB412	5 µm	90°
12AAB424	10 µm	90°
<b>14. For bottom surface</b>		
12AAE899	2 µm	60°
12AAE915	5 µm	90°

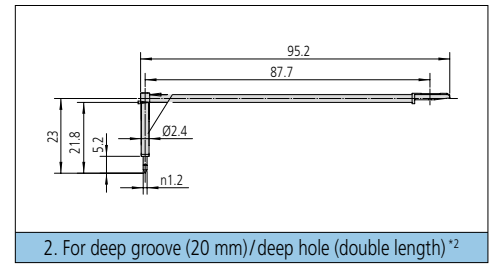
\*1 For downward-facing measurement only.

\*2 Used for calibration, a standard step gauge (178-611 optional accessory) is also required.

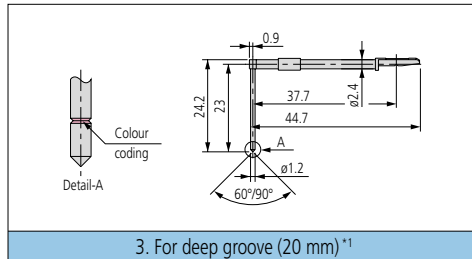
Tip radius	1 µm	2 µm	5 µm	10 µm	250 µm
Colour coding	White	Black	No colour	Yellow	No notch or colour



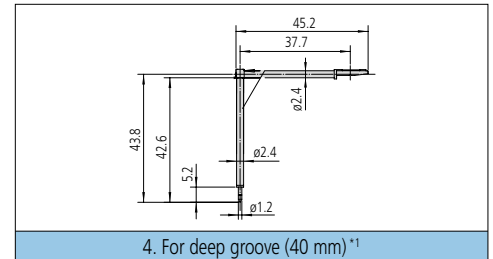
1. For deep groove (10 mm)



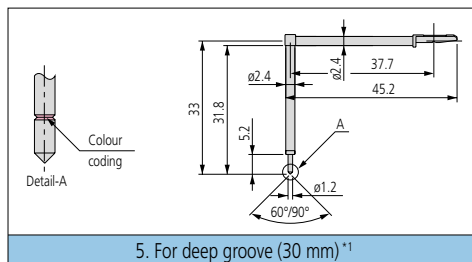
2. For deep groove (20 mm)/deep hole (double length) \*2



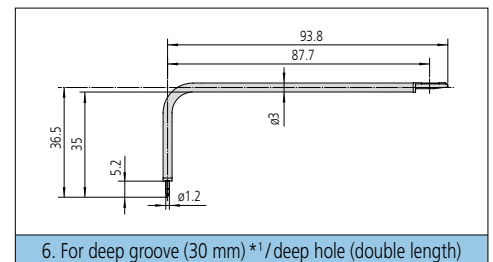
3. For deep groove (20 mm) \*1



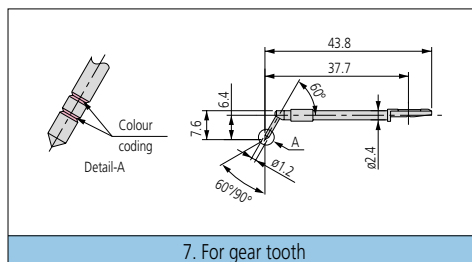
4. For deep groove (40 mm) \*1



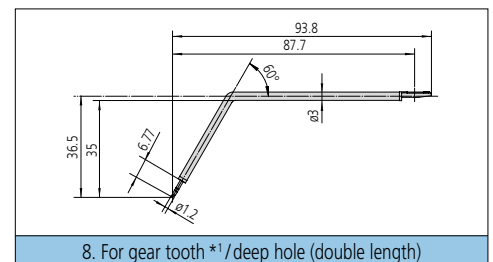
5. For deep groove (30 mm) \*1



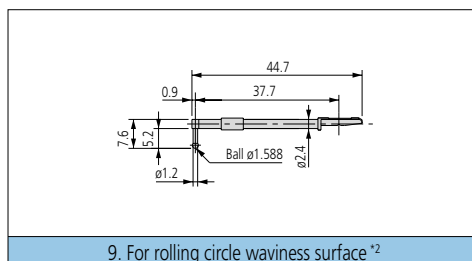
6. For deep groove (30 mm) \*1 / deep hole (double length)



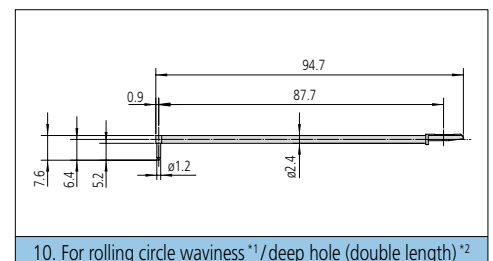
7. For gear tooth



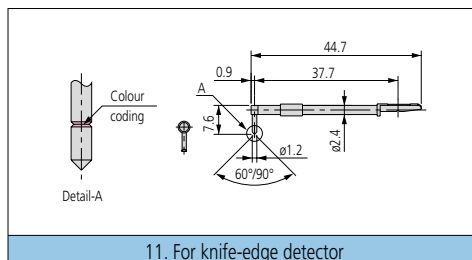
8. For gear tooth \*1 / deep hole (double length)



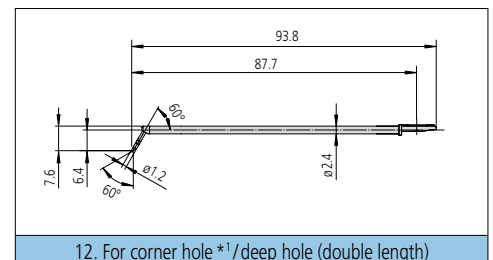
9. For rolling circle waviness surface \*2



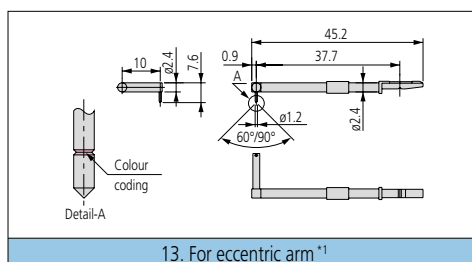
10. For rolling circle waviness \*1 / deep hole (double length) \*2



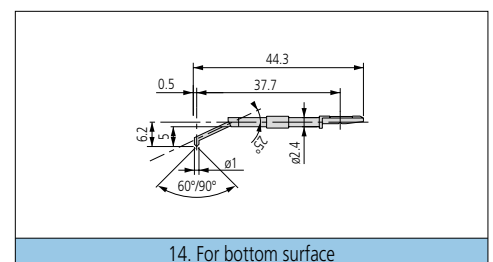
11. For knife-edge detector



12. For corner hole \*1 / deep hole (double length)



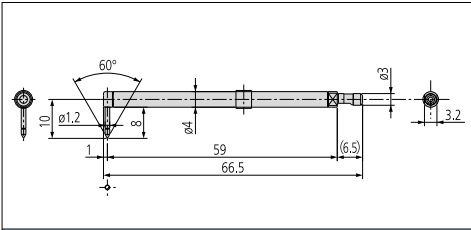
13. For eccentric arm \*1



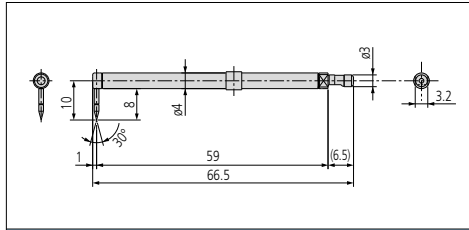
14. For bottom surface

# Optional Styli

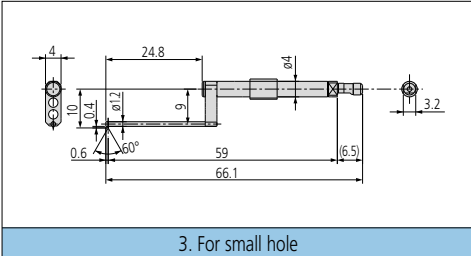
Compatible with CS-3200 Model



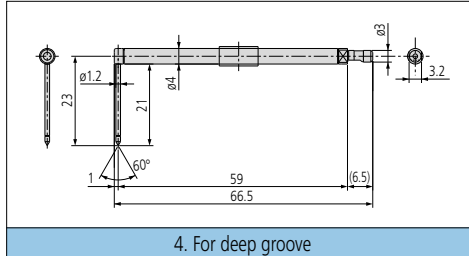
1. Standard stylus



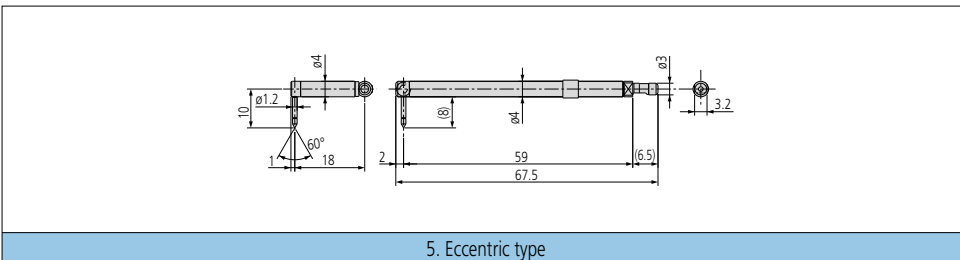
2. Cone \*1



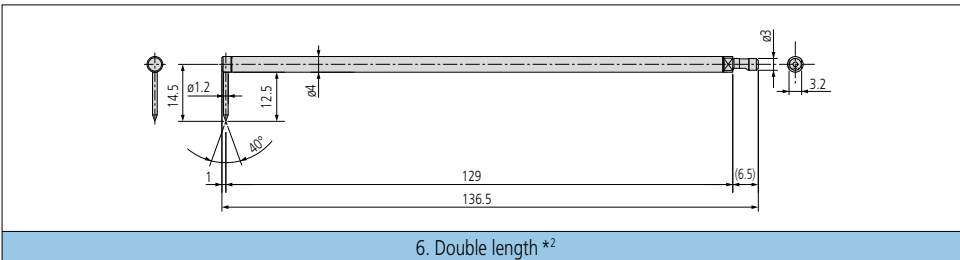
3. For small hole



4. For deep groove



5. Eccentric type



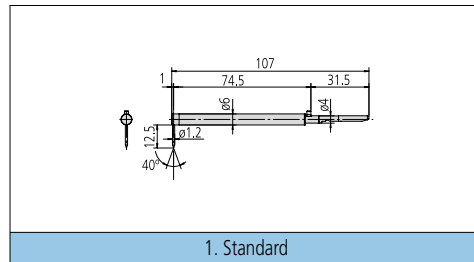
6. Double length \*2

Code No.	Measurement use	Tip radius	Tip angle	Tip material	Standard accessory
1. Standard					
12AAD554	Contour/surface roughness	2 μm	60°	Diamond	✓
2. Cone					
12AAD552	Contour	25 μm	30°	Sapphire	✓
3. For small hole					
12AAD556	Contour/surface roughness	2 μm	60°	Diamond	—
4. For deep groove					
12AAD560	Contour/surface roughness	2 μm	60°	Diamond	—
5. Eccentric type					
12AAD558	Contour/surface roughness	2 μm	60°	Diamond	—
6. Double length *					
12AAD562	Contour/surface roughness	5 μm	40°	Diamond	—

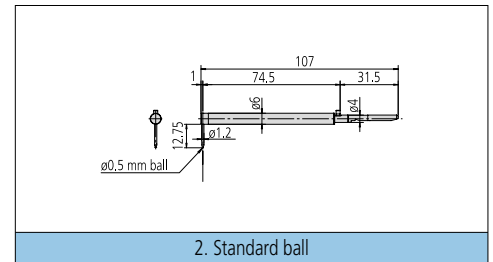
\*Measuring force is 4 mN and the Z1 measuring range and resolution is double that of the standard stylus.



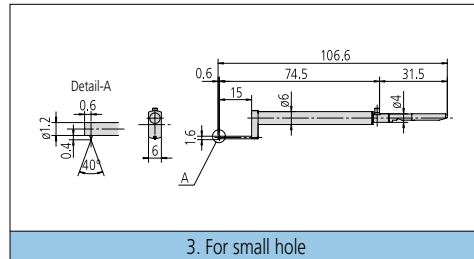
## Compatible with CS-5000CNC, CS-H5000CNC Models



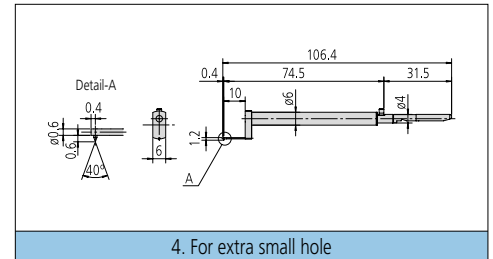
1. Standard



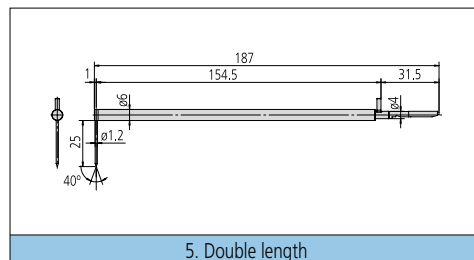
2. Standard ball



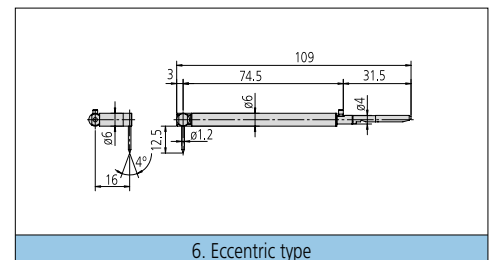
3. For small hole



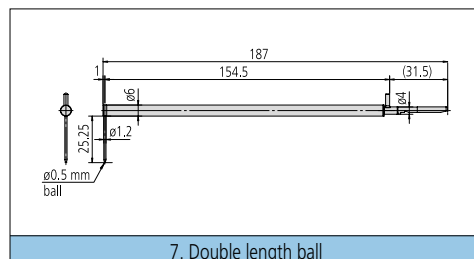
4. For extra small hole



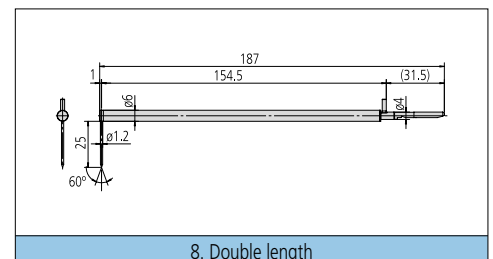
5. Double length



6. Eccentric type



7. Double length ball



8. Double length

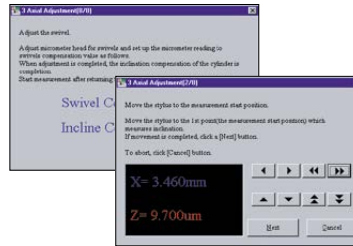
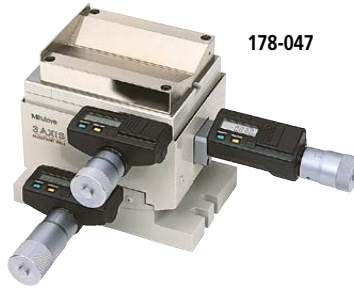
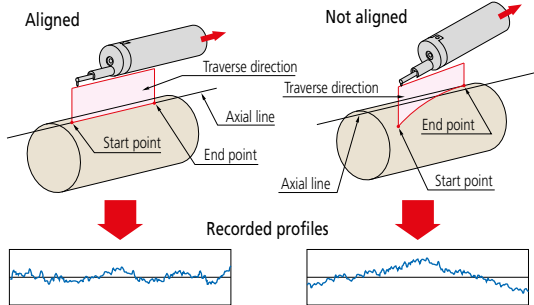
Code No.	Measurement use	Tip radius	Tip angle	Tip material	Standard accessory	
					CS-5000CNC	CS-H5000CNC
<b>1. Standard</b>						
12AAD543	Contour/surface roughness	5 μm	40°	Diamond	✓	—
12AAJ037	Contour/surface roughness	5 μm	40°	Diamond	—	✓
<b>2. Standard ball</b>						
12AAD544	Contour/surface roughness	—	—	Sapphire	✓	✓
<b>3. For small hole</b>						
12AAD651	Contour/surface roughness	5 μm	40°	Diamond	—	—
<b>4. For extra small hole</b>						
12AAD652	Contour/surface roughness	5 μm	40°	Diamond	—	—
<b>5. Double length</b>						
12AAD545	Contour/surface roughness	5 μm	40°	Diamond	✓	—
12AAJ039	Contour/surface roughness	5 μm	40°	Diamond	—	✓
<b>6. Eccentric type</b>						
12AAD653	Contour/surface roughness	5 μm	40°	Diamond	—	—
<b>7. Double length ball</b>						
12AAD546	Contour/surface roughness	—	—	Sapphire	✓	✓
<b>8. Double length</b>						
12AAJ041	Contour/surface roughness	2 μm	60°	Diamond	—	✓

# Optional Accessories

## For Surftest, Formtracer and Contracer

### 3-Axis Adjustment Table

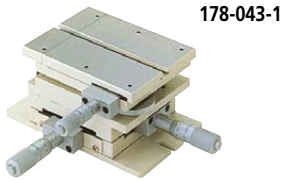
This table helps make the alignment adjustments required when measuring cylindrical surfaces. The corrections for the pitch angle and the swivel angle are determined from a preliminary measurement and the Digimatic micrometers are adjusted accordingly. A flat-surfaced workpiece can also be levelled with this table.



Code No.	Description	Price
178-047	3-axis adjustment table	£3760.00

### Levelling Table

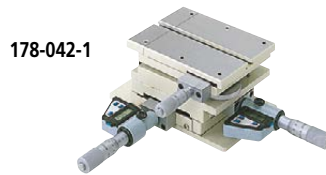
- Table top: 130 x 100 mm
- Levelling range:  $\pm 1.5^\circ$
- XY travel:  $\pm 12.5$  mm



Code No.	Description	Price
178-043-1	Levelling table (mm)	£2450.00
178-053-1	Levelling table (inch)	£2100.00

### Digital Levelling Table

- Table top: 130 x 100 mm
- Levelling range:  $\pm 1.5^\circ$
- XY travel:  $\pm 12.5$  mm



Code No.	Description	Price
178-042-1	Digital levelling table (mm)	£3170.00

### Cross-Travel Table

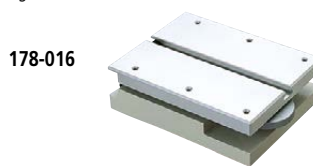
- Table top: 280 x 180 mm
- XY travel: 100 x 50 mm



Code No.	Description	Price
218-001	Cross-travel table (mm)	£1980.00

### Levelling Table

- Table top: 130 x 100 mm
- Levelling range:  $\pm 1.5^\circ$
- Height: 40 mm



Code No.	Description	Price
178-016	Levelling table	£650.00

### Cross-Travel Table

- Table top: 280 x 152 mm
- XY travel: 50 x 25 mm



Code No.	Description	Price
218-041	Cross-travel table (mm)	£2280.00
218-051	Cross-travel table (inch)	£2130.00

### V-Block

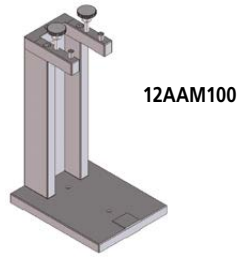
- Workpiece diameter: 1 to 160 mm
- Can be mounted on a levelling table



Code No.	Description	Price
998291	V-block	£659.00

### Calibration Stand

- Required for calibrating upward measurement of CV-3200 series



Code No.	Description
12AAM100	Calibration stand

### Calibration Stand

- Required for calibrating in bulk by mounting straight arm/ small-hole stylus arm without using cross-travel table and Y-axis table



Code No.	Description	Price
12AAG175	Calibration stand	£288.00

### Precision Vice

- Maximum workpiece size: 36 mm
- Can be mounted on a levelling table



Code No.	Description	Price
178-019	Precision vice	£721.00

### Rotary Vice

- Two-slide jaw type
- Maximum workpiece size:  $\varnothing 60$  mm
- Resolution: 1°



Code No.	Description	Price
218-003	Rotary vice	£1140.00

### Swivel Centre Support

- Maximum workpiece diameter: 80 mm\*
- Max. workpiece length: 140 mm
- \* 65 mm when swivelled 10°



Code No.	Description	Price
172-197	Swivel centre support	£476.00

### Holder with Clamp

- Used with a cross-travel table or rugged table
- Maximum workpiece height: 35 mm



Code No.	Description	Price
176-107	Holder with clamp	£177.00

### Centre Support

- Maximum workpiece diameter: 120 mm
- 60 mm riser is optional



Code No.	Description	Price
172-142	Centre support	£604.00

### Centre Support Riser

- Used with a centre support
- Maximum workpiece diameter: 240 mm



Code No.	Description	Price
172-143	Centre support riser	£265.00

### V-Block with Clamp

- Used with a cross-travel table or rugged table



Code No.	Description	Price
172-234	V-block with clamp (max. workpiece $\varnothing 50$ mm)	£325.00
172-378	V-block with clamp (max. workpiece $\varnothing 25$ mm)	£231.00

# Optional Accessories

## For Surftest, Formtracer and Contracer

### Y-Axis Table

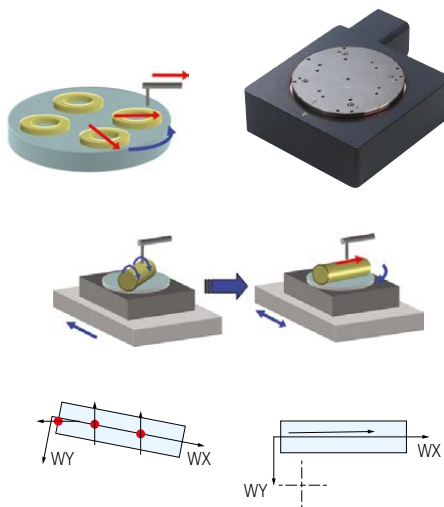
Enables efficient, automatic measurement of multiple aligned workpieces and multiple points on a single measurement surface. Allows semi-automatic measurement with a manually operated machine.  
(Not for CNC models.)



Code No.	178-097
Travel range	200 mm
Resolution	0.05 $\mu$ m
Positioning accuracy	$\pm 3$ $\mu$ m
Drive speed	Max. 80 mm/s
Maximum load	50 kg
Mass	28 kg

### $\theta$ 1-Axis Table

For efficient measurement in the axial/transverse directions. When measuring a cylindrical workpiece, automatic alignment can be performed in combination with the Y-axis table.  
Note:  $\theta$ 1-axis mounting plate (12AAE630) is required when directly installing on the base of the SV-3100.



Code No.	12AAD975
Displacement	360°
Resolution	0.004°
Maximum load	12 kg
Rotational speed	Max. 10°/s
Mass	7 kg

### $\theta$ 2-Axis Table

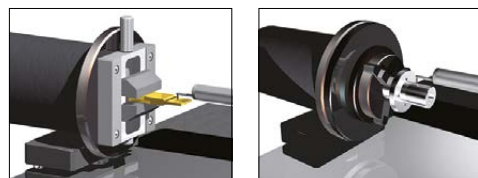
Enables measurement of multiple points on a cylindrical workpiece and automation of front/rear/side measurement. Allows semi-automatic measurement with a manually operated machine.

Note:  $\theta$ 2-axis mounting plate (12AAE718) is required when directly installing on the base of the SV-3100.



### Automatic Levelling Table

This is a stage that performs fully automatic levelling as measurement starts, freeing the user from this troublesome operation. Fully automatic levelling can be done quickly, easily and reliably.



Code No.	178-078
Displacement	360°
Resolution	0.0072°
Maximum load	4 kg
Rotational speed	Max. 18°/s
Mass	5 kg

Code No.	178-087	178-037
For models	SV, CV, CS-3200	CNC
Inclination adjustment angle	$\pm 2^\circ$	
Maximum load	7 kg	
Table dimensions	130 x 100 mm	
Mass	3.5 kg	

### Quick Chuck

This chuck is useful when measuring small workpieces, which are easily clamped by tightening the knurled ring.



Code No.	211-032	
Holding capacity	Internal jaws	OD: 1 - 36 mm
	Internal jaws	ID: 14 - 70 mm
	External jaws	OD: 25 - 79 mm
Dimensions	$\phi 118 \times 41$ mm	
Mass	1.2 kg	
Price	£1410.00	

### Micro-Chuck

This chuck is suitable for clamping extra-small diameter workpieces ( $\phi 1$  mm or less), which cannot be retained with the Quick Chuck.



Code No.	211-031
Holding capacity	OD: 0.1 - 1.5 mm
Dimensions	$\phi 107 \times 48.5$ mm
Mass	0.6 kg
Price	£1090.00

## Examples of Optimal Combinations of Accessories for CNC Models

Function	Y-axis table	θ1 axis table	θ2 axis table	Optional accessory		
				Drive unit tilting function (Patent pending: Japan)	Large θ table	Rotary detector holder
Automatic levelling	—	—	—	●	—	—
Automatic alignment (Patent registered: Japan)	●	●	—	▲	—	—
Multiple workpiece batch measurement	▲	—	—	—	—	—
Measurement in the Y-axis direction	●	—	—	—	—	—
Oblique measurement in the XY plane*	●	—	—	—	—	—
Outside 3D surface roughness measurement/evaluation*	●	—	—	▲	—	—
Multiple-piece measurement in the Y-axis direction (positioning in the Y-axis direction)	●	—	—	—	—	—
Multiple-piece measurement in the radial direction (rotary positioning in the XY plane)	▲	●	—	—	—	—
Tracking measurement in the Z-axis direction**	—	—	—	●	—	—
Inclined surface measurement in the X-axis direction	▲	—	—	●	—	—
Inclined hole inside measurement in the X-axis direction	▲	—	—	●	—	—
Multiple cylinder generatrix line measurement	▲	—	●	—	—	—
Measurement of both top and bottom surfaces	▲	—	●	—	—	—
Rotary positioning of a large workpiece***	—	—	—	—	●	—
Upward/downward and frontward/backward measurement of a large workpiece***	—	—	—	—	—	●

● Highly suitable

▲ Suitable

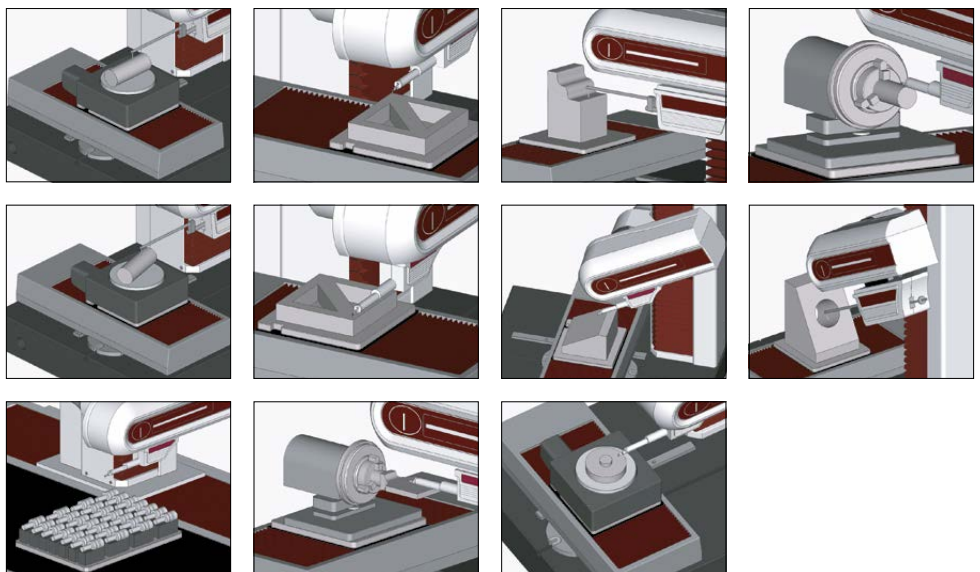
— Not required

\* Applicable only to surface roughness measurement

\*\* Applicable only to form/contour measurement

\*\*\* Applicable only for SV-M3000CNC

For the combinations and the specifications of various optional accessories described in this catalogue, contact your nearest Mitutoyo sales office.



# Roundtest RA-10

## SERIES 211 – Roundness Measuring Instruments

- Compact roundness tester combines outstanding cost and performance with full measurement capabilities and user-friendly operation.
- The control panel has large keys and an intuitive layout for easy operation.
- One-touch setup recall function: Complex setups can be stored in advance and recalled with a single keystroke.
- Zero-set function: The detector level can be set to zero with a single keystroke, thus relieving the user of the need for precise detector positioning.
- The positioning handles for vertical direction (Z axis) and radial direction (X axis) adjustments have been placed on the slider for best operability.
- Despite being an economically priced model, the turntable with air bearings offers rotational accuracy as high as  $(0.04+6H/10000) \mu\text{m}$ , thus assuring accuracy that compares well with that of higher-priced models.
- Measurement results and recorded profiles are easy to view with the large LCD panel display.
- The machine has a compact body with integrated electronics and printer making it ideal for crowded inspection areas.

**MeasurLink** ENABLED  
Data Management Software by Mitutoyo



### Specifications

Model		RA-10
Code No.		211-601E
Turntable	Rotational accuracy	$(0.04+6H/10000) \mu\text{m}$ , H = probing height (mm)
	Rotational speed	6 rpm
	Table diameter	150 mm
	Max. probing diameter	100 mm
	Max. workpiece diameter	320 mm
	Max. table loading	10 kg
Z axis (column)	Vertical travel	117 mm
	Max. probing height	152 mm from the turntable surface
	Max. probing depth	100 mm (min. ID: 30 mm)
X-axis horizontal arm travel		75 mm (including a protrusion of 25 mm over the turntable axis)
Probe and stylus	Measuring range	$\pm 1000 \mu\text{m}$
	Measuring force	70 to 100 mN
	Standard stylus	12AAL021, carbide ball, $\phi 1.6 \text{ mm}$
	Measuring direction	Bi-directional
Stylus angle adjustment		$\pm 45^\circ$ (with graduations)
Dimensions (W x D x H)		450 x 360 x 486 mm
Mass		26 kg

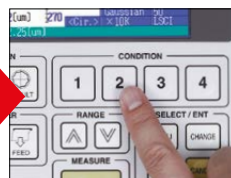
### Simple Measurement Procedure



Mount the workpiece on the holding fixture.



Position the detector in contact with the workpiece.



Press the "Condition" button as required.



Press the "START/STOP" button.

### Technical Data

Data analysis unit	
Processing unit:	Built-in
Data sampling points:	Max. 3600 points/rotation
Data analysis items:	Roundness, coaxiality, concentricity, flatness, circular runout (radial)
Types of roundness evaluation:	LSC, MZC, MIC, MCC
Recording device:	Built-in thermal line printer (optional external printer)
Recording magnification:	X5 to X200,000 (15-step)
Roughness component reduction:	Low pass filter, band pass filter
Filter type:	2CR-75%, 2CR-50%, 2CRPC-75% (phase corrected), Gaussian, filter OFF
Cutoff values:	15 upr, 50 upr, 150 upr, 500 upr, 15-150 upr, 15-500 upr, 50-500 upr
Number of measuring sections:	1-section to 5-section: Roundness, Coaxiality, Flatness 1-section to 3-section: Circular runout (radial) 2-section: Concentricity
Air supply	
Air pressure:	390 kPa
Air consumption:	30 L/min.
Power supply:	240VAC $\pm 10\%$ , 50/60Hz

### Optional Accessories

Styli refer to page L-45.

Fixture and stage accessories refer to pages L-47 to L-48.

### Consumables

Code No.	Description	Price
358592	Element for air filter (1 pc./set)	£48.60
358593	Element for air regulator (10 pcs./set)	£68.60
938882	SR44 (for Z-axis scale unit and alignment table head)	£4.30
12AAH181	Printer paper (10 rolls/set)	£74.40

# Roundtest RA-120

## SERIES 211 – Roundness Measuring Instruments

- The Roundtest RA-120 is compact, affordable, and simple-to-use device for measuring part geometry on the shop floor.
- Provides outstanding data analysis capabilities required of a laboratory roundness measuring instrument having a  $\pm 1000 \mu\text{m}$  wide range detector and a precision turntable with excellent rotational accuracy.
- Has a dedicated processor and control panel incorporated in the main unit for controlling operations.

**MeasurLink** ENABLED  
Data Management Software by Mitutoyo



### Technical Data

Data analysis unit  
Processing unit: Built-in  
Data sampling points: Max. 3600 points/revolution  
Types of roundness evaluation: LSC, MZC, MIC, MCC  
Recording device: Built-in thermal line printer  
Recording magnification: X5 to X200,000 (15-steps)  
Roughness component reduction: Low pass filter, band pass filter  
Filter type: 2CR-75%, 2CR-50%, 2CRPC-75% (phase corrected), 2CRPC-50% (phase corrected), Gaussian, filter OFF  
Cutoff values: 15 upr, 50 upr, 150 upr, 500 upr, 15-150 upr, 15-500 upr, 50-500 upr  
Number of measuring sections: Max. 5  
Air supply  
Air pressure: 390 kPa  
Air consumption: 30 L/min.  
Power supply: 240VAC  $\pm 10\%$ , 50/60Hz

### Optional Accessories

Styli refer to page L-45.

Fixture and stage accessories refer to pages L-47 to L-48.

### Consumables

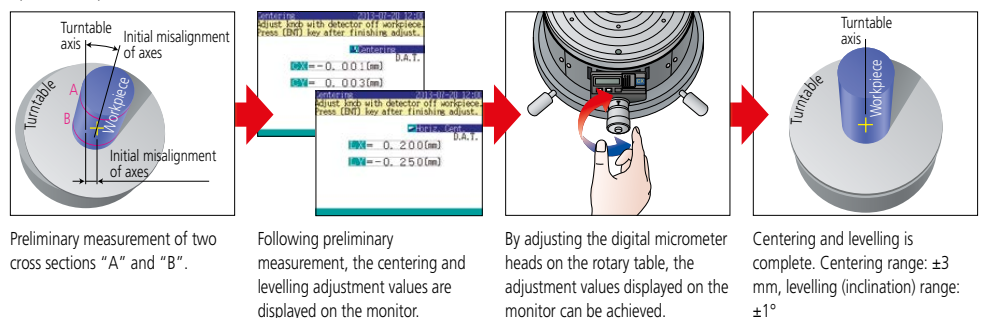
Code No.	Description	Price
358592	Element for air filter (1 pc./set)	£48.60
358593	Element for air regulator (10 pcs./set)	£68.60
12AAH181	Printer paper (10 rolls/set)	£74.40

### Specifications

Model		RA-120	
Code No.		211-544E	211-546E
Turntable	DAT function	—	Installed
	Rotational accuracy	Radial: $(0.04+6H/10000) \mu\text{m}$ , $H = \text{probing height (mm)}$ Axial: $(0.04+6X/10000) \mu\text{m}$ , $X = \text{probing radius (mm)}$	
	Rotational speed	6 rpm	
	Table diameter	150 mm	
	Centering range	$\pm 3 \text{ mm}$	
	Levelling range	$\pm 1^\circ$	
	Max. probing diameter	280 mm (380 mm when the detector is vertical, in which orientation measurement is restricted to features more than 50 mm above the table surface)	
	Max. workpiece diameter	440 mm	
	Max. table loading	25 kg	
Z axis (column)	Vertical travel	280 mm	
	Max. probing height	280 mm from the turntable surface	
	Max. probing depth	100 mm (min. ID: 30 mm)	
X-axis horizontal arm travel	165 mm (including a protrusion of 25 mm over the turntable axis)		
Probe and stylus	Measuring range	$\pm 1000 \mu\text{m}$	
	Measuring force	70 to 100 mN	
	Standard stylus	12AAL021, carbide ball, $\phi 1.6 \text{ mm}$	
	Measuring direction	Bi-directional	
	Stylus angle adjustment	$\pm 45^\circ$ (with graduations)	
Dimensions (WxDxH)	450 x 360 x 636 mm		
Mass	32 kg (main unit), 2 kg (air regulator)		

### DAT (Digital Adjustment Table) Function

The turntable displays centering and levelling adjustments digitally, making this challenging task simple enough for even an untrained operator to perform.



# Roundtest RA-120P

## SERIES 211 – Roundness Measuring Instruments

- Compact, affordable, and simple-to-use devices for measuring part geometry on the shop floor.
- Provides outstanding data analysis capabilities required of a laboratory roundness measuring instrument having a  $\pm 1000 \mu\text{m}$  wide range detector and a precision turntable with excellent rotational accuracy.
- PC-based model with all operations controlled via ROUNDPAK software (optional).

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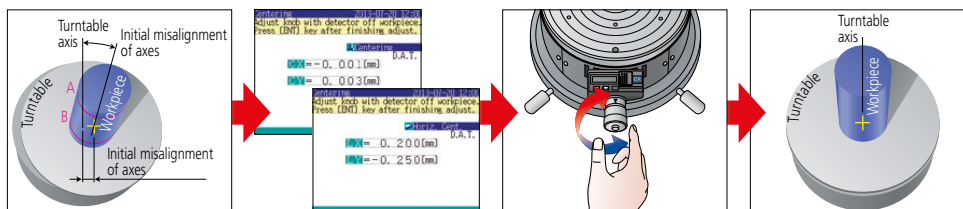


### Specifications

Model		RA-120P	
Code No.		211-547E	211-545E
Turntable	DAT function	—	Installed
	Rotational accuracy	Radial: $(0.04+6H/10000) \mu\text{m}$ , H = probing height (mm) Axial: $(0.04+6X/10000) \mu\text{m}$ , X = probing radius (mm)	
	Rotational speed	6 rpm	
	Table diameter	150 mm	
	Centering range	$\pm 3 \text{ mm}$	
	Levelling range	$\pm 1^\circ$	
	Max. probing diameter	280 mm (380 mm when the detector is vertical, in which orientation measurement is restricted to features more than 50 mm above the table surface)	
	Max. workpiece diameter	440 mm	
	Max. table loading	25 kg	
	Vertical travel	280 mm	
Z axis (column)	Max. probing height	280 mm from the turntable surface	
	Max. probing depth	100 mm (min. ID: 30 mm)	
X-axis horizontal arm travel	165 mm (including a protrusion of 25 mm over the turntable axis)		
Probe and stylus	Measuring range	$\pm 1000 \mu\text{m}$	
	Measuring force	70 to 100 mN	
	Standard stylus	12AAL021, carbide ball, $\phi 1.6 \text{ mm}$	
	Measuring direction	Bi-directional	
	Stylus angle adjustment	$\pm 45^\circ$ (with graduations)	
Dimensions (WxDxH)		450 x 360 x 636 mm	
Mass		32 kg (main unit), 2 kg (air regulator)	

### DAT (Digital Adjustment Table) Function

The turntable displays centering and levelling adjustments digitally, making this challenging task simple enough for even an untrained operator to perform.



Preliminary measurement of two cross sections "A" and "B".

Following preliminary measurement, the centering and levelling adjustment values are displayed on the monitor.

By adjusting the digital micrometer heads on the rotary table, the adjustment values displayed on the monitor can be achieved.

Centering and levelling is complete. Centering range:  $\pm 3 \text{ mm}$ , levelling (inclination) range:  $\pm 1^\circ$

### Technical Data

Data analysis unit	PC with Roundpak
Processing unit:	PC with Roundpak
Data sampling points:	Max. 3600 points/revolution
Types of roundness evaluation:	LSC, MZC, MIC, MCC
Recording device:	Built-in thermal line printer (optional external printer)*
Recording magnification:	X1 to X500,000 (Auto)
Roughness component reduction:	Low pass filter, band pass filter
Filter type:	2CR-75%, 2CR-50%, 2CRPC-75% (phase corrected), 2CRPC-50% (phase corrected), Gaussian, filter OFF
Cutoff values:	15 upr, 50 upr, 150 upr, 500 upr, 15-150 upr, 15-500 upr, 50-500 upr, Manual setting
Number of measuring sections:	100-section
Air supply	
Air pressure:	390 kPa
Air consumption:	30 L/min.
Power supply:	240VAC $\pm 10\%$ , 50/60Hz

### Optional Accessories

Styli refer to page L-45.

Fixture and stage accessories refer to pages L-47 to L-48.

### Consumables

Code No.	Description	Price
358592	Element for air filter (1 pc./set)	£48.60
358593	Element for air regulator (10 pcs./set)	£68.60

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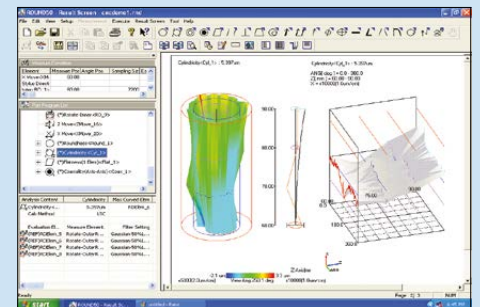
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### Software

#### ROUNDPAK

The latest roundness/cylindrical form analysis program.



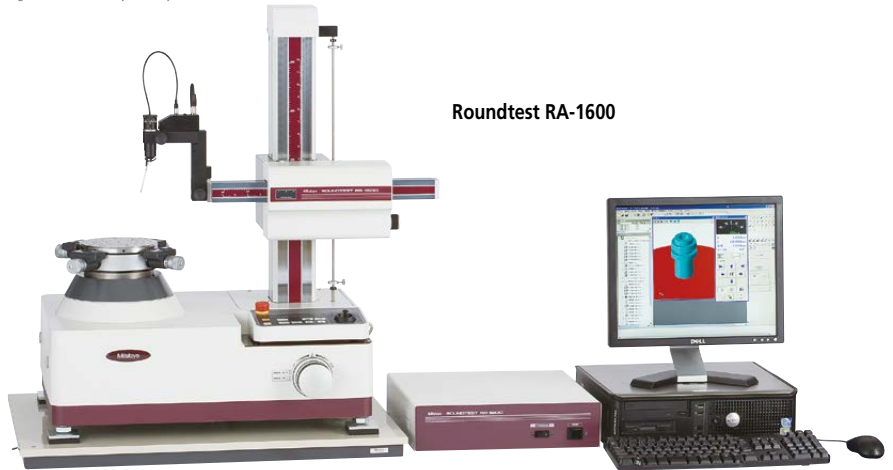


# Roundtest RA-1600

## SERIES 211 – Roundness/Cylindricity Measuring System

- Our latest PC-compliant roundness and cylindrical form measuring instrument with extensive analysis features to enable measurement of a wide variety of workpieces.
- The spiral-mode measurement function combines table rotation and rectilinear action allowing cylindricity, coaxiality, and similar measurements to be performed based on whole-surface data.
- Measurement while tracing is possible through a built-in linear scale in the X axis. This type of measurement is useful when displacement due to form variation exceeds the measuring range of the detector, and X-axis motion is necessary to maintain contact with the workpiece surface.
- Continuous internal/external diameter measurement is possible without changing the detector orientation.

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Roundtest RA-1600

### Technical Data

#### Vertical column (Z axis)

Vertical travel: 300 mm  
Straightness: 0.20  $\mu\text{m}/100\text{ mm}$  (narrow range),  
0.30  $\mu\text{m}/300\text{ mm}$  (entire range)

#### Parallelism with

turntable axis: 1.5  $\mu\text{m}/300\text{ mm}$

Positioning speed: Max. 15 mm/s

Measuring speed: 0.5, 1, 2, 5 mm/s

Max. probing height: 300 mm (ID/OD)\*

Max. probing depth: 91 mm (over  $\phi 32$ ), 50 mm (over  $\phi 7$ )

#### Air supply

Air pressure: 0.39 MPa (4 kgf/cm<sup>2</sup>)

Air consumption: 22 L/min.

Power supply: 240VAC  $\pm 10\%$ , 50/60Hz

\* Use the optional auxiliary stage (**356038**) for measuring a workpiece whose height is 20 mm or less.

### Optional Accessories

Styli refer to page L-45.

Fixture and stage accessories refer to pages L-47 to L-48.

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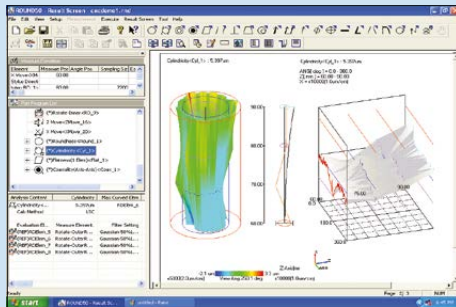
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## FORM

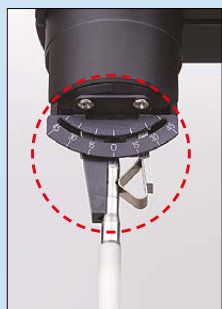
### Software

#### ROUNDPAK

The latest roundness/cylindrical form analysis program.



Safety mechanisms provided as a standard feature



A collision-sensing function has been incorporated in the detector unit (when it is in the vertical orientation) to prevent collision in the Z-axis direction. Additionally, an accidental collision prevention function, which stops the system when the detector displacement exceeds its range, has been added. When an accidental touch is detected, the dedicated analysis software (ROUNDPAK) senses the error and automatically stops the system.

Sliding detector-unit holder provided as a standard feature (option)



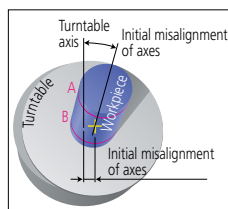
The detector-unit holder is equipped with a sliding mechanism, enabling one-touch measurement of a workpiece with a deep hole having a thick wall, which has been difficult with the conventional standard arm.

### Specifications

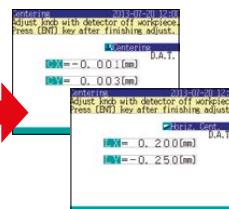
Model	RA-1600		
Code No.	211-723E (mm)	211-733E (inch/mm)	
Turntable	Rotational accuracy	Radial: (0.02+6H/10000) $\mu\text{m}$ , H = probing height (mm) Axial: (0.02+6X/10000) $\mu\text{m}$ , X = probing radius (mm)	
	Rotational speed	4, 6, 10 rpm	
	Table diameter	150 mm	
	Centering range	$\pm 3\text{ mm}$ (with DAT function)	
	Levelling range	$\pm 1^\circ$ (with DAT function)	
	Max. probing diameter	280 mm	
	Max. workpiece diameter	560 mm	
X axis (horizontal arm)	Max. table loading	25 kg	
	Horizontal travel	165 mm (from table axis -25 mm~ $\pm 140\text{ mm}$ )	
	Positioning speed	Max. 15 mm/s	
Probe and stylus	Measuring speed	0.5, 1, 2, 5 mm/s	
	Measuring range	$\pm 400\text{ }\mu\text{m}/\pm 40\text{ }\mu\text{m}/\pm 4\text{ }\mu\text{m}$	
	Measuring force	10 to 50 mN (5 level switching)	
	Standard stylus	12AAL021, carbide ball, $\phi 1.6\text{ mm}$	
	Measuring direction	Bi-directional	
Dimensions (WxDxH)	Stylus angle adjustment	$\pm 45^\circ$ (with graduations)	
	Mass	890 x 490 x 840 mm	
		170 kg	

### DAT (Digital Adjustment Table) Function

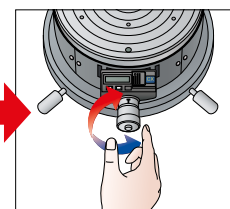
The turntable displays centering and levelling adjustments digitally, making this challenging task simple enough for even an untrained operator to perform.



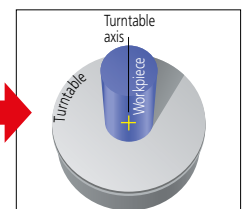
Preliminary measurement of two cross sections "A" and "B".



Following preliminary measurement, the centering and levelling adjustment values are displayed on the monitor.



By adjusting the digital micrometer heads on the rotary table, the adjustment values displayed on the monitor can be achieved.



Centering and levelling is complete. Centering range:  $\pm 3\text{ mm}$ , levelling (inclination) range:  $\pm 1^\circ$

# Roundtest RA-2200

## SERIES 211 – Roundness/Cylindricity Measuring System

- The RA-2200 provides high accuracy, high speed and high performance roundness measurement.
- The fully-automatic AAT or semi-automatic DAT functionality aids manual workpiece centering and levelling, turning a once challenging task into something simple enough for even the untrained user and substantially reducing overall measurement time.
- The RA-2200 system comes with the powerful ROUNDPAK data analysis software, with enhanced functionality and easy operation through the use of the mouse and icon selection.
- Continuous internal/external diameter measurement is possible without changing the detector orientation.
- With extremely high rotational accuracy, both in the radial and axial directions, the turntable allows high-accuracy flatness testing to be performed in addition to roundness and cylindricity measurements.
- The system can be upgraded to CNC operation by replacing and adjusting the detector unit.\*

\*This task should be performed by a Mitutoyo technician.

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**Roundtest RA-2200AS**  
Shown with vibration isolator and side table (optional accessories)



### Specifications

Model	RA-2200AS	RA-2200DS	RA-2200AH	RA-2200DH
Code No.	211-511E (mm)	211-513E (mm) 211-514E (inch)	211-512E (mm)	211-515E (mm) 211-516E (inch)
Z-axis (column) vertical travel	300 mm (standard column)		500 mm (tall column)	
Centering/levelling adjustment	AAT (automatic adjustment table)	DAT (digital adjustment table)	AAT (automatic adjustment table)	DAT (digital adjustment table)
Rotational accuracy	Radial: (0.02+3.5H/10000) µm, H = probing height (mm) Axial: (0.02+3.5X/10000) µm, X = probing radius (mm)			
Rotational speed	2, 4, 6, 10 rpm			
Turntable				
Table diameter	235 mm	200 mm	235 mm	200 mm
Centering range	±3 mm	±5 mm	±3 mm	±5 mm
Levelling range	±1°			
Max. probing diameter	300 mm			
Max. workpiece diameter	580 mm			
Max. table loading	30 kg			
Horizontal travel	175 mm (from table axis -25 mm~±140 mm)			
X axis (horizontal arm)				
Squareness with turntable axis	1.0 µm/150 mm			
Positioning speed	Max. 30 mm/s (joystick operation)			
Measuring speed	0.5, 1, 2, 5 mm/s			
Measuring range	±400 µm/±40 µm/±4 µm			
Measuring force	10 to 50 mN (5 level switching)			
Standard stylus	12AAL021, carbide ball, ø1.6 mm			
Measuring direction	Bi-directional			
Stylus angle adjustment	±45° (with graduations)			
Dimensions (WxDxH)	940x510x900 mm	910x510x900 mm	940x510x1100 mm	910x510x1100 mm
Mass	180 kg		200 kg	

### Technical Data

Vertical column (Z axis)	
Straightness (λ.c.2.5):	0.10 µm/100 mm, 0.15 µm/300 mm (0.25 µm/500 mm: AH, DH models)
Parallelism with turntable axis:	0.7 µm/300 mm (1.2 µm/500 mm: AH, DH models)
Positioning speed:	Max. 50 mm/s
Measuring speed:	0.5, 1, 2, 5 mm/s
Max. probing height:	300 mm (OD), 300 mm (ID) [500 mm: AH, DH models]
Max. probing depth:	85 mm for ø32 mm or more, 50 mm for ø7 mm or more
Air supply	
Air pressure:	0.39 MPa
Air consumption:	30 L/min.
Power supply:	240VAC ±10%, 50/60Hz

### Optional Accessories

Styli refer to page L-45.

Fixture and stage accessories refer to pages L-47 to L-48.

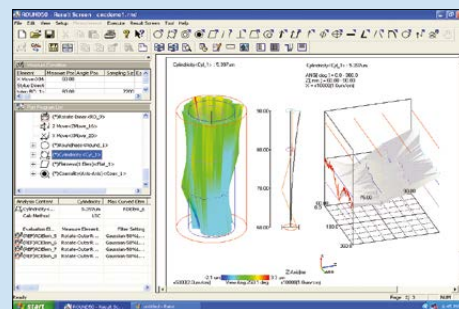
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### Standard Software

#### ROUNDPAK

The latest roundness/cylindrical form analysis program.



### AAT (Automatic Adjustment Table) Function

Incorporating an Automatic Adjustment Table (AAT), the top-of-the-line RA-2200AS/AH models relieve the operator of the task of workpiece centering and levelling.

### DAT (Digital Adjustment Table) Function

Refer to previous page.

# Roundtest RA-H5200

## SERIES 211 – Roundness/Cylindricity Measuring System

### Technical Data

Vertical column (Z axis)	
Straightness ( $\lambda c2.5$ ):	0.05 $\mu\text{m}/100\text{ mm}$ , 0.14 $\mu\text{m}/350\text{ mm}$ (0.2 $\mu\text{m}/550\text{ mm}$ AH model)
Parallelism with turntable axis:	0.2 $\mu\text{m}/350\text{ mm}$ (0.32 $\mu\text{m}/550\text{ mm}$ AH model)
Positioning speed:	Max. 60 mm/s
Measuring speed:	0.5, 1, 2, 5 mm/s
Max. probing height:	350 mm (OD), 350 mm (ID) [550 mm (OD/ID): AH model]
Max. probing depth:	85 mm for $\varnothing 32\text{ mm}$ or more, 50 mm for $\varnothing 7\text{ mm}$ or more
Air supply	
Air pressure:	0.39 MPa
Air consumption:	45 L/min.
Power supply:	240VAC $\pm 10\%$ , 50/60Hz

### Optional Accessories

Styli refer to page L-45.

Fixture and stage accessories refer to pages L-47 to L-48.

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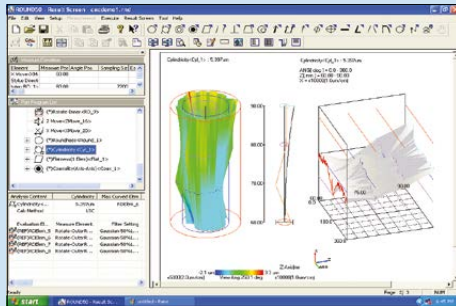
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## FORM

### Software

#### ROUNDPAK

The latest roundness/cylindrical form analysis program.



### X-axis tracking measurement



A linear scale incorporated into the X axis enables measurement to be extended by tracking the workpiece surface (tracking range:  $\pm 5\text{ mm}$ ). This capability is effective for measuring a workpiece with a displacement that exceeds the detection range of the probe when measuring roundness/cylindricity or a taper that is determined with slider/column movement.

- RA-H5200AS/AH, a roundness/cylindricity measuring system developed to combine world-class accuracy with flexibility and high analysis capability.
- Continuous automatic measurement can be performed from external diameter to internal diameter without changing probe orientation. This reduces measurement time and also eliminates errors associated with probe position changes, greatly facilitating high-accuracy measurement.
- The automatic centering/levelling mechanism incorporates a high-precision glass scale on each axis of the turntable. This generates feedback preventing positioning errors from affecting centering/levelling adjustments.
- Also capable of roughness measurement if an optional roughness detector unit is incorporated into the system, measuring in the circumferential direction around the turntable axis as well as in the X- and Z-directions with the turntable stopped.
- A highly accurate, highly rigid turntable has been created through exceptional manufacturing accuracy of critical components, such as the rotor and stator. In addition, an air bearing incorporating a complex aperture provides superior rigidity and uniform pressure distribution, resulting in an industry leading (0.02+3.5H/10000)  $\mu\text{m}$  rotational accuracy (radial).

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### Roundtest RA-5200AH

with side table (optional accessory)



### Specifications

Model	RA-H5200AS	RA-H5200AH
Code No. (with vibration isolation stand)	211-531E	211-532E
Z-axis (column) vertical travel	350 mm (standard column)	550 mm (tall column)
Rotational accuracy	Radial: (0.02+3.5H/10000) $\mu\text{m}$ , H = probing height (mm) Axial: (0.02+3.5X/10000) $\mu\text{m}$ , X = probing radius (mm)	
Rotational speed	2, 4, 6, 10 rpm (20 rpm: auto-centering)	
Turntable	Table diameter: 300 mm	
Centering range	$\pm 5\text{ mm}$	
Levelling range	$\pm 1^\circ$	
Max. probing diameter	400 mm	
Max. workpiece diameter	680 mm	
Max. table loading	80 kg (65 kg: auto-centering)	
Horizontal travel	225 mm	
X axis (horizontal arm)	Straightness ( $\lambda c2.5$ ): 0.4 $\mu\text{m}/200\text{ mm}$	
Squareness with turntable axis	0.5 $\mu\text{m}/200\text{ mm}$	
Positioning speed	Max. 50 mm/s	
Measuring speed	0.5, 1, 2, 5 mm/s	
Probe and stylus	Measuring range: $\pm 400\text{ }\mu\text{m}/\pm 40\text{ }\mu\text{m}/\pm 4\text{ }\mu\text{m}$	
Measuring force	10 to 50 mN (5 level switching)	
Standard stylus	12AAL021, carbide ball, $\varnothing 1.6\text{ mm}$	
Measuring direction	Bi-directional	
Stylus angle adjustment	$\pm 45^\circ$ (with graduations)	
Dimensions (WxDxH)	1260 x 710 x 1700 mm	1260 x 710 x 1900 mm
Mass (with vibration isolation stand)	650 kg	670 kg

# Roundtest Extreme RA-2200CNC

## SERIES 211 – CNC Roundness/Cylindricity Measuring System

- Mitutoyo offers innovative roundness/cylindricity measuring systems capable of automated measurement with independent/simultaneous multi-axis CNC control. In addition to high measuring accuracy and reliability, these CNC models provide excellent inspection productivity.
- Roundness and surface roughness measurements are both available from a single measuring system so workpiece resetting for roughness measurement is not required if an optional roughness detector unit is incorporated into the system, with measurement possible in the circumferential direction around the turntable axis as well as in the X- and Z-directions with the turntable stopped.

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Data Management Software by Mitutoyo

### Roundtest RA-2200CNC

Standard column type shown with vibration isolator and side table (optional accessories)



### Technical Data

Vertical column (Z axis)	
Straightness ( $\lambda c2.5$ ):	0.10 $\mu\text{m}/100\text{ mm}$ , 0.15 $\mu\text{m}/300\text{ mm}$ (0.25 $\mu\text{m}/500\text{ mm}$ )*
Parallelism with turntable axis:	0.7 $\mu\text{m}/300\text{ mm}$ (1.2 $\mu\text{m}/500\text{ mm}$ )*
Positioning speed:	Max. 50 mm/s
Measuring speed:	0.5, 1, 2, 5 mm/s
Max. probing height:	300 mm (OD), 300 mm (ID) [500 mm (OD/ID)]*
Max. probing depth:	104 mm ( $\phi 32\text{ mm}$ or more) 26 mm ( $\phi 12.7\text{ mm}$ or more)
Air supply	
Air pressure:	0.39 MPa
Air consumption:	30 L/min.
Power supply:	240VAC $\pm 10\%$ , 50/60 Hz
*Tall-column type.	

### Optional Accessories

Styli refer to page L-46.

Fixture and stage accessories refer to pages L-47 to L-48.

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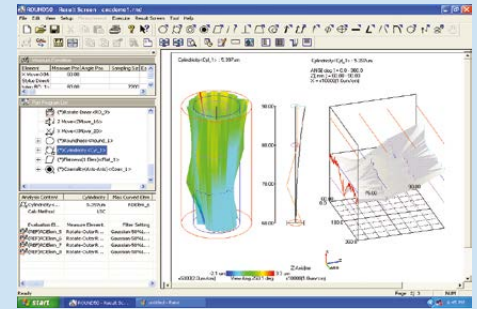
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### Software

#### ROUNDPAK

The latest roundness/cylindrical form analysis program.



### Specifications

Model	RA-2200CNC	
Code No. (with vibration isolation stand)	211-517E	211-518E
Z-axis (column) vertical travel	300 mm (standard column)	500 mm (tall column)
Turntable	Rotational accuracy Radial: $(0.02+3.5H/10000)\ \mu\text{m}$ , H = probing height (mm) Axial: $(0.02+3.5X/10000)\ \mu\text{m}$ , X = probing radius (mm)	
	Rotational speed 2, 4, 6, 10 rpm	
	Table diameter 235 mm	
	Centering range $\pm 3\text{ mm}$	
	Levelling range $\pm 1^\circ$	
	Max. probing diameter 256 mm	
	Max. workpiece diameter 580 mm	
	Max. table loading 30 kg	
X axis (horizontal arm)	Horizontal travel 175 mm (from table axis -25 mm~ +150 mm)	
	Straightness ( $\lambda c2.5$ ) 0.7 $\mu\text{m}/150\text{ mm}$	
	Squareness with turntable axis 1.0 $\mu\text{m}/150\text{ mm}$	
	Positioning speed Max. 30 mm/s	
	Measuring speed 0.5, 1, 2, 5 mm/s	
Probe and stylus	Measuring range $\pm 400\ \mu\text{m}$ ( $\pm 5\text{ mm}$ : tracking range)	
	Measuring force 40 mN	
	Standard stylus 12AAE301, carbide ball, $\phi 1.6\text{ mm}$	
	Measuring direction Bi-directional	
Stylus angle adjustment Fixed		
Dimensions (WxDxH)	940x510x900 mm	940x510x1100 mm
Mass	180 kg	200 kg



# Roundtest Extreme RA-H5200CNC

## SERIES 211 – CNC Roundness/Cylindricity Measuring System

- Mitutoyo offers innovative roundness/cylindricity measuring systems capable of automated measurement with independent/simultaneous multi-axis CNC control. In addition to high measuring accuracy and reliability, these CNC models provide excellent inspection productivity.
- Roundness and surface roughness measurements are both available from a single measuring system so workpiece resetting for roughness measurement is not required if an optional roughness detector unit is incorporated into the system, with roughness measurement possible in the circumferential direction around the turntable axis as well as in the X- and Z-directions with the turntable stopped.

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Data Management Software by Mitutoyo

### Roundtest RA-H5200CNC

Tall column type with side table (optional accessory)



### Specifications

Model	RA-H5200CNC	
Code No. (with vibration isolation stand)	211-533E	211-534E
Z-axis (column) vertical travel	350 mm (standard column)	550 mm (tall column)
Turntable	Rotational accuracy Radial: (0.02+3.5H/10000) μm, H = probing height (mm) Axial: (0.02+3.5X/10000) μm, X = probing radius (mm)	
	Rotational speed 2, 4, 6, 10 rpm (20 rpm: auto-centering)	
	Table diameter 300 mm	
	Centering range ±5 mm	
	Levelling range ±1°	
	Max. probing diameter 356 mm	
	Max. workpiece diameter 680 mm	
X axis (horizontal arm)	Max. table loading 80 kg (65 kg: auto-centering)	
	Horizontal travel 225 mm	
	Straightness (λc2.5) 0.4 μm/200 mm	
	Squareness with turntable axis 0.5 μm/200 mm	
Probe and stylus	Positioning speed Max. 50 mm/s	
	Measuring speed 0.5, 1, 2, 5 mm/s	
	Measuring range ±400 μm/±40 μm/±4 μm (±5 mm: tracking range)	
	Measuring force 40 mN	
	Standard stylus 12AAE301, carbide ball, ø1.6 mm	
Measuring direction Bi-directional		
Stylus angle adjustment Fixed		
Dimensions (WxDxH)	1260x710x1700 mm	1260x710x1900 mm
Mass (with vibration isolation stand)	650 kg	670 kg

### Technical Data

#### Vertical column (Z axis)

Straightness (λc2.5): 0.05 μm/100 mm, 0.14 μm/350 mm  
(0.2 μm/550 mm)\*

#### Parallelism with

turntable axis: 0.2 μm/350 mm (0.32 μm/550 mm)\*

Positioning speed: Max. 60 mm/s

Measuring speed: 0.5, 1, 2, 5 mm/s

Max. probing height: 350 mm (OD), 350 mm (ID)  
[550 mm (OD / ID)]\*

Max. probing depth: 104 mm (ø32 mm or more)  
26 mm (12.7 mm or more)

#### Air supply

Air pressure: 0.39 MPa

Air consumption: 45 L/min.

Power supply: 240VAC ±10%, 50/60Hz

\*Tall-column type.

### Optional Accessories

Styli refer to page L-46.

Fixture and stage accessories refer to pages L-47 to L-48.

# MiCAT

Mitutoyo Intelligent Computer Aided Technology

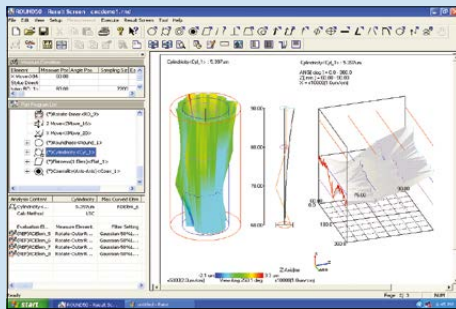
the standard in world  
metrology software

## FORM

### Software

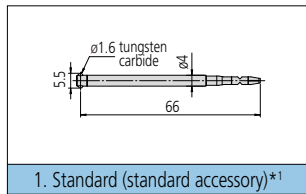
#### ROUNDPAK

The latest roundness/cylindrical form analysis program.

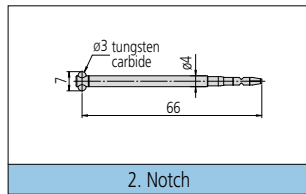


# Optional Styli

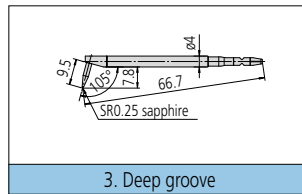
Compatible with Non-CNC Roundness Measuring Instruments



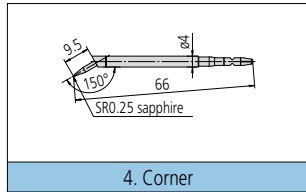
1. Standard (standard accessory)\*1



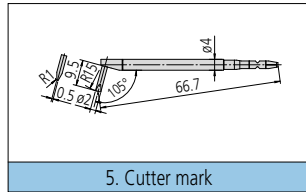
2. Notch



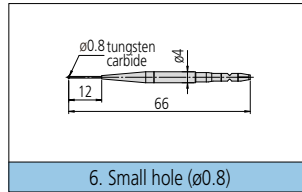
3. Deep groove



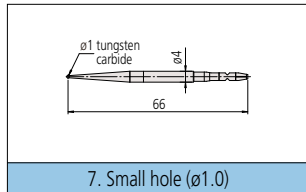
4. Corner



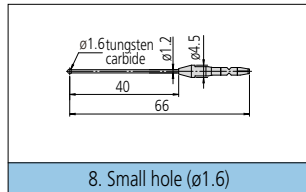
5. Cutter mark



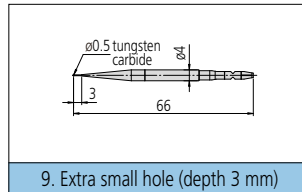
6. Small hole (ø0.8)



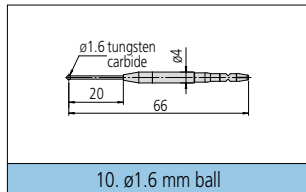
7. Small hole (ø1.0)



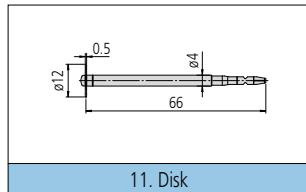
8. Small hole (ø1.6)



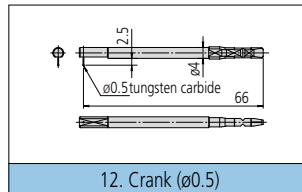
9. Extra small hole (depth 3 mm)



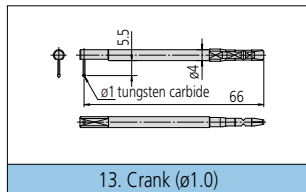
10. ø1.6 mm ball



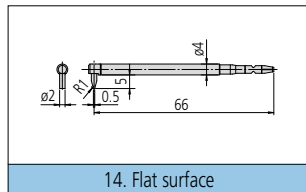
11. Disk



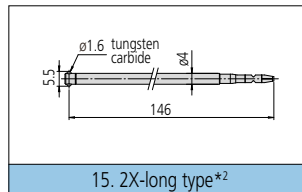
12. Crank (ø0.5)



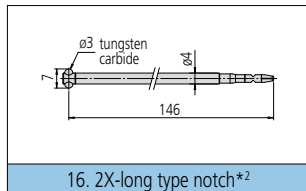
13. Crank (ø1.0)



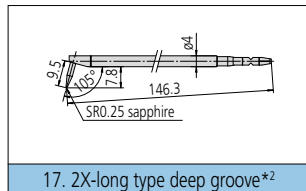
14. Flat surface



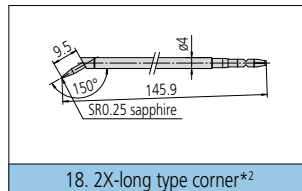
15. 2X-long type\*2



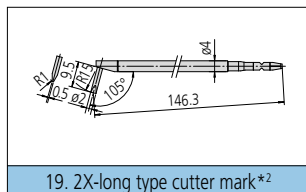
16. 2X-long type notch\*2



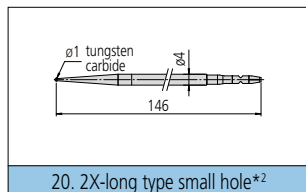
17. 2X-long type deep groove\*2



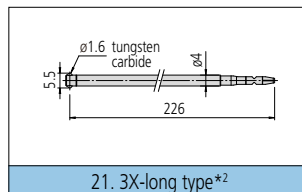
18. 2X-long type corner\*2



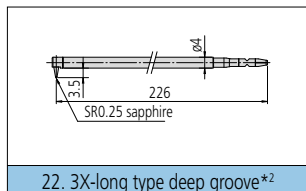
19. 2X-long type cutter mark\*2



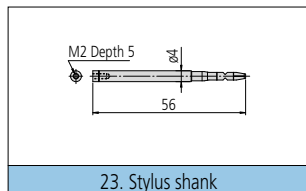
20. 2X-long type small hole\*2



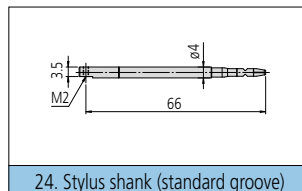
21. 3X-long type\*2



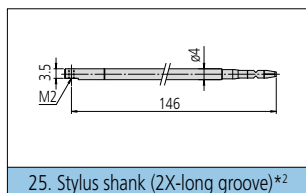
22. 3X-long type deep groove\*2



23. Stylus shank



24. Stylus shank (standard groove)



25. Stylus shank (2X-long groove)\*2

Unit: mm

\*1 Standard accessory for all Roundtest models.

\*2 Measuring is only possible in the vertical direction.  
Not available for RA-10, RA-120, RA-120P, RA-220.

Customized special interchangeable styli are available on request. Please contact any Mitutoyo office for more information.

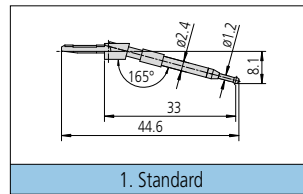
## Technical Data

Code No.	Description
	1. Standard (standard accessory)*1
12AAL021	ø1.6 mm tungsten carbide
	2. Notch
12AAL022	ø3 mm tungsten carbide
	3. Deep groove
12AAL023	SR0.25 mm sapphire
	4. Corner
12AAL024	SR0.25 mm sapphire
	5. Cutter mark
12AAL025	Tungsten carbide
	6. Small hole (ø0.8)
12AAL026	ø0.8 mm tungsten carbide
	7. Small hole (ø1.0)
12AAL027	ø1 mm tungsten carbide
	8. Small hole (ø1.6)
12AAL028	ø1.6 mm tungsten carbide
	9. Extra small hole (depth 3 mm)
12AAL029	ø0.5 mm tungsten carbide
	10. ø1.6 mm ball
12AAL030	ø1.6 mm tungsten carbide
	11. Disk
12AAL031	ø12 mm tungsten carbide
	12. Crank (ø0.5)
12AAL032	ø0.5 mm tungsten carbide (depth 2.5 mm)
	13. Crank (ø1.0)
12AAL033	ø1 mm tungsten carbide (depth 5.5 mm)
	14. Flat surface
12AAL034	Tungsten carbide
	15. 2X-long type*2
12AAL035	ø1.6 mm tungsten carbide
	16. 2X-long type notch*2
12AAL036	ø3 mm tungsten carbide
	17. 2X-long type deep groove*2
12AAL037	SR0.25 mm sapphire
	18. 2X-long type corner*2
12AAL038	SR0.25 mm sapphire
	19. 2X-long type cutter mark*2
12AAL039	Tungsten carbide
	20. 2X-long type small hole*2
12AAL040	ø1 mm tungsten carbide
	21. 3X-long type*2
12AAL041	ø1.6 mm tungsten carbide
	22. 3X-long type deep groove*2
12AAL042	SR0.25 mm sapphire
	23. Stylus shank
12AAL043	For mounting CMM stylus (mounting thread M2)
	24. Stylus shank (standard groove)
12AAL044	For mounting CMM stylus (mounting thread M2)
	25. Stylus shank (2X-long groove)*2
12AAL045	For mounting CMM stylus (mounting thread M2)

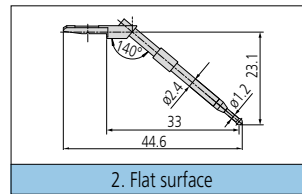
## Technical Data

Code No.	Description
1. Standard	
12AAE301	ø1.6 mm tungsten carbide
2. Flat surface	
12AAE302	ø1.6 mm tungsten carbide
3. ø1.6 mm ball	
12AAE303	ø1.6 mm tungsten carbide
4. ø0.8 mm ball	
12AAE304	ø0.8 mm tungsten carbide
5. ø0.5 mm ball	
12AAE305	ø0.5 mm tungsten carbide
6. Deep hole A	
12AAE306	ø1.6 mm tungsten carbide
7. Deep hole B	
12AAE307	ø1.6 mm tungsten carbide
8. Deep groove	
12AAE308	ø1.6 mm tungsten carbide
9. Notch	
12AAE309	ø3 mm tungsten carbide
10. Deep groove	
12AAE310	ø1.6 mm tungsten carbide

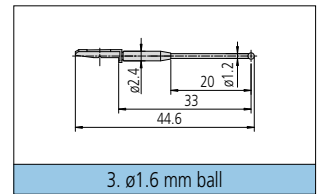
## Compatible with CNC Roundness Measuring Instruments



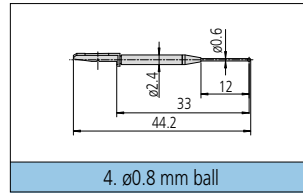
1. Standard



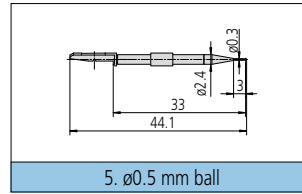
2. Flat surface



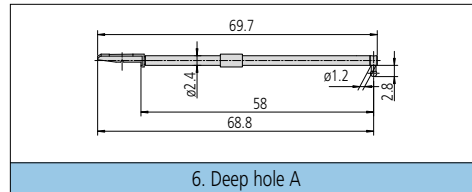
3. ø1.6 mm ball



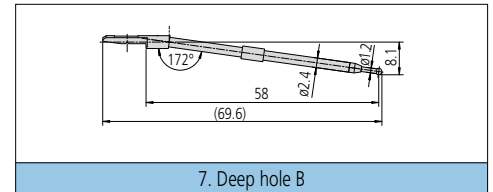
4. ø0.8 mm ball



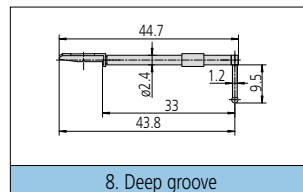
5. ø0.5 mm ball



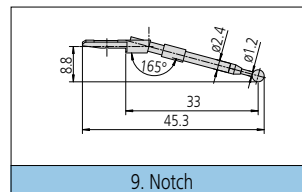
6. Deep hole A



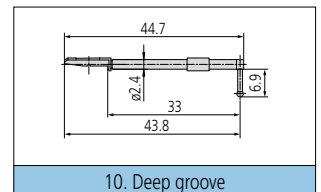
7. Deep hole B



8. Deep groove



9. Notch



10. Deep groove

## Usage examples of various styli



Cutter mark.



Corner.



Small hole.



Small hole.



Flatness measurement.



Notched workpiece measurement.



ID measurement.

Analyzing items	Models						
	RA-H5200CNC / RA-H5200	RA-2200CNC / RA-2200	RA-1600	RA-220	RA-120P	RA-120	RA-10
○ Roundness	✓	✓	✓	✓	✓	✓	✓
⊘ Cylindricity	✓	✓	✓	✓	—	—	—
◎ Concentricity	✓	✓	✓	✓	✓	✓	✓
◎ Coaxiality	Axis-element	✓	✓	✓	✓	✓	✓
	Axis-axis	✓	✓	✓	—	✓	—
▭ Flatness	✓	✓	✓	✓	✓	✓	✓
// Parallelism	✓	✓	✓	✓	✓	✓	—
⊥ Perpendicularity	✓	✓	✓	✓	✓	✓	—
⚡ Runout	✓	✓	✓	✓	✓	✓	✓
⚡ Total runout	✓	✓	✓	—	—	—	—
— Straightness	✓	✓	✓	—	—	—	—
∠ Inclination	✓	✓	✓	—	—	—	—
∧ Taper	✓	✓	✓	—	—	—	—

# Optional Accessories

## For Roundness Measuring Instruments

### Centering Chuck (ring operated)

- Suitable for holding small parts with easy-to-operate knurled-ring clamping.



<b>Code No.</b>	<b>211-032</b>	
Holding capacity	Internal jaws	OD: 1 - 36 mm ID: 16 - 69 mm
	External jaws	OD: 35 - 78 mm
Dimensions (D x H)	ø118 x 41 mm	
Mass	1.2 kg	
<b>Price</b>	<b>£1410.00</b>	

### Centering Chuck (handle operated)

- Suitable for holding longer parts and those requiring a relatively powerful clamp such as crankshafts.



<b>Code No.</b>	<b>211-014</b>	
Holding capacity	Internal jaws	OD: 2 - 35 mm ID: 25 - 68 mm
	External jaws	OD: 35 - 78 mm
Dimensions (D x H)	ø157 x 70.6 mm	
Mass	3.8 kg	
<b>Price</b>	<b>£750.00</b>	

### Micro-Chuck

- Used for clamping a workpiece (less than ø1 mm) that the centering chuck cannot handle.



<b>Code No.</b>	<b>211-031</b>	
Holding capacity	OD: 0.1 - 1.5 mm	
Dimensions (D x H)	ø107 x 48.5 mm	
Mass	0.6 kg	
<b>Price</b>	<b>£1090.00</b>	

### Quick Chuck

- This chuck is useful when measuring small cylindrical workpieces, which are easily clamped by tightening the knurled ring.



<b>Code No.</b>	<b>211-052</b>	
Internal jaws holding capacity	OD: 1 - 79 mm ID: 16 - 69 mm	
<b>Price</b>	<b>£1380.00</b>	

### Collet Chuck

- Used for holding parts with a collet (optional).



<b>Code No.</b>	<b>211-061</b>
Holding capacity	OD: 0.5 - 10 mm* <sup>1</sup>
Centering error	50 µm or less * <sup>2</sup>
Mass	1.4 kg
<b>Price</b>	<b>£771.00</b>

\*<sup>1</sup> Collets compatible with the workpiece are optional.

\*<sup>2</sup> When measured with a ø5 mm pin gauge at the measurement height of 30 mm.

### Collets

- Individual collets for the Collet Chuck.\*<sup>3</sup>

Code No.	Holding capacity	Price
<b>12AAH402</b>	OD: 0.5 - 1.0 mm	<b>£161.00</b>
<b>12AAH403</b>	OD: 1.0 - 1.5 mm	<b>£161.00</b>
<b>12AAH404</b>	OD: 1.5 - 2.0 mm	<b>£127.00</b>
<b>12AAH405</b>	OD: 2.0 - 2.5 mm	<b>£127.00</b>
<b>12AAH406</b>	OD: 2.5 - 3.0 mm	<b>£115.00</b>
<b>12AAH407</b>	OD: 3.0 - 3.5 mm	<b>£115.00</b>
<b>12AAH408</b>	OD: 3.5 - 4.0 mm	<b>£115.00</b>
<b>12AAH409</b>	OD: 4.0 - 5.0 mm	<b>£115.00</b>
<b>12AAH410</b>	OD: 5.0 - 6.0 mm	<b>£115.00</b>
<b>12AAH411</b>	OD: 6.0 - 7.0 mm	<b>£115.00</b>
<b>12AAH412</b>	OD: 7.0 - 8.0 mm	<b>£115.00</b>
<b>12AAH413</b>	OD: 8.0 - 9.0 mm	<b>£115.00</b>
<b>12AAH414</b>	OD: 9.0 - 10.0 mm	<b>£115.00</b>

\*<sup>3</sup> Collet chuck (211-061) is necessary to mount collets.

### V-Block Jig Type A

- Made to special order to suit customer's application. Contact Mitutoyo for details.



<b>Code No.</b>	<b>211-053</b>
<b>Price</b>	<b>£863.00</b>

### V-Block Jig Type B

- Made to special order to suit customer's application. Contact Mitutoyo for details.



<b>Code No.</b>	<b>211-054</b>
<b>Price</b>	<b>£1035.00</b>

### OD/ID Mating Jig

- Made to special order to suit customer's application. Contact Mitutoyo for details.



<b>Code No.</b>	<b>211-055</b>
<b>Price</b>	<b>£1035.00</b>

### 2X Extension Detector Holder

- For the measurement of deep holes with the RA-1600, RA-2200 and RA-H2000.

<b>Code No.</b>	<b>12AAF203</b>
Mass	1.1 kg
<b>Price</b>	<b>£1980.00</b>

### Auxiliary Detector Holder

- Enables a larger diameter workpiece to be handled by the tester than does the standard holder.

<b>Code No.</b>	<b>12AAF204</b>
<b>Price</b>	<b>£1560.00</b>

### 3X Extension Detector Holder

- For the measurement of deep holes with the RA-H200.

<b>Code No.</b>	<b>12AAF205</b>
<b>Price</b>	<b>£2160.00</b>

### Sliding Detector Holder

- For the RA-1600 (supplied with RA-H5200/RA-2200 as standard).

<b>Code No.</b>	<b>12AAL090</b>
<b>Price</b>	<b>£1500.00</b>

### Protective Shield

- Protective shield for RA-H5200.

<b>Code No.</b>	<b>12AAB598</b>
<b>Price</b>	<b>£1470.00</b>

### X-Axis Stop

- Used to ensure the detector is returned to the same point on the X axis for repetitive measurements.



<b>Code No.</b>	<b>12AAH320</b>
<b>Price</b>	<b>£92.00</b>



## Magnification Calibration Gauge

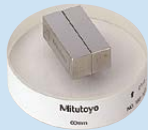
- Used for normalizing detector magnification by calibrating detector travel against displacement of a micrometer spindle.



<b>Code No.</b>	<b>211-045</b>
Max. calibration range	400 µm
Graduation	0.2 µm
Dimensions (W x D x H)	235 (max) x 185 x 70 mm
Mass	4 kg
<b>Price</b>	<b>£2280.00</b>

## Magnification Checking Kit\*<sup>4</sup>

- A combination of gauge blocks and an optical flat.



<b>Code No.</b>	<b>997090</b>
<b>Price</b>	<b>£240.00</b>

\*<sup>4</sup> Supplied with RA-H5200/RA-H5200 CNC/RA-2200/RA-2200 CNC as standard.

## Reference Hemisphere

- Used for checking rotational accuracy and aligning the detector.



<b>Code No.</b>	<b>211-016</b>
<b>Price</b>	<b>£750.00</b>

## Spacer for Reference Hemisphere

- Used for raising the Reference Hemisphere above the turntable surface.

<b>Code No.</b>	<b>12AAH420</b>
<b>Price</b>	<b>£60.00</b>

## Origin-Point Gauge\*<sup>6</sup>

- For zero setting the R- and Z-axes.



<b>Code No.</b>	<b>998382</b>
<b>Price</b>	<b>£331.00</b>

\*<sup>6</sup> Supplied with RA-H5200/RA-2200 as standard.

## Digital Adjustment Table

- The turntable displays centering and levelling adjustments digitally, making this challenging task simple enough for even an untrained operator to perform.



<b>Code No.</b>	<b>12AAH425</b>	<b>12AAH426</b>
Type	mm	inch/mm
Table diameter	150 mm	
Maximum measuring diameter	100 mm	
<b>Price</b>	<b>£2590.00</b>	<b>£2590.00</b>

## Auxiliary Workpiece Stand\*<sup>5</sup>



<b>Code No.</b>	<b>356038</b>
Loading diameter	100 mm
Dimensions (D x H)	ø105 x 25 mm
Mass	1.7 kg
<b>Price</b>	<b>£380.00</b>

\*<sup>5</sup> Supplied with RA-H5200 as standard.

## Z-Axis Scale Unit

- Useful for determining height of detector above the turntable.



<b>Code No.</b>	<b>12AAH318</b>
<b>Price</b>	<b>£276.00</b>

## Recording Paper Set

- For the RA-10 and RA-120 thermal printers.

<b>Code No.</b>	<b>12AAH181</b>
Number of rolls	10 (25 m per roll)
<b>Price</b>	<b>£74.40</b>

## Vibration Isolator

- Air suspension system for isolating a roundness tester from ground-borne vibration.



<b>Code No.</b>	<b>178-025</b>	<b>211-013</b>
Vibration isolation method	Diaphragm isolation system	
Applicable models	RA-1600	RA-10, -120, -120P
Dimensions (W x D x H)	750 x 550 x 57 mm	615 x 515 x 51 mm
<b>Price</b>	<b>£5510.00</b>	<b>£3370.00</b>

Optional accessory used with this Vibration Isolator: Stand (178-024)

## Stand for Vibration Isolator

<b>Code No.</b>	<b>178-024</b>
<b>Price</b>	<b>£744.00</b>

## Vibration Isolator Desk

- Compatible with RA-2200.



<b>Code No.</b>	<b>12AAK110</b>
Vibration isolation method	Diaphragm system
Dimensions (W x D x H)	830 x 800 x 700 mm
<b>Price</b>	<b>£12470.00</b>

Optional accessories used with this Vibration Isolator Desk: Monitor arm (12AAK120), Side table (12AAL019).

## Monitor Arm for Vibration Isolator Desk

<b>Code No.</b>	<b>12AAK120</b>
<b>Price</b>	<b>£1420.00</b>

## Side Table

- Convenient for supporting a PC, keyboard, mouse and printer (front load/ejection type). Commonly used with Vibration Isolator Desk (12AAK110).



<b>Code No.</b>	<b>12AAL019</b>
Dimensions (W x D x H)	660 x 670 x 700 mm
<b>Price</b>	<b>£2120.00</b>

M

# HARDNESS TESTING



### Micro-Vickers Hardness Testing Machines



### Vickers Hardness Testing Machines



### Rockwell Hardness Testing Machines



### Portable Hardness Testing Instruments



### Contents

#### Micro-Vickers Hardness Testing Machines

HM-200 Series	M-03
---------------	------

#### Vickers Hardness Testing Machines

HV-100 Series	M-04
---------------	------

#### Rockwell Hardness Testing Machines

HR-530 Series	M-05
---------------	------

HR-110MR / HR-320MS / HR-430MS	M-06
--------------------------------	------

#### Portable Hardness Testing Instruments

Hardmatic HH-411	M-07
------------------	------

Hardmatic HH-300 Series	M-08
-------------------------	------

Optional Accessories for Hardness Testing Machines	M-10
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# HM-200 Series

## SERIES 810 – Micro-Vickers Hardness Testing Machines

- The latest electromagnetic force motor used in the loading mechanism enables the test force to be freely selected over the wide range of 0.05 gf to 2 kgf. It is also possible to freely set the time for loading and load dwell time. Now the benefits of absolute control over the indentation size in Vickers hardness testing can be realized. The HM-200 series always offers the test force most appropriate for the specimen material and shape.
- The objectives used enable a very comfortable working distance between the objective and the specimen surface. This greatly reduces the possibility of collision between the specimen and the objective during focussing operations. (For example, for 50X objectives: 1.1 mm for conventional models; 2.5 mm for HM-200 series models.)
- Newly designed 'MH Plan' objectives are optimized for measuring indentation images. The lineup includes 6 long working distance objectives: 10X, 20X, 50X and 100X for measuring indentation images, and 2X and 5X for enabling wide-range measurement around indentations. LEDs are used in the illumination system for their advantages of longer life, lower heat generation and higher energy efficiency than the traditional incandescent bulb.

**MeasurLink** ENABLED  
Data Management Software by Mitutoyo



System A



System B



System C

### Specifications

Model	HM-210		HM-220	
	A	B/C/D	A	B/C/D
System	A	B/C/D	A	B/C/D
Code No.	810-401E	810-404E	810-406E	810-409E
Indentation measurement	Measuring eyepiece	Automatic (AVPAK-20)	Measuring eyepiece	Automatic (AVPAK-20)
Main unit operation	Touch panel	PC	Touch panel	PC
Fixed test forces	10, 20, 30, 50, 100, 200, 300, 500, 1000 gf		0.05, 0.1, 0.2, 0.3, 0.5, 1, 2, 3, 5, 10, 20, 30, 50, 100, 200, 300, 500, 1000, 2000 gf	
Arbitrary test force	One setting can be saved, default is HV0.025 (25 gf)			
Test force control	Force generation by electromagnetic and automatic control (load, dwell, unload)			
Turret drive	Motor-driven			
Control unit	Touch screen type	—	Touch screen type	—
Indenters	A maximum of two can be installed. (One indenter shaft with diamond indenter is provided as standard in the main unit.)			
Objectives	A maximum of four can be installed in turret. (A 50X objective is provided as standard.)			
Dimensions (W x D x H)* <sup>1</sup>	315 x 671 x 595 mm	315 x 586 x 741 mm	315 x 671 x 595 mm	315 x 586 x 741 mm
Mass (main unit)	38.5 kg	37.4 kg	38.5 kg	37.4 kg
Power supply	220-240 VAC			

\*<sup>1</sup> Excluding protrusions and stage.

### Technical Data

Test force range	HM-210A: 9 steps + arbitrary test force HM-220A: 19 steps + arbitrary test force
Load dwell time:	0 - 999s
Max. specimen height	System A/B: 133 mm (stage size: 25 x 25 mm) System C: 112 mm (stage size: 25 x 25 mm) System D: 72 mm (stage size: 25 x 25 mm)
Max. specimen depth:	160 mm (from the centre of indenter)
Optical path:	4-port turret, infinity-corrected objectives
Resolution:	0.1 µm when using objectives less than 50X (0.01 µm when using objectives of 50X or more)
Data output:	Serial (RS-232), Digimatic and USB 2.0 interfaces
Functions:	Calculation of Vickers/Knoop* <sup>2</sup> hardness and ceramic fracture toughness based on IF method (JIS R1697), 3 display formats (standard, list, simple), GO/±NG judgement, test condition guide, curve and user correction, hardness corresponding value, statistics calculation

\*<sup>2</sup> For Knoop hardness test, Knoop indenter (optional) is required.

### Optional Accessories

Code No.	Description	Price
375-056	Micro-scale	£281.00
810-013	Specimen (thin plate) holder	£296.00
810-017	Vice (100 mm)	£931.00
810-018	Rotary table	£782.00
810-019	Specimen tilting holder	£1500.00
810-020	Universal specimen holder	£493.00
810-085	Adjustable specimen (thin plate) holder	£905.00
810-095	Rotatable specimen stage	£1990.00
810-641	Vibration isolator stand	£4580.00
11AAC104	Objective lens 2X	£1140.00
11AAC105	Objective lens 5X	£700.00
11AAC106	Objective lens 10X	£730.00
11AAC107	Objective lens 20X	£910.00
11AAC108	Objective lens 100X	£1270.00
11AAC109	Indenter shaft (HM-210)	£3130.00
11AAC110	Indenter shaft (HM-220)	£4960.00
11AAC129	Measuring eyepiece (System B, C and D)	£2560.00

For Hardness Test Blocks refer to page M-10 for details.

For Indenters refer to page M-10 for details.

### Systems

#### System A (HM-210A/HM-220A):

All-in-one model with simple colour touch-panel operation.

#### System B (HM-210B/HM-220B):

A system equipped with automatic reading function with AVPAK software.

#### System C (HM-210C/HM-220C):

In addition to the functions of System B, System C is equipped with an electric stage.

#### System D (HM-210D/HM-220D):

In addition to the functions of System B and System C, System D is equipped with the auto focus function.

# HV-100 Series

## SERIES 810 – Vickers Hardness Testing Machines

### Technical Data

Test force range:	8 steps
Load dwell time:	5 - 999 s
Max. specimen height	
System A:	210 mm (using flat anvil)
System B:	181 mm (stage size: 50x50 mm)
System C:	172 mm
System D:	132 mm
Max. specimen depth:	170 mm (from the centre of indenter)
Optical path:	3-port objectives switching system of infinity-corrected optical system
Resolution:	0.1 µm when using objectives less than 50X (0.01 µm when using objective lens more than 50X)
Data output:	Serial interface (RS-232), Digimatic interface, USB 2.0
Functions:	Calculation of Vickers/Knoop*2/ Brinell*3 hardness and ceramic fracture toughness based on IF method (JIS R1697), 3 display format (standard, list, simple), GO/±NG judgement, test condition guide, curve and user correction, hardness corresponding value, statistics calculation

\*2 For Knoop hardness testing the Knoop indenter (optional) is required.

\*3 For Brinell hardness testing a Brinell indenter (optional) and additional weight are required.

### Optional Accessories

Code No.	Description	Price
810-037	Round table (ø180 mm)	£490.00
810-038	Round table (ø250 mm)	£972.00
810-040	V-anvil (ø40 mm, 120° groove 30 mm wide, ø15 - ø60 mm)	£246.00
810-041	V-anvil ((ø40 mm, 120° groove 30 mm wide, ø3 - ø9 mm)	£202.00
810-420	Manual XY stage (25x25 mm)	£660.00
810-423	Manual XY stage (50x50 mm)	£1320.00
11AAC129	Measuring eyepiece (System B, C and D)	£2560.00
11AAC697	Brinell weight (0.5 kg)	£98.00
11AAC698	Brinell weight (1.25 kg)	£98.00
11AAC699	Brinell weight (5.625 kg)	£109.00
11AAC700	Brinell weight (12.5 kg)	£134.00
11AAC702	Stand for testing machine	£1290.00
11AAC712	Objective lens 2X	£890.00
11AAC713	Objective lens 5X	£650.00
11AAC714	Objective lens 20X	£690.00
11AAC715	Objective lens 50X	£830.00
11AAC716	Objective lens 100X	£1190.00
11AAC719	Vibration isolator	£5490.00

For Hardness Test Blocks refer to page M-10 for details.

For Indenters refer to page M-10 for details.

### Systems

#### System A (HM-110A/HM-120A):

All-in-one model with simple colour touch-panel operation.

#### System B (HM-110B/HM-120B):

A system equipped with automatic reading function with AVPAK software.

#### System C (HM-110C/HM-120C):

In addition to the functions of System B, System C is equipped with an electric stage.

#### System D (HM-110D/HM-120D):

In addition to the functions of System B and System C, System D is equipped with the auto focus function.

- Vickers hardness testers have a wide application in testing metals, especially small heat-treated parts, and are also suitable for making special-purpose tests such as carburized case hardness, maximum hardness of spot welds, high-temperature hardness, and fracture toughness of ceramic materials.
- Objective lenses specifically developed for hardness testing are supplied. A clear and natural view of an indentation is achieved by changing the light source of the illumination from halogen to LED.
- A new 2X lens for wide-angle observation has been added to the range. Now, magnifications of 10X, 20X, 50X and 100X for observation and gauging; and 5X and 2X for observation are available. Also, the working distance is doubled (5.9 to 11.8mm) for the 10X objective lens (in-house comparison) to minimize the risk of collision between the workpiece and the lens during operations.
- In addition to Vickers hardness testing, fracture toughness tests (IF Method: JIS R 1607) and other tests can be performed with optional accessories such as a Knoop indenter and additional indenters and a weight for Micro Brinell testing.
- Four systems are available: Basic model A; model B equipped with automatic indentation reading function; model C equipped with automatic indentation reading function and automatic XY stage; model D equipped with automatic indentation reading function, automatic XY stage, and auto-focus stage.

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System A



System B



System C

### Specifications

Model	HV-110		HV-120	
	A	B/C/D	A	B/C/D
System				
Code No.	810-440E	810-443E	810-445E	810-448E
Indentation measurement	Measuring eyepiece	Automatic (AVPAK-20)	Measuring eyepiece	Automatic (AVPAK-20)
Main unit operation	Touch panel	PC	Touch panel	PC
Fixed test force	1, 2, 3, 5, 10, 20, 30, 50 kgf		0.3, 0.5, 1, 2.5, 5, 10, 20, 30 kgf	
Test force control	Lever method and automatic control (load, dwell, unload)			
Turret drive	Motor-driven and manual			
Control unit type	Touch screen	—	Touch screen	—
Objectives	A maximum of three can be installed in turret. (A 10X objective is provided as standard.)			
Dimensions (WxDxH)*1	307x696x786 mm	307x627x875 mm	307x696x786 mm	307x627x875 mm
Mass (main unit)	Approx. 60 kg	Approx. 58 kg	Approx. 60 kg	Approx. 58 kg
Power supply	240VAC ±10%, 50/60Hz			

\*1 Excluding protrusions and stage.

# HR-530 Series

## SERIES 810 – Rockwell Hardness Testing Machines

- Unique electronic control makes the HR-530 series of hardness testers extremely versatile by enabling Brinell hardness testing as well as load-sequence hardness testing of plastics, plus Rockwell and Rockwell Superficial hardness testing.
- This series can test the hardness of the inside wall of a ring, a test that is only possible using ordinary hardness testers by cutting the ring into pieces. (All models.)
- The touch-panel display unit can be mounted on top of the tester, providing significant convenience if the machine installation space is restricted. (All models.) Use the optional display mounting bracket to mount the unit.
- This series allows numeric display of statistical analysis results such as maximum and minimum values, mean value and graphic display of X-R control charts and histograms required for hardness evaluation.

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810-336

### Specifications

Model	HR-530	HR-530L
Code No.	810-236	810-336
Preload test force	3, 10 kgf	
Test force	Rockwell Superficial	15, 30, 45 kgf
	Rockwell	60, 100, 150 kgf
	Brinell	6.25, 10, 15.625, 25, 30, 31.25, 62.5, 100, 125, 187.5 kgf
Conversions to other hardness scales	HV, HK, HR (Rockwell hardness A, B, C, D, F, G/Rockwell Superficial 15T, 30T, 45T, 15N, 30N, 45N), HS, HB, tensile strength	
Functions	GO/NG judgement, serial test (for specimen of the same thickness), cylindrical correction, spherical correction, OFFSET correction, multipoint correction, statistical calculation (maximum value, minimum value, mean value, standard deviation, upper limit, lower limit, GO count, range, NG count, graph generation (X-R control chart))	
Test force setting	By control unit	
Stage elevation	Automatic (braking and load sequence)	
Control unit	Touch-screen type	
Dimensions (W x D x H)	250 x 667 x 621 mm	300 x 667 x 766 mm
Mass	Approx. 60 kg	Approx. 69 kg

### Technical Data

Load control:	Automatic (load, dwell, unload)
Load dwell time:	0 - 120 s (1 s increments)
Max. specimen height	
HR-530:	250 mm (for standard flat anvil)
HR-530L:	395 mm (for standard flat anvil)
Max. specimen depth:	150 mm (from the centre of indenter shaft)
Data output:	RS-232C, Digimatic, USB2.0
Power supply:	240VAC ±10%, 50/60Hz
Control unit	
Dimensions:	191 x 147 x 171 mm
Mass:	Approx. 1.1 kg

### Optional Accessories

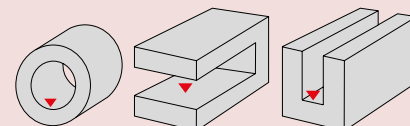
Code No.	Description	Price
264-505E	DP-1VA LOGGER Digimatic Mini-Processor	£406.00
810-029	V-anvil (400 mm long, 120° groove 50 mm wide, ø50 - ø100 mm)	£1570.00
810-030	Spot anvil (diamond tipped type for Rockwell Superficial, ø3.5 mm)	£1650.00
810-037	Round table (ø180 mm)	£490.00
810-038	Round table (ø250 mm)	£972.00
810-039	Flat anvil (ø64 mm)	£187.00
810-040	V-anvil (ø40 mm, 120° groove 30 mm wide, ø15 - ø60 mm)	£246.00
810-041	V-anvil (ø40 mm, 90° groove 6 mm wide, ø3 - ø9 mm)	£202.00
810-042	V-anvil (ø10 mm, 120° groove 8 mm wide, ø4 - ø16 mm)	£163.00
810-043	Spot anvil (ø12 mm)	£180.00
810-044	Spot anvil (ø5.5 mm)	£180.00
11AAC237	EXPAK-07 data processing program	£990.00

For Hardness Test Blocks refer to page M-10 for details.  
For Indenters refer to page M-10 for details.



Excellent capability for testing difficult specimens

The nose-type indenter mechanism enables measurement of surfaces inside pipes and grooves.



# HR-110MR/HR-320MS/HR-430MS

## SERIES 963 – Rockwell Hardness Testing Machines

### Technical Data

Max. specimen height: 180 mm (100 mm if cover is attached)

Max. specimen depth: 165 mm (from indenter axis to the frame)

### Optional Accessories

Code No.	Description	Price
264-505E	DP-1VA LOGGER Digimatic Mini-Processor	£406.00
810-027	Adjustable support for long workpieces	£1790.00
810-028	Height adjustable jack rest	£1790.00
810-029	V-anvil (400 mm long, 120° groove 50 mm wide, ø50-ø100 mm)	£1570.00
810-030	Spot anvil (diamond tipped type for Rockwell Superficial, ø3.5 mm)	£1650.00
810-037	Round table (ø180 mm)	£490.00
810-038	Round table (ø250 mm)	£972.00
810-040	V-anvil (ø40 mm, 120° groove 30 mm wide, ø15-ø60 mm)	£246.00
810-041	V-anvil (ø40 mm, 90° groove 6 mm wide, ø3-ø9 mm)	£202.00
810-042	V-anvil (ø10 mm, 120° groove 8 mm wide, ø4-ø16 mm)	£163.00
810-043	Spot anvil (ø12 mm)	£180.00
810-044	Spot anvil (ø5.5 mm)	£180.00
810-048	Steel table	£1420.00
810-700	Stage with fine adjustment	£2490.00
937387	SPC data cable (1 m)	£39.10
965013	SPC data cable (2 m)	£49.80
06AFM380E	USB Input Tool Direct USB-ITN-E (2 m)	£119.00
56AAK286B	Brinell weight set for HR-110MR (3 pcs.)	£130.00
56AAK287B	Brinell weight set for HR-320MS (4 pcs.)	£180.00
56AAK289B	Brinell weight set for HR-430MS (4 pcs.)	£150.00

For Hardness Test Blocks refer to page M-10 for details.

For Indenters refer to page M-10 for details.

- The newly designed frame provides maximum clearance for positioning the workpiece. A table or bench is all that is needed for mounting these testing machines.
- Simple to operate. With the analogue type, HR-110MR, the gauge presetting operation has been eliminated by the adoption of an automatic presetting dial gauge.
- The HR-430MS uses an automatic steering wheel brake and loading sequence to enable simple test handling.
- HR-110MR does not require a power source, and is considered to be environmentally friendly.
- The digital types HR-320MS and HR-430MS provide Digimatic output for direct data transfer to the DP-1VA LOGGER Digimatic Mini-Processor, and the USB-ITN-E input tool can be used to connect to a PC for data transfer and processing.
- Brinell hardness tests can be performed by using the following optional accessories: a Brinell indenter, a weight set and a measurement microscope.

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963-210-20



963-231E



963-241E

### Specifications

Model	HR-110MR	HR-320MS	HR-430MS
Code No.	963-210-20	963-231E	963-241E
Type of hardness test	Rockwell	Rockwell / Rockwell Superficial	
Standard	JIS B 7726	ISO 6508-2, JIS B 7726, ASTM E 18	
Display	Analogue	Digital	
Minimum reading	0.5HR graduation	0.1HR indication	
Preload force (handling support)	Automatic pre-setting dial gauge	Loading navigator indication	Automatic steering wheel brake
Preload force setting	—	Dial switching	
Total test force setting	Weight change		Dial switching
Total test force control	Manual	Motor drive – button start	Motor drive – automatic start
Test force duration	Manual	Fixed 3 - 5.5 s or manual	3 - 60 s setting or manual operation
Functions	—	Success or failure decision function, offset revision function, hardness conversion function	
Data output	—	Digimatic (SPC), RS-232C	
Power supply	No power required	240VAC ±10%, 50/60Hz	
Dimensions (W x D x H)	Approx. 296 x 512 x 780 mm	Approx. 235 x 516 x 780 mm	
Mass	Approx. 49 kg	Approx. 47 kg	Approx. 50 kg

# Hardmatic HH-411

## SERIES 810 – Impact Type Hardness Tester

- The HH-411 is a rebound type portable hardness tester for metal with a compact body and high operability. It allows anyone to perform hardness testing easily at the touch of a key, so can be used widely on various types of workpiece in the field.
- In addition to the general-purpose impactor (D type) supplied as standard equipment, the impactor lineup includes many variations (available separately) to support special applications. The DC type is provided for hardness testing of internal walls of pipes with diameters that cannot be tested with the D type, the D+15 type for bearings and gears, and the DL type for small areas such as the bottom of small gear teeth and weld corners.
- For the rebound type hardness tester, gravity affects the measurement result depending on the orientation of the impactor relative to the vertical when pressed against the specimen surface. The HH-411 is equipped with the latest measurement technology that automatically detects the orientation of the impactor to automatically correct for this effect, so maximum accuracy is always achieved.
- Only a small surface area on a workpiece is required for hardness testing (standard D type:  $\varnothing 22$  mm; optional DL type:  $\varnothing 4$  mm). Therefore the HH-411 can be used for testing of various specimen shapes such as around grooves and gear teeth.
- Up to 1800 hardness test results can be saved, which is useful for patrol tests in the field.
- Based on the hardness HL value (L value: according to ASTM A 956), conversion can be performed to Vickers, Brinell, Rockwell C, Rockwell B, and Shore hardness as well as tensile strength. Conversion can be performed after the test, or hardness value can be displayed in conversion mode.
- To operate, the impactor is pressed against the sample surface and the button is pushed with a finger just like clicking a ballpoint pen, so is very easy for anyone to operate.

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810-298-10

### Specifications

Model	HH-411	
Code No.	810-298-10	
Conversion range / increment	Vickers	43 - 950HV / 1HV
	Brinell	20 - 894HB / 1HB
	Rockwell C	19.3 - 68.2HRC / 0.1HRC
	Rockwell B	13.5 - 101.7HRB / 0.1HRB
	Shore	13.2 - 99.3HS / 0.1HS
	Tensile strength	499 - 1996 MPa / 1 MPa
Testable workpiece	Thickness	Min. 5 mm
	Mass	5 kg or more
Price	<b>£2630.00</b>	

### Technical Data

Hardness value:	Hardness L (Leeb)
Accuracy:	$\pm 12HL$ (800HL $\pm 1.5\%$ )
Impactor:	Impact hammer with integrated detector and carbide-ball tip D type: conforming to ASTM A 956
Display unit:	7-segment LCD
Functions:	Auto angle compensation, offset, GO/ $\pm$ NG judgement, hardness scale conversion, data storage (1800 data entries), statistical analysis (average, maximum, minimum, dispersion), auto sleep, impact counter display.
Power supply:	Alkaline AA battery 2pcs or optional AC adapter (battery life: 70 hours)
Output:	RS-232C, Digimatic (SPC)
Dimensions	
Display unit:	70 x 110 x 35 mm
Impactor:	$\varnothing 28$ x 175 mm
Mass:	320 g

### Optional Accessories

Code No.	Description	Price
<b>264-505E</b>	DP-1VA LOGGER Digimatic Mini-Processor	<b>£406.00</b>
<b>810-288-10</b>	DC type impactor UD-412	<b>£1290.00</b>
<b>810-289-10</b>	D+15 type impactor UD-413	<b>£1350.00</b>
<b>810-290-10</b>	DL type impactor UD-414	<b>£1650.00</b>
<b>937387</b>	SPC data cable (1 m)	<b>£39.10</b>
<b>11AAC238</b>	EXPAK-08 data processing program	<b>£990.00</b>
<b>06AEG302E</b>	AC adapter (9V, 500mA)	<b>£62.40</b>
<b>19BAA248</b>	Support ring for convex surface of cylinder (R10-20 mm)	<b>£29.90</b>
<b>19BAA249</b>	Support ring for concave surface of cylinder (R14-20 mm)	<b>£29.90</b>
<b>19BAA250</b>	Support ring for convex surface of sphere (R10-27.5 mm)	<b>£16.40</b>
<b>19BAA251</b>	Support ring for concave surface of sphere (R13.5-20 mm)	<b>£16.40</b>
<b>19BAA457</b>	Carbide ball for D, DC, D+15 type impactors	<b>£10.70</b>
<b>19BAA458</b>	Ball shaft for DL type impactor	<b>£370.00</b>

For Hardness Test blocks refer to page M-10 for details.



The impactor is simply pressed against the sample surface and the button pushed to make a hardness measurement.



# Hardmatic HH-300 Series

## SERIES 811 – Digimatic Readout Durometers

### Technical Data

Functions:	Data hold, zero-setting, SPC output, power ON/OFF
Power supply:	SR44 silver oxide cell x 1pc.

### Optional Accessories

Code No.	Description	Price
264-505E	DP-1VA LOGGER Digimatic Mini-Processor	£406.00
811-012	Test stand (Shore D)	£1730.00
811-013	Test stand (Shore A)*1	£1730.00
811-019	Test stand (Shore A)*2	£1730.00
905338	SPC data cable (1 m)	£33.90
905409	SPC data cable (2 m)	£38.00
64AAA590	Shore D reference material (3pcs.)	£216.00
64AAA964	Shore A reference material (3pcs.)	£216.00

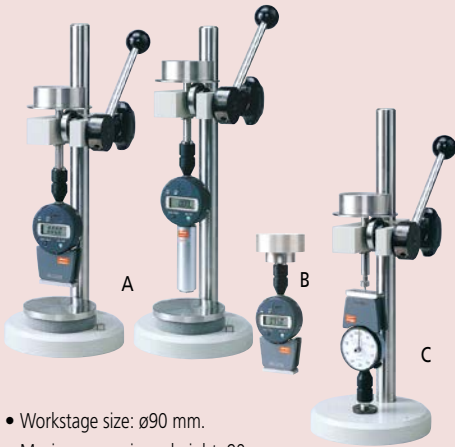
\*1 Only available for Compact Type Durometer.

\*2 Only available for Long Type Durometer.

### Test stand applications

These stands are used to mount Durometers. They allow constant-force hardness measurement by ensuring that the Durometer presses vertically on the workpiece surface at all times.

- A Anyone can perform repeatable hardness measurement due to fewer possibilities for human error and measurement variations.
- B The supplied weights can be attached directly to a Durometer and allow constant-force hardness measurement of large samples for which a stand cannot be used.
- C The supplied weights are used for calibrating the spring force of Durometers.



- Workstage size: ø90 mm.
- Maximum specimen height: 90 mm.

- Digimatic Durometers are suitable for testing the hardness of non-metallic materials such as natural rubber, neoprene, polyesters, P.V.C., leather, Thiokol, nitrile rubber, wax, vinyl, cellulose acetates, glass, polystyrene, etc.
- Units are available reading both in both Shore A and Shore D scales to suit a wide variety of applications.
- Designed in accordance with the ASTM D 2240, ISO868, ISO 7619, DIN 53 505, JIS K 6253, and JIS K 7215 specifications.
- The Digimatic Durometer is provided with a data hold function for error-free reading.

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811-336-10



811-334-10

### Specifications

Model	HH-336	HH-332	HH-338	HH-334
Code No.	811-336-10	811-332-10	811-338-10	811-334-10
Scale	Shore A		Shore D	
Type	Compact	Long-leg	Compact	Long-leg
Applications	Natural rubber, soft elastomers, etc.		Hard elastomers, plastics, hard rubber, ebonite, etc.	
Resolution	0.5			
Range	HA: 10 - 90		HD: 20 - 90	
Standards	ASTM D 2240	✓	✓	✓
	ISO 868	✓	✓	✓
	ISO 7619	✓	✓	✓
	DIN 53 505	—	✓	—
	JIS K 6253	✓	✓	✓
	JIS K 7215	✓	✓	✓
Pressure foot size	44 x 18 mm	ø18 mm	44 x 18 mm	ø18 mm
Spring force (mN)	550+75H (Hardness reading: 10 - 90)		444.5H (Hardness reading: 20 - 90)	
Indenter	Blunt taper (tip diameter: 0.79 mm)		Sharp point (tip radius: 0.1±0.01 mm)	
Tip angle	35°±0.25°		30°±0.5°	
Indenter diameter	1.25 mm			
Indenter protrusion	2.5 mm			
Dimensions (W x D x H)	60 x 28.5 x 151 mm	60 x 29.5 x 193 mm	60 x 28.5 x 151 mm	60 x 29.5 x 193 mm
Mass	290 g	310 g	290 g	310 g
Price	£1090.00	£1090.00	£1090.00	£1090.00

# Hardmatic HH-300 Series

## SERIES 811 – Dial Readout Durometers

- Dial Durometers are suitable for testing the hardness of non-metallic materials such as natural rubber, neoprene, polyesters, P.V.C., leather, Thiokol, nitrile rubber, wax, vinyl, cellulose acetates, glass, polystyrene, etc.
- Designed in accordance with the ASTM D 2240, ISO868, ISO 7619, DIN 53 505, JIS K 6253, and JIS K 7215 specifications.
- Units are available reading both in Shore A and Shore D scales to suit a wide variety of applications.
- The Dial Durometer is provided with a peak retaining hand for error-free reading.



811-337-10



810-331-10

### Specifications

Model	HH-335	HH-331	HH-337	HH-333
Code No.	811-335-10	811-331-10	811-337-10	811-333-10
Scale	Shore A		Shore D	
Type	Compact	Long-leg	Compact	Long-leg
Applications	Natural rubber, soft elastomers, etc.		Hard elastomers, plastics, hard rubber, ebonite, etc.	
Resolution	1			
Range	HA: 10-90		HD: 20-90	
Standards	ASTM D 2240	✓	✓	✓
	ISO 868	✓	✓	✓
	ISO 7619	✓	✓	✓
	DIN 53 505	—	✓	—
	JIS K 6253	✓	✓	✓
	JIS K 7215	✓	✓	✓
Pressure foot size	44 x 18 mm	ø18 mm	44 x 18 mm	ø18 mm
Spring force (mN)	550+75H (Hardness reading: 10-90)		444.5H (Hardness reading: 20-90)	
Indenter	Blunt taper (tip diameter: 0.79 mm)		Sharp point (tip radius: 0.1±0.01 mm)	
Tip angle	35°±0.25°		30°±0.5°	
Indenter diameter	1.25 mm			
Indenter protrusion	2.5 mm			
Dimensions (W x D x H)	68 x 34 x 146 mm	68 x 35 x 188 mm	68 x 34 x 146 mm	68 x 35 x 188 mm
Mass	300 g	320 g	300 g	320 g
Price	£625.00	£625.00	£625.00	£625.00

### Technical Data

Functions: Peak retaining hand

### Optional Accessories

Code No.	Description	Price
811-012	Test stand (Shore D)	£1730.00
811-013	Test stand (Shore A)* <sup>1</sup>	£1730.00
811-019	Test stand (Shore A)* <sup>2</sup>	£1730.00
64AAA590	Shore D reference material (3 pcs.)	£216.00
64AAA964	Shore A reference material (3 pcs.)	£216.00

\*<sup>1</sup> Only available for Compact Type Durometer.

\*<sup>2</sup> Only available for Long Type Durometer.

### Test stand applications

These stands are used to mount Durometers. They allow constant-force hardness measurement by ensuring that the Durometer presses vertically on the workpiece surface at all times.

- A Anyone can perform repeatable hardness measurement due to fewer possibilities for human error and measurement variations.
- B The supplied weights can be attached directly to a Durometer and allow constant-force hardness measurement of large samples for which a stand cannot be used.
- C The supplied weights are used for calibrating the spring force of Durometers.



- Workstage size: ø90 mm.
- Maximum specimen height: 90 mm.

# Optional Accessories

## For Hardness Testing Machines

### Hardness Test Blocks

Code No.	Calibrated hardness	Applicable Hardness Testing Machines					Price
		HM-210 HM-220	HV-110 HV-120	HR-530 HR-530L	HR-110MR HR-320MS HR-430MS	HH-411	
19BAA001	100HMV	✓					£485.00
19BAA002	200HMV	✓					£485.00
19BAA003	300HMV	✓					£485.00
19BAA004	400HMV	✓					£485.00
19BAA005	500HMV	✓					£485.00
19BAA006	600HMV	✓					£485.00
19BAA007	700HMV	✓					£485.00
19BAA008	800HMV	✓					£485.00
19BAA009	900HMV	✓					£485.00
19BAA010	40HMV	✓					£485.00
19BAA011	HV5/200HV		✓				£325.00
19BAA012	HV5/300HV		✓				£325.00
19BAA013	HV5/400HV		✓				£325.00
19BAA014	HV5/500HV		✓				£325.00
19BAA015	HV5/600HV		✓				£325.00
19BAA016	HV5/700HV		✓				£325.00
19BAA017	HV5/800HV		✓				£325.00
19BAA018	HV5/900HV		✓				£325.00
19BAA028	32HRB			✓	✓		£190.00
19BAA029	42HRB			✓	✓		£190.00
19BAA030	52HRB			✓	✓		£190.00
19BAA031	62HRB			✓	✓		£190.00
19BAA032	72HRB			✓	✓		£190.00
19BAA033	82HRB			✓	✓		£190.00
19BAA034	92HRB			✓	✓		£190.00
19BAA035	10HRC			✓	✓		£190.00
19BAA036	20HRC			✓	✓		£190.00
19BAA037	30HRC			✓	✓		£190.00
19BAA038	40HRC			✓	✓		£190.00
19BAA039	50HRC			✓	✓		£190.00
19BAA040	60HRC			✓	✓		£190.00
19BAA041	70HRC			✓	✓		£190.00
19BAA042	41HR30N			✓	✓		£190.00
19BAA043	50HR30N			✓	✓		£190.00
19BAA044	60HR30N			✓	✓		£190.00
19BAA045	73HR30N			✓	✓		£190.00
19BAA046	83HR30N			✓	✓		£190.00
19BAA047	75HR15N			✓	✓		£190.00
19BAA048	85HR15N			✓	✓		£190.00
19BAA049	90HR15N			✓	✓		£190.00
19BAA050	32HR30T			✓	✓		£190.00
19BAA051	42HR30T			✓	✓		£190.00
19BAA052	52HR30T			✓	✓		£190.00
19BAA053	62HR30T			✓	✓		£190.00
19BAA054	72HR30T			✓	✓		£190.00
19BAA055	78HR30T			✓	✓		£190.00
19BAA056	82HR15T			✓	✓		£190.00
19BAA057	87HR15T			✓	✓		£190.00
19BAA243	880HLD					✓	£505.00
19BAA244	830HLD					✓	£505.00
19BAA245	730HLD					✓	£505.00
19BAA246	620HLD					✓	£505.00
19BAA247	520HLD					✓	£505.00

### Indenters

Code No.	Description	Price
For HM-210		
19BAA058	Vickers diamond indenter	£320.00
19BAA061	Knoop diamond indenter	£320.00
For HM-220		
19BAA059	Vickers diamond indenter	£320.00
19BAA062	Knoop diamond indenter	£320.00
For HV-100 Series		
19BAA060	Vickers diamond indenter	£320.00
19BAA063	Knoop diamond indenter	£320.00
For all HR Series		
19BAA072	Rockwell diamond indenter (standard)	£320.00
19BAA073	Rockwell diamond indenter (ISO 6508-3)	£320.00
19BAA162	Brinell carbide ball only (5 mm)	£55.00
19BAA163	Brinell carbide ball only (10 mm)	£75.00
19BAA277	Brinell carbide ball indenter (1 mm)	£195.00
19BAA279	Brinell carbide ball indenter (2.5 mm)	£220.00
19BAA280	Brinell carbide ball indenter (5 mm)	£230.00
19BAA281	Brinell carbide ball only (1 mm)	£12.90
19BAA283	Brinell carbide ball only (2.5 mm)	£14.80
19BAA284	Brinell carbide ball indenter (10 mm)	£275.00
19BAA504	Rockwell carbide ball indenter (3.175 mm)	£170.00
19BAA505	Rockwell carbide ball indenter (6.35 mm)	£170.00
19BAA506	Rockwell carbide ball indenter (12.7 mm)	£260.00
19BAA507	Rockwell carbide ball only (1.5875 mm)	£27.00
19BAA508	Rockwell carbide ball only (3.175 mm)	£29.50
19BAA509	Rockwell carbide ball only (6.35 mm)	£47.40
19BAA510	Rockwell carbide ball only (12.7 mm)	£140.00
19BAA515	Rockwell carbide ball indenter (1.5875 mm)	£165.00

# COORDINATE MEASURING MACHINES

COORDINATE MEASURING

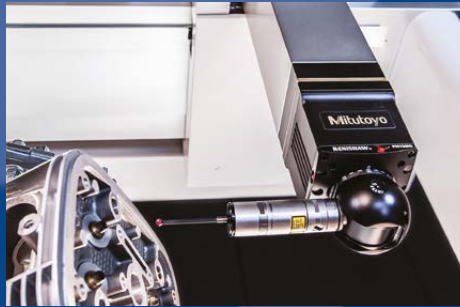
MACHINES



MEASURING MACHINE

3A 653

### Coordinate Measuring Machines



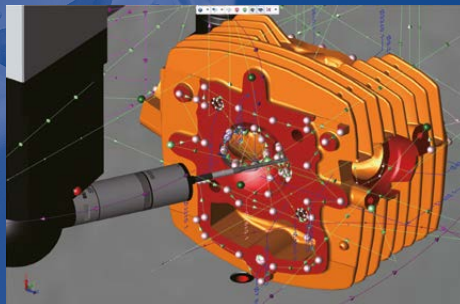
### Probes and Styli



### eco-fix



### Software



### Contents

MiStar	N-03
CRYSTA-Plus M	N-04
CRYSTA-Apex S	N-05
CRYSTA-Apex EX	N-07
STRATO-Apex	N-09
FALCIO G	N-10
LEGEX	N-11
MACH-Ko-Ga-Me	N-12
MACH-3A	N-13
MACH-V	N-14
Probes	N-15
Styli	N-17
eco-fix	N-18
Software	N-19

# MiStar

## Shop Floor CNC Type CMM

- High performance/cost ratio in a compact CMM featuring high environmental resistance and maintainability.
- Hardened for shop floor use by special precautions to protect moving parts and scales against ingress of dust.
- Built-in thermal compensation provides excellent accuracy even when the CMM is subject to temperature variations as extreme as 10°C to 40°C.
- Installation is eased by the small footprint together with no requirement for an air supply.
- Compact design locates controller and PC in stand. Monitor and keyboard may be mounted on an arm attached to the base (option).
- Ideal for inspection of small- to medium-size workpieces and offers a wide range of measurement probes including touch trigger, optical and contact scanning types.

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**MiStar 555**  
(arm shown is optional)

### Specifications

Model	MiStar 555	
Measuring range	X	570 mm
	Y	500 mm
	Z	500 mm
Resolution	0.1 $\mu$ m	
Accuracy	18 - 22°C	$\pm(2.2+0.3L/100)$ $\mu$ m*
	10 - 30°C	$\pm(2.9+0.45L/100)$ $\mu$ m*
	10 - 40°C	$\pm(3.8+0.8L/100)$ $\mu$ m*
Work table	Material	Granite
	Tapped insert	M8 x 1.25 mm
	Max. loading	120 kg

\* Using an SP25M probe; stylus:  $\varnothing$ 4 x 50 mm.

### Technical Data

Length standard: High-accuracy linear encoder  
Guide system: Linear guide  
Max. drive speed (3D): 606 mm/s  
Max. acceleration (3D): 2700 mm/s<sup>2</sup>

### Guaranteed accuracy temperature environment

Temperature range		18 - 22°C	10 - 30°C	10 - 40°C
Temperature change	Per hour	2.0 K		
	Per 24 hours	2.0 K	5.0 K	10.0 K
Temperature gradient	Vertical	1.0 K/m		
	Horizontal	1.0 K/m		

# CRYSTA-Plus M

## SERIES 196 – Manual-Floating Type CMM

- This CMM has been developed in the quest for high accuracy, low cost and easy operation.
- The CRYSTA-Plus M is applicable to a wide range of applications from simple dimension to complex form measurement.
- Thermal compensation is offered as an option and when fitted provides accurate measurement even when the CMM is subject to wide shop-floor temperature variations (15°C to 30°C).
- Smooth operation due to high-precision air bearings and lightweight moving members.
- Continuous fine feed over the entire measuring range.

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### Technical Data

Length standard:	High-accuracy linear encoder
Guide system:	Air bearing
Axis clamp:	One-touch air clamp (screw clamp: M776, M7106)
Fine feed range:	Entire range
Air pressure:	0.4 MPa (0.35 MPa: M443, M544, M574)
Air consumption:	50 L/min

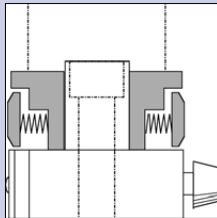
### Guaranteed accuracy temperature environment\*1

Temperature range	19-21°C (15-30°C)	
Temperature change	Per hour	— (2.0 K)
	Per 24 hours	— (5.0 K)
Temperature gradient	Vertical	0.5 K/m (1.0 K/m)
	Horizontal	0.5 K/m (1.0 K/m)

\*1 The values shown in brackets apply when the machine is equipped with the thermal compensation system (optional).



One-touch air clamp and fine feed for rapid and easy positioning.



Ergonomically designed guide grip on Z axis for reliable measurement (only for CRYSTA-Plus M776 and M7106).



Probe illumination (optional) makes placement of styli on the workpiece easier and more precise.

CRYSTA-Plus M574



CRYSTA-Plus M7106



### Specifications

Model		CRYSTA-Plus M				
		443	544	574	776	7106
Measuring range	X	400 mm		500 mm		700 mm
	Y		400 mm		700 mm	
	Z	300 mm		400 mm		600 mm
Resolution		0.5 μm				
Accuracy*2	E	±(3.0+0.4L/100) μm		±(3.5+0.4L/100) μm		±(4.5+0.45L/100) μm
	R		±4.0 μm			±5.0 μm
Work table	Material	Granite				
	Size	624 x 805 mm	764 x 875 mm	764 x 1175 mm	900 x 1440 mm	900 x 1740 mm
	Tapped insert	M8 x 1.25 mm				
	Max. loading		180 kg		500 kg	800 kg
Max. workpiece height		480 mm	590 mm		800 mm	
Mass (main unit)		360 kg	450 kg	575 kg	1451 kg	1697 kg

\*2 According to ISO 10360-2 methods when using the TP20 probe system and with thermal compensation operating. L: measuring length (mm).

# CRYSTA-Apex S

## SERIES 191 – Standard CNC CMM

- Designed and constructed using Mitutoyo's many years of experience in CNC CMM technology, CRYSTA-Apex features lightweight materials and an innovative machine structure, providing high motion stability, high accuracy, and affordability.
- Thermal compensation is equipped as standard to guarantee accurate measurement even when the CMM is subject to typical shop floor temperature variations (16°C to 26°C).
- In addition to contact measurement, the MPP-310Q and SMP laser probes provide a contact/non-contact scanning function.

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CRYSTA-Apex S544



CRYSTA-Apex S776



### Specifications

Model	CRYSTA-Apex S			
	544	574	776	7106
Measuring range	X	500 mm		700 mm
	Y	400 mm	700 mm	1000 mm
	Z	400 mm		600 mm
Resolution	0.1 µm			
Accuracy* <sup>1</sup>	E <sub>0</sub> ,MPE	±(1.7+0.3L/100) µm, ±(1.7+0.4L/100) µm* <sup>2</sup>		
	PFTU,MPE	±1.7 µm		
	MPETHP	±2.3 µm (50 s)		
Work table	Material	Granite		
	Size	638 x 860 mm	638 x 1160 mm	880 x 1420 mm
	Tapped insert	M8 x 1.25 mm		
	Max. loading	180 kg		800 kg
Max. workpiece height	545 mm		800 mm	
Mass (main unit)	515 kg	625 kg	1675 kg	1951 kg

Model	CRYSTA-Apex S					
	9106	9108	9166	9168	9206	9208
Measuring range	X	900 mm				
	Y	1000 mm		1600 mm		2000 mm
	Z	600 mm	800 mm	600 mm	800 mm	600 mm
Resolution	0.1 µm					
Accuracy* <sup>1</sup>	E <sub>0</sub> ,MPE	±(1.7+0.3L/100) µm, ±(1.7+0.4L/100) µm* <sup>2</sup>				
	PFTU,MPE	±1.7 µm				
	MPETHP	±2.3 µm (Z <sub>600</sub> = 50 s, Z <sub>800</sub> = 90 s)				
Work table	Material	Granite				
	Size	1080 x 1720 mm		1080 x 2320 mm		1080 x 2720 mm
	Tapped insert	M8 x 1.25 mm				
	Max. loading	1200 kg		1500 kg		1800 kg
Max. workpiece height	800 mm	1000 mm	800 mm	1000 mm	800 mm	1000 mm
Mass (main unit)	2231 kg	2261 kg	2868 kg	2898 kg	3912 kg	3942 kg

\*<sup>1</sup> According to ISO 10360-2/4/5 methods when using the SP25M probe system with a ø4 x 50 mm stylus and with thermal compensation operating over the temperature range 18-22°C. L: measuring length (mm).

\*<sup>2</sup> Guaranteed accuracy temperature range: 16-26°C.

### Technical Data

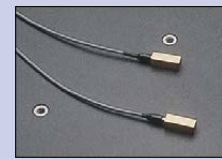
Length standard:	High-accuracy linear encoder
Guide system:	Air bearing
Max. drive speed:	519 mm/s
Max. acceleration:	2309 mm/s <sup>2</sup>
Air pressure:	0.4 MPa
Air consumption:	50 L/min (500 series) 60 L/min (700, 900 series)

### Guaranteed accuracy temperature environment

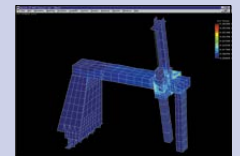
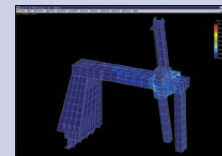
Temperature range	18-22°C	16-26°C
Temperature change	Per hour	1.0 K
	Per 24 hours	2.0 K
Temperature gradient	Vertical	1.0 K/m
	Horizontal	1.0 K/m

#### Main Unit Startup System

A start-up system (relocation detection sensor) is an integral security feature of this machine and will disable its operation if subject to relocation or strong vibration. Please be advised to contact your nearest Mitutoyo Service Centre as soon as possible or in advance of such circumstance.



Workpiece thermal compensation system temperature sensors.



The machine structure has been optimized using FEM (Finite Element Method) and modal analysis.



Controllers are equipped with one or two joysticks, according to model of CMM.





Optional monitor stand (PC and monitor not included).



Optional CMM artefact.



Optional CMM enclosure.

## Specifications

Model		CRYSTA-Apex 5		
		121210	122010	123010
Measuring range	X	1200 mm		
	Y	1200 mm	2000 mm	3000 mm
	Z	1000 mm		
Resolution		0.1 µm		
Accuracy* <sup>1</sup>	E <sub>0,MPE</sub>	±(2.3+0.3L/100) µm, ±(2.3+0.4L/100) µm* <sup>2</sup>		
	PFTU,MPE	±2.0 µm		
	MPE <sub>THP</sub>	±2.8 µm (50 s)		
Material		Granite		
Work table	Size	1420x2165 mm	1420x2965 mm	1420x3965 mm
	Tapped insert	M8x1.25 mm		
	Max. loading	2000 kg	2500 kg	3000 kg
Max. workpiece height		800 mm [1000 mm]		1200 mm
Mass (main unit)		4050 kg	6150 kg	9110 kg

Model		CRYSTA-Apex 5					
		162012	163012	164012	162016	163016	164016
Measuring range	X	1600 mm					
	Y	2000 mm	3000 mm	4000 mm	2000 mm	3000 mm	4000 mm
	Z	1200 mm			1600 mm		
Resolution		0.1 µm					
Accuracy* <sup>1</sup>	E <sub>0,MPE</sub>	±(3.3+0.45L/100) µm, ±(3.3+0.55L/100) µm* <sup>2</sup>		±(4.5+0.55L/100) µm, ±(4.5+0.65L/100) µm* <sup>2</sup>			
	PFTU,MPE	±5.0 µm			±6.0 µm		
	MPE <sub>THP</sub>	±6.0 µm (150 s)			±7.0 µm (150 s)		
Material		Granite					
Work table	Size	1800x3205 mm	1800x4205 mm	1800x5205 mm	1800x3205 mm	1800x4205 mm	1800x5205 mm
	Tapped insert	M8x1.25 mm					
	Max. loading	3000 kg	3500 kg	4500 kg	3000 kg	3500 kg	4500 kg
Max. workpiece height		1400 mm			1800 mm		
Mass (main unit)		9300 kg	10600 kg	14800 kg	9350 kg	10650 kg	14850 kg

Model		CRYSTA-Apex 5	
		203016	204016
Measuring range	X	2000 mm	
	Y	3000 mm	4000 mm
	Z	1600 mm	
Resolution		0.1 µm	
Accuracy* <sup>1</sup>	E <sub>0,MPE</sub>	±(4.5+0.8L/100) µm, ±(4.5+0.9L/100) µm* <sup>2</sup>	
	PFTU,MPE	±6.0 µm	
	MPE <sub>THP</sub>	±6.0 µm (150 s)	
Material		Granite	
Work table	Size	2220x4205 mm	2220x5205 mm
	Tapped insert	M8x1.25 mm	
	Max. loading	4000 kg	5000 kg
Max. workpiece height		1800 mm	
Mass (main unit)		14100 kg	19400 kg

\*<sup>1</sup> According to ISO 10360-2/4/5 methods when using the SP25M probe system with a ø4 x 50 mm stylus and with thermal compensation operating over the temperature range 18 - 22°C. L: measuring length (mm).

\*<sup>2</sup> Guaranteed accuracy temperature range: 16 - 26°C.

### CRYSTA-Apex S122010



# CRYSTA-Apex EX

## SERIES 191 – 5-axis CNC CMM

- 5-axis operation reduces the time required for probe rotational movements and allows more flexible positioning. This also ensures easy access to complex workpieces and saves time both during programming and measurement.
- Thermal compensation is equipped as standard to provide accurate measurement even when the CMM is subject to typical shop floor temperature variations (16°C to 26°C).

### CRYSTA-Apex EX 500T/700T/900T

- The CRYSTA-Apex EX 500T/700T/900T series are CNC CMMs equipped with the PH20 5-axis control touch-trigger probe head.
- In addition to the 3-axis point measurement mode as used on conventional coordinate measuring machines, the PH20 probe head also supports 'head touch' operation for quick point measurement using the two rotational axes of the probe only, with no movement required along the CMM axes.
- The PH20 head incorporates a TP20 probe and allows use of modules designed for the TP20. Automatic probe changeover with a module changer is also supported.
- Even without the workpiece to be measured, a measurement program can be created on a PC using 3D CAD data. Compared to joystick operation, this makes for more efficient programming and also allows interference checking.

### CRYSTA-Apex EX 1200R

- CRYSTA-Apex EX 1200R series products are advanced CNC CMMs equipped with the REVO 5-axis scanning probe head.
- Ultra-high-speed 5-axis scanning (max. 500 mm/s) is enabled with this advanced scanning head, far surpassing that of conventional 3-axis performance. Support for high speed sampling of up to 4,000 points per second allows acquisition of densely spaced measurement points, even during fast scanning.
- Laser position-sensing technology in the REVO ensures high accuracy measurement even when using very long styli (up to 500 mm\*).
- Two types of probe are supported: RSP2 for 5-axis scanning and the SP25M type RSP3 probe that allows use of a cranked stylus. Automatic changeover of these probes with an auto probe changer is possible, enabling fully automated measurement of parts needing more than one probe configuration for effective measurement.
- Probe calibration of RSP2 requires only about 20 minutes to enable use of the full angular range, which notably reduces preparation time compared to that required for conventional scanning probes.

\* Distance from probe rotation centre to stylus tip.

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CRYSTA-Apex EX 544T



CRYSTA-Apex EX 123010R

### Technical Data

Length standard:	High-accuracy linear encoder
Guide system:	Air bearing
Max. drive speed:	300 mm/s
Max. acceleration:	375 mm/s <sup>2</sup>
Air pressure:	0.4 MPa (REVO: 0.5 MPa)
Air consumption:	50 L/min (500 series) 60 L/min (700, 900 series) 150 L/min (1200 series)

### Guaranteed accuracy temperature environment

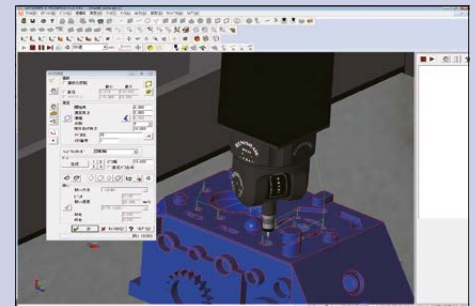
Temperature range		18-22°C	16-26°C
Temperature change	Per hour	1.0 K	
	Per 24 hours	2.0 K	5.0 K
Temperature gradient	Vertical	1.0 K/m	
	Horizontal	1.0 K/m	

### Main Unit Startup System

A start-up system (relocation detection sensor) is an integral security feature of this machine and will disable its operation if subject to relocation or strong vibration. Please be advised to contact your nearest Mitutoyo Service Centre as soon as possible or in advance of such circumstance.



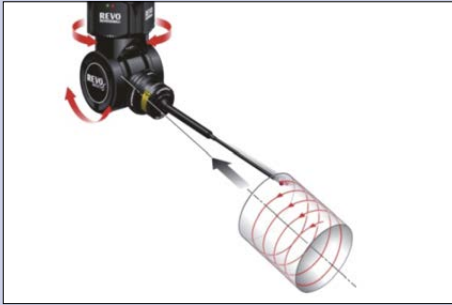
The PH20 5-axis probe head can position the probe at just the right orientation for maximum measurement accuracy.



Programming with 3D CAD model.



Head touch probing with the PH20 5-axis probe head.



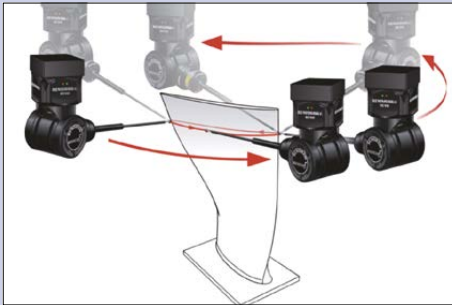
Helical scanning with the REVO 5-axis probe head.



Gasket scanning with the REVO 5-axis probe head.



Sweep scanning with the REVO 5-axis probe head.



Scanning an aerofoil section with the REVO 5-axis probe head.



Optional CMM artefact.

## Specifications

Model		CRYSTA-Apex EX			
		544T	574T	776T	7106T
Measuring range	X	500 mm		700 mm	
	Y	400 mm	700 mm	700 mm	1000 mm
	Z	400 mm		600 mm	
Resolution		0.1 µm			
Accuracy* <sup>1</sup>	E <sub>0</sub> ,MPE	±(2.2+0.3L/100) µm, ±(2.2+0.4L/100) µm* <sup>2</sup>			
	PFTU,MPE	2.2 µm			
Material		Granite			
Work table	Size	638x860 mm	638x1160 mm	880x1420 mm	880x1720 mm
	Tapped insert	M8x1.25 mm			
	Max. loading	180 kg		800 kg	1000 kg
Max. workpiece height		545 mm		800 mm	
Mass (main unit)		536 kg	646 kg	1696 kg	1972 kg

Model		CRYSTA-Apex EX		
		9106T	9166T	9206T
Measuring range	X	900 mm		2000 mm
	Y	1000 mm	1600 mm	2000 mm
	Z	600 mm		
Resolution		0.1 µm		
Accuracy* <sup>1</sup>	E <sub>0</sub> ,MPE	±(2.2+0.3L/100) µm, ±(2.2+0.4L/100) µm* <sup>2</sup>		
	PFTU,MPE	2.2 µm		
Material		Granite		
Work table	Size	1080x1720 mm	1080x2320 mm	1080x2720 mm
	Tapped insert	M8x1.25 mm		
	Max. loading	1200 kg	1500 kg	1800 kg
Max. workpiece height		800 mm		
Mass (main unit)		2252 kg	2889 kg	3933 kg

Model		CRYSTA-Apex EX		
		121210R	122010R	123010R
Measuring range	X	1200 mm		
	Y	1200 mm	2000 mm	3000 mm
	Z	960 mm		
Resolution		0.1 µm		
Accuracy* <sup>3</sup>	E <sub>0</sub> ,MPE	±(2.9+0.4L/100) µm, ±(2.9+0.5L/100) µm* <sup>2</sup>		
	PFTU,MPE	3.2 µm		
Material		Granite		
Work table	Size	1420x2165 mm	1420x2965 mm	1420x3965 mm
	Tapped insert	M8x1.25 mm		
	Max. loading	2000 kg	2500 kg	3000 kg
Max. workpiece height		1160 mm		
Mass (main unit)		4050 kg	6150 kg	9110 kg

\*<sup>1</sup> According to ISO 10360-2/4/5 methods when using the PH20 probe system with a ø4 x 10 mm stylus and with thermal compensation operating. L: measuring length (mm).

\*<sup>2</sup> Guaranteed accuracy temperature range: 16 - 26°C.

\*<sup>3</sup> According to ISO 10360-2/4/5 methods when using the REVO probe system with a ø6 x 10 mm RSH250 stylus and with thermal compensation operating over the temperature range 18 - 22°C. L: measuring length (mm).



Optional monitor stand (PC and monitor not included).



Optional CMM enclosure.

# STRATO-Apex

## SERIES 355 – High Accuracy CNC CMM

- Thermal compensation is equipped as standard to guarantee the outstanding accuracy specification over the temperature range 18°C to 22°C.
- The high drive speed and acceleration guarantee top scanning performance in a machine that also offers high-accuracy measuring in the 1 µm class.
- High speed and accuracy in measurement is ensured by a redesign of the machine body that has improved rigidity of the structure, and by a remodelled guide mechanism.
- High-performance scanning measurement has been achieved through the improved structural rigidity and incorporation of a newly developed compensation technology.
- Ultra-high precision scales are used on each axis to provide a higher resolution and accuracy that complements the improved overall performance.

**MeasurLink<sup>®</sup> ENABLED**  
Data Management Software by Mitutoyo



STRATO-Apex 9106

### Specifications

Model	STRATO-Apex					
	574	776	7106	9106	9166	
Measuring range	X	500 mm	700 mm		900 mm	
	Y	700 mm		1000 mm	1600 mm	
	Z	400 mm	600 mm			
Resolution	0.05 µm		0.02 µm			
Accuracy*	E <sub>0,MPE</sub>	±(0.7+0.25L/100) µm		±(0.9+0.25L/100) µm		
	PFTU,MPE	0.7 µm		0.9 µm		
	MPETHP	1.3 µm (40 s)		1.8 µm (45 s)		
Work table	Material	Granite				
	Size	700x1420 mm	880x1420 mm	880x1720 mm	1080x1720 mm	1080x2320 mm
	Tapped insert	M8x1.25 mm				
	Max. loading	180 kg	500 kg	800 kg	1200 kg	1200 kg
Max. workpiece height	560 mm		770 mm			
Mass (main unit)	1530 kg	1895 kg	2180 kg	2410 kg	3085 kg	

Model	STRATO-Apex			
	162012	162016	163012	163016
Measuring range	X	1600 mm		
	Y	2000 mm		3000 mm
	Z	1200 mm	1600 mm	1200 mm
Resolution	0.05 µm			
Accuracy*	E <sub>0,MPE</sub>	±(2.5+0.4L/100) µm		
	PFTU,MPE	2.3 µm		
	MPETHP	2.5 µm (60 s)		
Work table	Material	Granite		
	Size	1850x3280 mm		1850x4280 mm
	Tapped insert	M8x1.25 mm		
	Max. loading	3500 kg		4000 kg
Max. workpiece height	1350 mm	1750 mm	1350 mm	1750 mm
Mass (main unit)	11150 kg	11200 kg	15300 kg	15350 kg

\* According to ISO 10360-2/4/5 methods when using the SP25M probe system with a ø4x50 mm stylus and with thermal compensation operating. L: measuring length (mm).

### Technical Data

Length standard:	Ultra-high-accuracy linear encoder (glass scale with virtually zero thermal expansion coefficient)
Guide system:	Air bearing
Max. drive speed:	519 mm/s
Max. acceleration:	2598 mm/s <sup>2</sup>
Air pressure:	0.4 MPa (9106: 0.5 MPa)
Air consumption:	120 L/min (1600 series: 250 L/min)

### Guaranteed accuracy temperature environment

Series No.	574	700/900	
Temperature range	18 - 22°C	19 - 21°C	
Temperature change	Per hour	0.5 K	1.0 K
	Per 24 hours	1.0 K	2.0 K
Temperature gradient	Vertical	1.0 K/m	
	Horizontal	1.0 K/m	

### Main Unit Startup System

A start-up system (relocation detection sensor) is an integral security feature of this machine and will disable its operation if subject to relocation or strong vibration. Please be advised to contact your nearest Mitutoyo Service Centre as soon as possible or in advance of such circumstance.



Dust-resistant high-precision glass scales.



Controller positioned at rear of machine.



STRATO-Apex 163016

# FALCIO G

## SERIES 355 – High Accuracy Large Gantry CNC CMM

### Technical Data

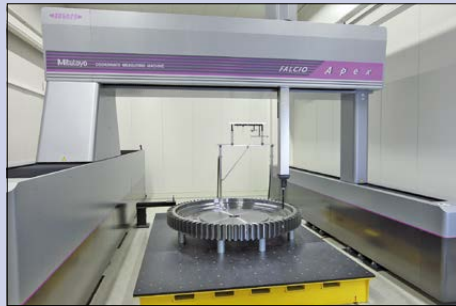
Length standard:	High-accuracy linear encoder
Guide system:	Air bearing
Max. drive speed:	520 mm/s

### Guaranteed accuracy temperature environment

Temperature range	18 - 22°C	
Temperature change	Per hour	1.0 K
	Per 24 hours	2.0 K
Temperature gradient	Vertical	1.0 K/m
	Horizontal	1.0 K/m

#### Main Unit Startup System

A start-up system (relocation detection sensor) is an integral security feature of this machine and will disable its operation if subject to relocation or strong vibration. Please be advised to contact your nearest Mitutoyo Service Centre as soon as possible or in advance of such circumstance.



FALCIO-Apex 305020G measuring a gear for a wind turbine generator.

### MeasurLink<sup>1</sup> ENABLED

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FALCIO Apex 406020G

### Specifications

Model	FALCIO-Apex				
	203015G	203020G	204015G	303012G	
Measuring range	X	2005 mm		3005 mm	
	Y	3005 mm		4005 mm	
	Z	1505 mm	2005 mm	1205 mm	
Resolution	0.1 μm				
Accuracy*	MPEE	±(4.8+5L/1000) μm	±(7+7L/1000) μm	±(4.8+5L/1000) μm	±(4.9+5L/1000) μm

Model	FALCIO-Apex			
	305015G	305020G	406020G	
Measuring range	X	3005 mm		4005 mm
	Y	5005 mm		6005 mm
	Z	1505 mm	2005 mm	
Resolution	0.1 μm			
Accuracy*	MPEE	±(5.5+5L/1000) μm	±(6+8L/1000) μm	±(8+8L/1000) μm

\* When using the SP25M probe system and with thermal compensation operating. L: measuring length (mm).

# LEGEX

## SERIES 356 – Ultra-High Accuracy CNC CMM

- Unsurpassed point-to-point measuring accuracy has been achieved in the LEGEX CNC CMM by rigorous analysis of all possible error-producing factors and elimination, or minimization, of their effects and the use of ultra-high-accuracy crystallized-glass scales with a thermal expansion coefficient of practically zero on each axis.
- Thermal compensation is equipped as standard to guarantee the outstanding accuracy specification over the temperature range 18°C to 22°C.
- Premium scanning performance with the MPP-310Q probe is guaranteed by the fixed bridge architecture and precision air bearings running on highly rigid guideways that together ensure superior dynamic motion stability.
- Machines in this series are suitable for complex, small- to medium-sized workpieces such as gears, bearings, lenses, dies and scroll rotors which must be inspected to exceptionally high dimensional accuracy.
- Many types of optional probe systems are available, including touch-trigger probes, laser scanning probes, and vision measuring probes.

**MeasurLink** ENABLED  
Data Management Software by Mitutoyo



LEGEX 9106

### Specifications

Model	LEGEX				
	574	774	776	9106	12128
Measuring range	X	500 mm	700 mm	900 mm	1200 mm
	Y	700 mm		1000 mm	1200 mm
	Z	450 mm		600 mm	800 mm
Resolution	0.01 µm				
Accuracy*1	E <sub>0</sub> ,MPE*2	±(0.28+0.1L/100) µm			±(0.6+0.15L/100) µm
	PFTU,MPE	0.4 µm			0.6 µm
	MPE <sub>THP</sub>	1.1 µm (60s)			—
Work table	Material	Cast iron			
	Size	550 x 750 mm	750 x 750 mm	950 x 1050 mm	1250 x 1250 mm
	Tapped insert	M8 x 1.25 mm			
	Max. loading	250 kg	500 kg	800 kg	1000 kg
Max. workpiece height	700 mm		850 mm		1056 mm
Mass (main unit)	3500 kg	5000 kg	5100 kg	6500 kg	10500 kg

\*1 According to ISO 10360-2/4/5 methods when using the MPP-310Q probe system and with thermal compensation operating. L: measuring length (mm).

\*2 Guaranteed accuracy temperature range: 19-21°C.

### Technical Data

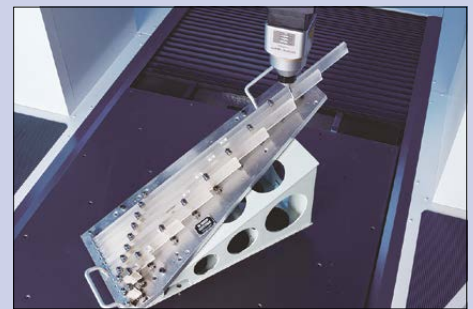
Length standard:	High-accuracy linear encoder
Guide system:	Air bearing
Max. drive speed:	519 mm/s
Max. acceleration:	1300 mm/s <sup>2</sup>
Air pressure:	0.4 MPa
Air consumption:	150 L/min

### Guaranteed accuracy temperature environment

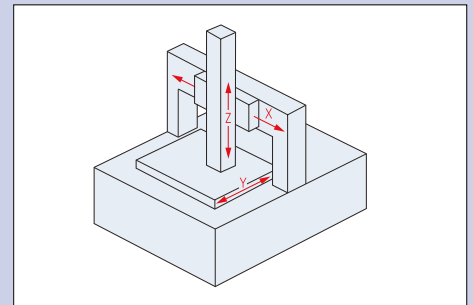
Temperature range		18-22°C
Temperature change	Per hour	1.0 K
	Per 24 hours	2.0 K
Temperature gradient	Vertical	1.0 K/m
	Horizontal	1.0 K/m

#### Main Unit Startup System

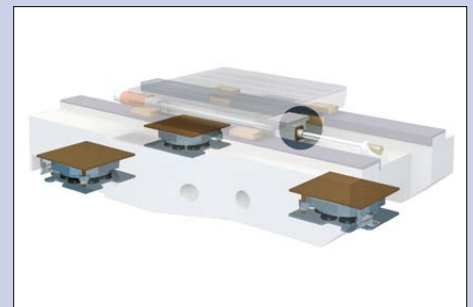
A start-up system (relocation detection sensor) is an integral security feature of this machine and will disable its operation if subject to relocation or strong vibration. Please be advised to contact your nearest Mitutoyo Service Centre as soon as possible or in advance of such circumstance.



CMM calibration using a virtually zero thermal expansion glass artefact.



Fixed-bridge design with measuring table Y-axis movement in the base structure.



Actively controlled, integrated, vibration damping measuring table.

# MACH-Ko-Ga-Me

## SERIES 357 – The Agile CNC CMM

### Technical Data

Length standard:	Linear encoder
Guide system:	Straight-motion hard bearing
Max. drive speed:	340 mm/s
Max. acceleration:	6750 mm/s <sup>2</sup>

- Compact, 3D CNC measuring system that can flexibly configure to almost any production process, with built-in thermal compensation that provides excellent accuracy even when the CMM is subject to shop floor temperature variations as extreme as 10°C to 35°C.
- Small-sized, requiring only a minimal installation envelope of 440x410x120 mm.
- Agile and easy for a customer to mount using either an available fixed base or mounting system of your own design.
- Can be used in stand-alone applications or integrated into work cells; no air supply is required.
- Ideal for inspection of small workpieces and can be used with a wide range of measurement probes including touch trigger, optical and contact scanning types.

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Fixed-base installation.



Optional stand.



MACH-Ko-Ga-Me

### Specifications

Model		MACH-Ko-Ga-Me
		KGM12128-B
Measuring range	X	120 mm
	Y	120 mm
	Z	80 mm
Resolution		0.1 μm
Accuracy*	19-21°C	±(2+0.5L/100) μm
	15-25°C	±(2.3+0.57L/100) μm
	10-30°C	±(2.7+0.65L/100) μm
	10-35°C	±(3+0.72L/100) μm

\* TP200 stylus: ø3 x 10 mm, SP25M stylus: ø4 x 50 mm.

# MACH-3A

## SERIES 360 – In-Line Type CNC CMM

- High speed for manufacturing. The ideal replacement for your mechanical gauges.
- Designed for shopfloor conditions with built-in thermal compensation that provides excellent accuracy even when the CMM is subject to temperature variations as extreme as 5°C to 40°C.
- The exceptional performance of the MACH-3A is due to a horizontal-ram architecture that enables phenomenal acceleration and drive speed that provides the potential to keep pace with production rates even with a 100% inspection requirement.
- Designed for automated processes with a touchscreen for easy operation and monitoring.
- Choose from the full range of Mitutoyo CMM accessories including styli, jigs, loading systems and indexing heads, all designed to enhance convenience and production efficiency.

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Data Management Software by Mitutoyo



MACH-3A 653

### Specifications

Model		MACH-3A 653	MACH-3A 864	
Measuring range	X	600 mm	800 mm	
	Y	500 mm	600 mm	
	Z	280 mm	380 mm	
Resolution		0.1 µm		
Accuracy*	E <sub>0</sub> ,MPE	19 - 21°C	±(2.5+0.35L/100) µm	±(2.8+0.35L/100) µm
		15 - 25°C	±(2.8+0.42L/100) µm	±(3.1+0.42L/100) µm
		10 - 30°C	±(3.2+0.50L/100) µm	±(3.5+0.50L/100) µm
		5 - 35°C	±(3.5+0.57L/100) µm	±(3.8+0.57L/100) µm
	5 - 40°C	±(3.9+0.65L/100) µm	±(4.2+0.65L/100) µm	
PFTJ,MPE		±2.5 µm		

\* According to ISO 10360-2/4/5 methods when using the TP7M probe system with a ø4x20 mm styli and with thermal compensation operating. L: measuring length (mm).

### Technical Data

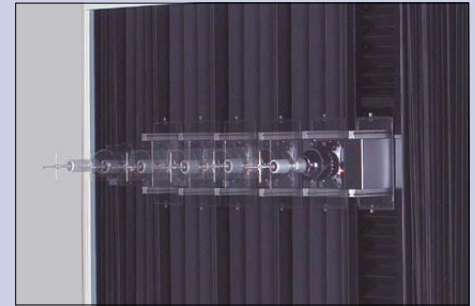
Length standard:	High-accuracy linear encoder
Guide system:	Linear guide
Max. drive speed:	1212 mm/s
Max. acceleration:	11880 mm/s <sup>2</sup>

### Guaranteed accuracy temperature environment

Temperature range	5 - 40°C	
Temperature change	Per hour	2.0 K
	Per 24 hours	10.0 K
Temperature gradient	Vertical	1.0 K/m
	Horizontal	1.0 K/m

#### Main Unit Startup System

A start-up system (relocation detection sensor) is an integral security feature of this machine and will disable its operation if subject to relocation or strong vibration. Please be advised to contact your nearest Mitutoyo Service Centre as soon as possible or in advance of such circumstance.



Enclosed design for best environmental resistance.



# MACH-V

## SERIES 360 – In-Line Type CNC CMM

- The MACH-V maximizes machining performance by performing in-line, high-speed coordinate measuring in conjunction with your CNC machine tools.
- Designed for shopfloor conditions with built-in thermal compensation that provides excellent accuracy even when the CMM is subject to temperature variations as extreme as 5°C to 35°C.
- These high-throughput machines are designed to be incorporated right into the manufacturing line and can provide pre/post-machining feedback to your machine tool for process adjustments.

**MeasurLink<sup>1</sup> ENABLED**  
Data Management Software by Mitutoyo

### Technical Data

Length standard:	High-accuracy linear encoder
Guide system:	Linear guide
Max. drive speed:	866 mm/s
Max. acceleration:	8480 mm/s <sup>2</sup>

### Guaranteed accuracy temperature environment

Temperature range	5-35°C	
Temperature change	Per hour	2.0 K
	Per 24 hours	10.0 K
Temperature gradient	Vertical	1.0 K/m
	Horizontal	1.0 K/m

### Main Unit Startup System

A start-up system (relocation detection sensor) is an integral security feature of this machine and will disable its operation if subject to relocation or strong vibration. Please be advised to contact your nearest Mitutoyo Service Centre as soon as possible or in advance of such circumstance.



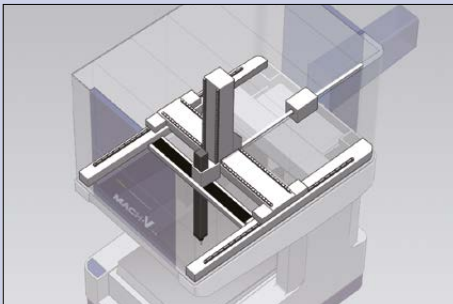
Built for integration with a production line.



Frame design allows unobstructed throughput.



Compatible with overhead transfer systems.



Protected guideways.



MACH-V9106

### Specifications

Model		MACH-V	
		565	9106
Measuring range	X	500 mm	900 mm
	Y	600 mm	1000 mm
	Z	500 mm	600 mm
Resolution		0.1 μm	
Accuracy*	E <sub>0</sub> ,MPE	19-21°C	±(2.5+0.35L/100) μm
		18-22°C	±(2.7+0.38L/100) μm
		15-25°C	±(2.9+0.43L/100) μm
		5-35°C	±(3.6+0.58L/100) μm
	PFTU,MPE	±2.5 μm (±2.2 μm: using SP25M)	

\* According to ISO 10360-2/4/5 methods when using the TP7M probe system with a ø4x20 mm stylus and with thermal compensation operating. L: measuring length (mm)

# Probes

## Probe Systems for Manual/CNC Coordinate Measuring Machines

### Contact-Scanning Probe Systems

#### MPP-310Q

Ultra-high accuracy and low measuring force type.

This ultra-high-precision probe contains micro-miniature scales to track relative movement in 3 dimensions. Equally suitable for scanning measurement, ultra-high-precision point measurement or centre-alignment applications.



#### SP80

High accuracy type (available with 500 mm long extension).

A highly accurate probe able to use long styli of up to 500 mm. Equally suitable for scanning measurement, high-precision point measurement or centre-alignment applications.



#### SP25M

Compact, high-accuracy type.

Compact and highly accurate, this probe is only  $\varnothing 25$  mm diameter, ideal for working in restricted spaces. Equally suitable for scanning measurement, high-precision point measurement or centre-alignment applications. Can be attached to a probe head (PH10M/10MQ) for automatically changing the orientation to enable more flexible measurements.



#### REVO

High speed 5-axis scanning-head type.

Laser position-sensing technology ensures high accuracy measurement from this scanning head even with long styli up to 500 mm in length. Combined with high-speed operation, 5-axis simultaneous control with a CMM and non-step indexing this probe provides unmatched performance.



### Optical (Non-Contact) Probe Systems

#### SurfaceMeasure

Laser scanning probe.

This compact, high accuracy, non-contact type laser probe is designed for use with CNC CMMs. The probe automatically adjusts to workpiece surface characteristics to deliver highly efficient measurements. Automatic laser intensity and camera sensitivity adjust according to the environment and the workpiece material for simpler programming.



#### QVP (Quick Vision Probe)

Video probe.

Gives a CMM the vision capability to measure very small features, thin-walled workpieces (prone to deflection by contact probing) as well as parts made from soft, easily deformed materials. Integrated white-light LED system for optimum workpiece illumination. Uses VISIONPAK software that runs under standard MCOSMOS.



### Probe for Roughness Measurement

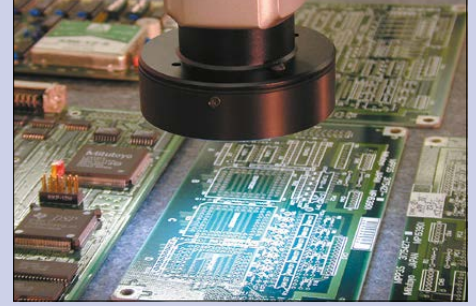
#### SURFTEST Probe

Surface roughness measurement probe.

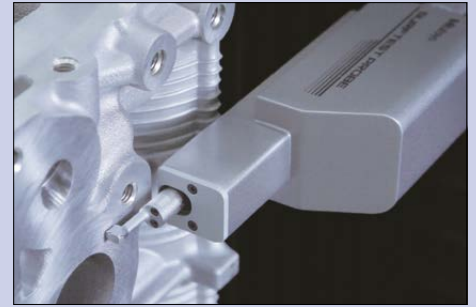
Mounting of this probe on a CMM enables surface roughness measurement and analysis to be included in fully automatic CNC measurement cycles. This probe is compatible with the automatic probe changer, and therefore can be automatically replaced with another type of probe for 3D coordinate measurement within the same measuring cycle. A wide variety of roughness analyses can be performed using the dedicated evaluation software.



SurfaceMeasure probe scanning a complex surface.



QVP probe inspecting a PCB.



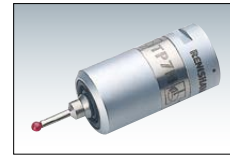
SURFTEST probe measuring surface roughness.

## Touch-Trigger Probe Systems

### TP7M

High-accuracy type.

This touch-trigger probe has high repeatability (at the  $2\sigma$  level) of 0.25  $\mu\text{m}$  for use with premium quality CMMs. A long stylus up to 150 mm can be installed.



### TP200

Compact and high-accuracy (stylus change) type.

This compact, high accuracy, touch-trigger probe is only  $\varnothing 13.5$  mm outside diameter, which allows working in very restricted spaces. Styli auto-changing (optional) is supported when mounted on a CNC CMM.



### TP20

Compact type.

This compact touch-trigger probe is only  $\varnothing 13.2$  mm outside diameter, which allows working in very restricted spaces. Styli auto-changing (optional) is supported when mounted on a CNC CMM.



### MH20

Compact type.

This touch-trigger probe equipped with manual probe head is designed for use with manual CMMs. The probe head section can be manually positioned to the desired orientation.



### MH20i

Compact type.

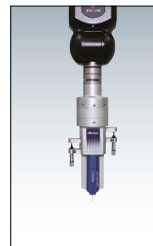
This touch-trigger probe equipped with manual probe head is designed for use with manual CMMs. The probe head section may be manually indexed to 168 positions.



### Micro Touch Probe

UMAP-CMM.

The extremely small styli used by this probe ( $\varnothing 0.1$  or  $\varnothing 0.3$  mm) have made possible highly accurate measurement of minute features not previously possible with a contact method. Mounts on the PH10MQ head.



### PH20

5-axis control touch-trigger type.

Thanks to the unique *head touch* capability, it is possible to measure purely by movement of the probe head instead of the CMM elements. Also, measuring time can be shortened significantly by means of the probe's 5-axis concurrent control and infinite angular-positioning capabilities.



### TP8

Manual indexable probe.

This is an entry level touch-trigger probe for applications that do not need indexing during program execution. Supplied with two knuckle joints to allow alignment of the probe as required.



## Probe Heads

### PH10M/PH10MQ

Motor-drive indexing type.

Allows automatic control of positioning (up to 720 directions) of the mounted probe. It is possible to mount not only a touch-trigger probe but also any scanning probe, vision probe, laser probe, screw thread depth probe, etc. Auto-changing is available (optional).



### PH1

Simple manual type.

This manual probe head is designed for use with the TP200/ TP20. It is possible to manually change positioning of the attached probe to the desired orientation.



### MIH

Manual indexing type.

This probe head allows manual positioning (up to 720 directions) of the mounted probe (for TP200/TP20). A probe extension up to 300 mm in length can be attached.



**Note:** Probes shown on these probe heads are optional.

# Styli

## Styli for Manual/CNC Coordinate Measuring Machines

- Mitutoyo offers a wide range of styli and accessories to suit practically any application. A bespoke styli design and manufacture service is also available.
- With nearly 30 years' experience in manufacturing styli, and based on its cutting-edge materials development, Mitutoyo can offer a wide range of styli made from materials to suit your application.



### The Materials we use for Contact Points

#### Ruby

- As the hardest of all probe element materials, ruby is the perfect all-rounder when it comes to manufacturing styli contact points.
- Spherical contact points made of ruby have been used as tried and tested equipment for most standard applications for decades.
- The low specific density of ruby enables the mass of the stylus to be kept as small as possible for best dynamic performance.

#### Zirconium oxide

- The specific surface properties of balls made of zirconium oxide – a ceramic compound – makes this stylus suitable for aggressive scanning of abrasive surfaces, such as cast iron.
- Zirconium oxide has virtually the same hardness and wear-resistant properties as ruby.

#### Silicon nitride

- Silicon nitride is extremely hard and superbly wear-resistant, with the least surface roughness of all styli materials.
- It has the specific advantage that it is not attracted by aluminium and therefore 'picks up' to a much lesser extent than ruby or zirconium oxide when scanning or touching aluminium alloy workpieces.



Ruby.



Zirconium oxide.



Silicon nitride.

### The Materials we use for Bases and Styli Stems

#### Steel

- The material of choice for high-strength precision styli for very accurate measuring tasks.
- The high strength and stiffness makes steel an excellent choice of material for manufacturing styli or reference probe elements.

#### Aluminium alloy

- Lightweight and stable, and therefore frequently used for probe extensions.
- Styli stems or extensions made of aluminium alloy perform best in measuring labs with stable temperatures and, accordingly, the lowest possible temperature gradients.

#### Tungsten carbide

- Bend-resistant styli stems made of tungsten carbide are ideal for virtually all standard applications in the measuring lab with its stable ambient temperature.
- A durable material that has proved its worth.

#### Titanium

- Titanium is remarkably stiff yet has a relatively low density.
- Probe components made of titanium offer the outstanding characteristics of being extremely rigid and stable, yet surprisingly lightweight.
- Mitutoyo uses the material primarily for bases, connecting pieces and extensions for measuring styli.

#### Carbon fibre

- The highest-quality material with an expansion coefficient of virtually zero at ambient temperatures up to 45°C.
- Carbon fibre is very lightweight and extremely stiff, making it particularly suitable for the manufacture of long styli.
- Mitutoyo uses carbon fibre tube for probe extensions and styli with sophisticated configurations.

#### Ceramic

- Very lightweight and extremely stiff. The ideal material, especially for long stems.
- Low thermal expansion makes ceramic styli suitable for use in the production environment.

### Sample Sets



## Optional Accessories

### Positioning Rail Kits S and L

Longer rails for fixing larger workpieces. Rails are clamped to the CMM table with 3 x M8 screws.

Rail kit L.



### Handles Set for eco-fix

The eco-fix handles allow easy and comfortable carrying of the main plate. The handles are foldable in horizontal posture, making for the best possible access to the probing area.

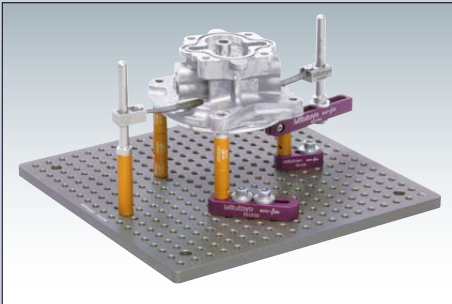


### Masterball Adaptor (M6/M8)

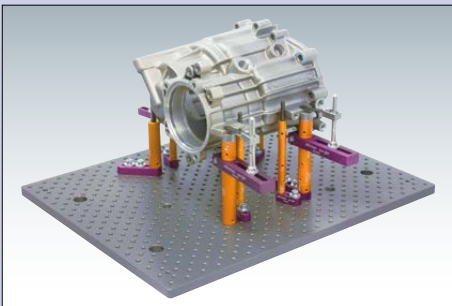
An M8-threaded masterball can be mounted on the M6-threaded eco-fix plate, or other brackets, by using this adaptor.



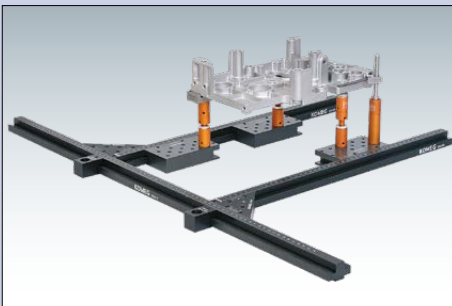
## Application Examples



eco-fix kit S.



eco-fix kit L.



Quick-rail kit.

# eco-fix

## Modular Clamping System for Coordinate Measuring Machines

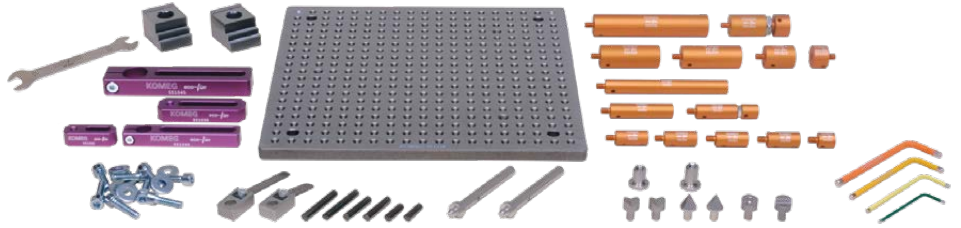
- The modular clamping system eco-fix allows efficient working in many ways.
- Functions and colours unite in a practice-oriented concept for time-saving, economical working and confusion-proof handling.
- Eco-fix concentrates on accomplishing nearly every clamping task in a cost- and performance-optimising way.

- Fits all CMM brands.
- Mitutoyo offers three fully comprehensive sets containing new and convenient accessories for even more efficiency.
- Smaller kits are also available and all items can be purchased individually to expand your existing kit.

### eco-fix Kit S

- Fixture kit for small- to mid-size workpieces.
- Base plate 250x250 mm.

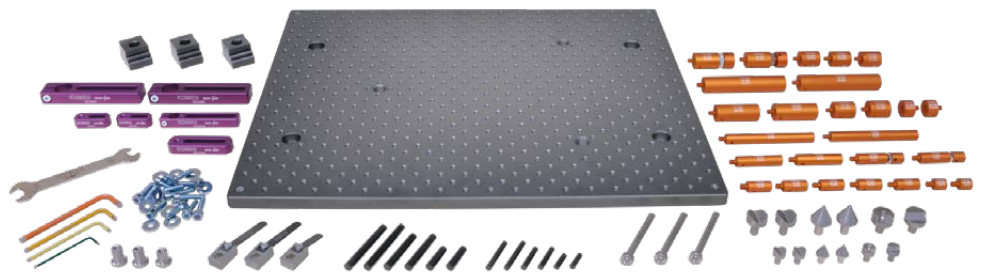
- Includes 58 eco-fix clamping parts, e.g. brackets, location pins, spring clips.



### eco-fix Kit L

- Fixture kit for mid- to large-size workpieces.
- Base plate 500x400 mm.

- Includes 97 eco-fix clamping parts, e.g. brackets, location pins, spring clips.



### Quick-Rail Kit

- Quick-rail is the perfect choice for quickly clamping a wide variety of workpieces from large to small.
- It is made up of 3 rails (1x 800 mm, 2x 500 mm) for fixing to the CMM's table and carrying the clamping elements.

- 21 eco-fix clamping parts (e.g. brackets, location pins, spring clips) are used to establish a three-point support of the workpiece.
- In addition, quick rail could perfectly be combined with the eco-fix series to establish reproducible positioning for workpieces of the same type.



## Specifications

Order No.	Model	Description
551048	eco-fix Kit S	Fixture kit for small- to mid-size workpieces
551049	eco-fix Kit L	Fixture kit for mid- to large-size workpieces
550914	eco-fix Quick-Rail Kit	Rail kit for attaching clamping elements and large workpieces

# Software

## MCOSMOS CMM Software Suite

- MCOSMOS has three module configurations, from the basic MCOSMOS 1 to the advanced MCOSMOS 3, which enables you to choose the appropriate functionality for current measurement applications now and expand, if needed, in the future.
- Designed to cover every aspect of measurement: geometry, scanning, digitising, file transfer and conversion, graphical aids and analysis, statistics and output.

### MCOSMOS 1

**Geopak**, operating under the MCOSMOS system, is the latest and most advanced CMM analysis and programming module available for geometry measurement. Geopak is fully programmable and has sophisticated reporting functions. Includes *PartManager* for program management and security.

### MCOSMOS 2

Includes MCOSMOS 1 plus...

**CAT1000P** is the ultimate in CAD to inspection software and runs in conjunction with Geopak, either on-line for optimum CMM control or off-line to maximise CMM up-time. Features include simple program generation by 'single click' element measurement, automatic probe path generation and simulation with collision detection.

**CAT1000S** is an advanced 3D-freeform-surface program that allows tolerance comparisons between measured points and the corresponding points on a CAD model, allowing operators to instantly see problem areas on a measured component. Deviations from nominal are colour coded and displayed graphically.

The standard *STEP* CAD format is provided with CAT1000. The optional formats of IGES, CATIA, Parasolid, PRO/E, SolidWorks, Unigraphics (NX) and Auto CAD Inventor are also available.

### MCOSMOS 3

Includes MCOSMOS 1 and 2 plus...

**Scanning and Profile Analysis** software providing measurement and analysis of profiles.

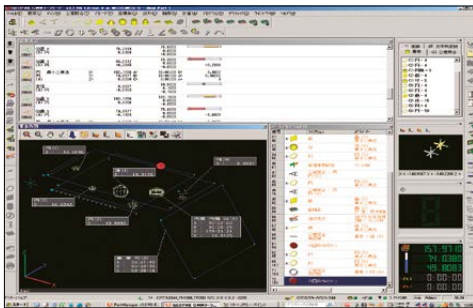
High speed contact scanning probes can be utilised to maximise data collection speed. Profiles can then be compared to nominal, output to CAD or used for subsequent analysis. Geometric components can also be computed from scanned results.

**MiCAT**

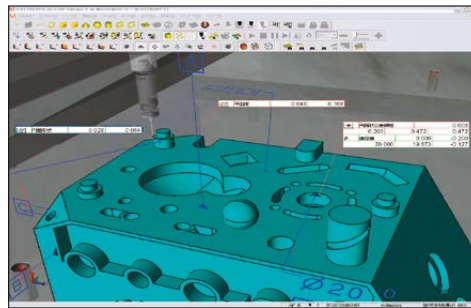
Mitutoyo Intelligent Computer Aided Technology

the standard in world  
metrology software  
**cmm**

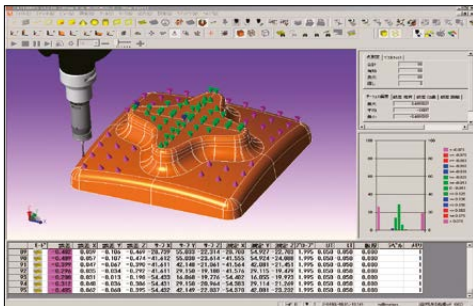
Module included	GEOPAK	CAT1000P	CAT1000S	SCANPAK
MCOSMOS 1	✓	—	—	—
MCOSMOS 2	✓	✓	✓	—
MCOSMOS 3	✓	✓	✓	✓



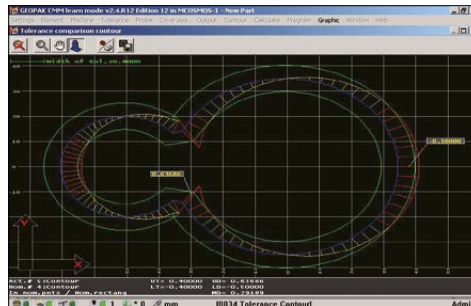
Geopak screenshot.



CAT1000P screenshot.



CAT1000S screenshot.



SCANPAK screenshot.

## MiCAT Planner CMM Software

- MiCAT Planner uses 3D CAD models with tolerance information to automatically generate CMM measurement programs, potentially with just one mouse click, thereby reducing part-programming time by up to 95%.
- Identifies tolerance information (GD&T) in 3D models and uses your CMM configuration to automatically generate an MCOSMOS program to measure features of the imported CAD model.
- Customisable rules ensure that measurements are executed in the same consistent way.
- Programming paths are optimised automatically for the shortest measurement time with the minimum of probe and tool changes.
- For design models that do not contain tolerance information, MiCAT Planner has a GD&T Wizard that allows you to simply annotate design models prior to program generation.
- MiCAT Planner screen setups offer simple interfaces such as 3D view and plan view, thereby enabling intuitive operation. The placement and window sizes of the interfaces can be freely customized.

### 3D View

Full-colour graphics showing:

- Measuring machine details.
- CAD model with tolerances.
- Measurement points and measurement paths.
- Measurement animations.

### Plan View

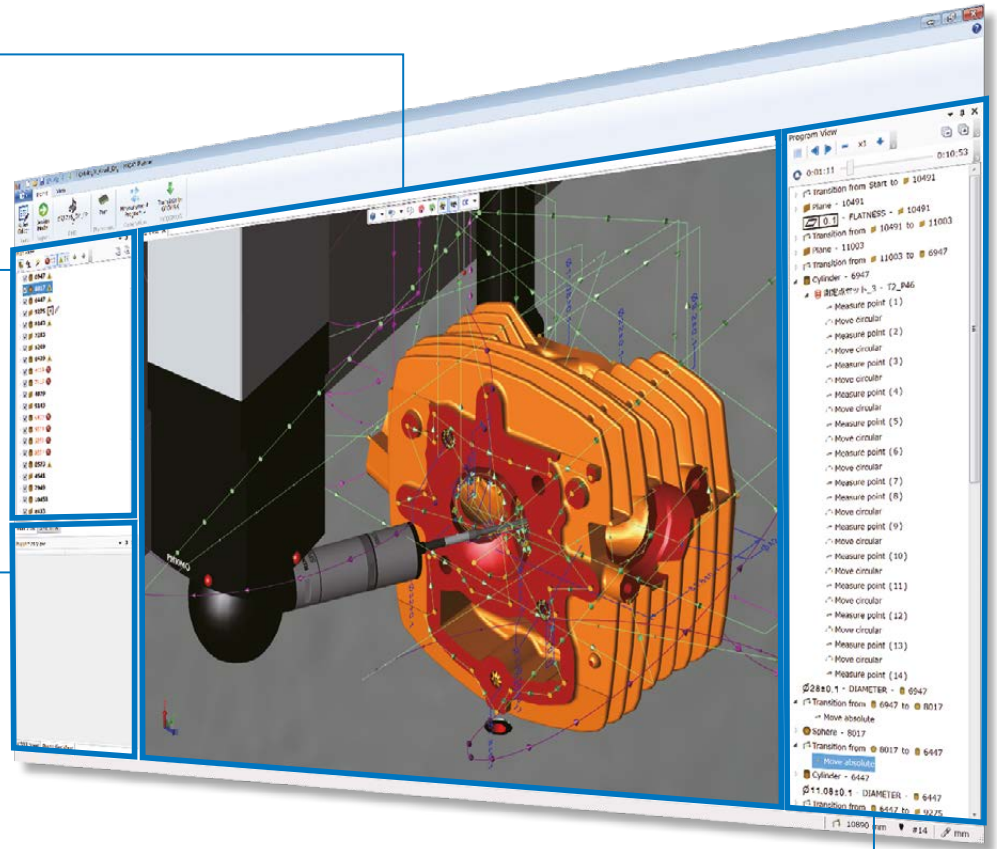
- Shows lists such as measurement parameters and tolerances.
- Lets you flag measurements and assessments using check boxes.
- The parameters are set in the order of the measurements.
- You can prioritise the order of measurement.

### Properties View

You can change the names of parameters, tolerance items and measurement points, and edit measurement points for individual parameters.

### Program View

- Shows measurement details and measurement estimation times.
- Enables animation of measurement programs in 3D.



### Easy

Simply load a CAD model and generate a CMM program with a single mouse click.

### Fast

Automatic generation is enabled by the input of CAD, tolerance information and measurement environment. Cycle times are automatically optimised to produce the fastest measurement routine.

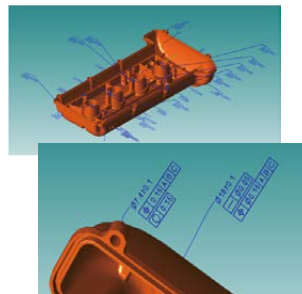
### Automatic

User-defined rules enable automatic feature measurement.

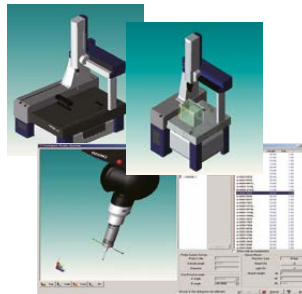
### Reliable

Eliminates potential for user error, misinterpretation of design intent, collisions.

#### CAD data with tolerance information

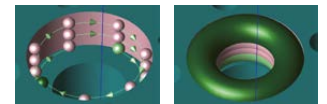


#### CMM system structural information



#### User defined measurement rules

Number of locations to measure CAD data with tolerance information and sampling method, etc.



Example of sampling method: touch measurement.

Example of sampling method: scanning measurement.

Instantly and automatically creates a measurement program



Output a measurement program for MCOSMOS

# SUPPORT & SERVICES





## Support &amp; Services



## Contents

Company Profile	U-03
Mitutoyo Corporate Philosophy	U-04
Mitutoyo UK Facilities	U-05
Calibration	U-07
Services – our commitment to our customers	U-08
Mitutoyo Gauging Technology	U-09
Training	U-11
European Network	U-12
Overseas Dealer Network	U-12
Terms and Conditions of Business	U-13

# Company Profile

Our leading position is built on many years of success



The future of measuring technology at Mitutoyo is growing on a solid grounding of more than 80 years of success.

The corporation that has now become a global leader in the field, offering more than 5,000 high-tech measuring tools, started out in 1934 by manufacturing just one single product: the mechanical outside micrometer.

Once company founder Yehan Numata had managed to turn the outside micrometer he had developed and manufactured into an extremely successful reference product, his focus expanded to include further measuring technology components.

Over the course of subsequent years and decades the company developed into one of the leading Japanese manufacturers of length and production measurement technology devices, and even back then offered the widest range of products of anyone in the sector.

The beginning of the 1960s – entry into the North American market having been successfully accomplished – marked the company's entry into Europe.

The company was therefore internationally and strategically in a prime position to face a new era in metrology driven by the advance of solid-state electronics technology, which gained increasingly in importance in the 1970s. As with their predecessors, the new electronically controlled form, surface and contour measuring devices, vision measuring systems and coordinate measuring machines bearing the Mitutoyo logo won over users around the globe.

The company then demonstrated its claim to leadership in the development and realization of innovative products once more by taking the next step in measuring device evolution – CNC technology.

Now, more than 80 years after the company was founded, the name Mitutoyo stands for the most comprehensive range of length measurement technology products and the most important internationally active full-range provider in this sector of industry.



Mitutoyo's founder, the Rev. Dr. Yehan Numata (1897-1994).

# Mitutoyo Corporate Philosophy

## Our name and logo

To become a complete man, one must acquire Wisdom, Benevolence and Valour. With Wisdom only, one tends to be cold. Benevolence alone makes one weaker. With Valour only, one may reach beyond his capabilities. When the three qualities are combined however, one will become a complete man. Similarly, success in enterprise lies in the knowledge of Heaven, Earth and Man. Business will succeed only when these three factors, 'heaven sent' chances, natural opportunities, and harmony of man are present. Without even one factor, success is remote.

In Buddhism, Butsu (Buddha), Po (Doctrine) and So (Priest) are three principle treasures for the promotion of teaching. In Christianity, God, Bible, and Minister. The word MITUTOYO signifies three abundances. 'Mitsu' means three, while 'Toyo' stands for state of abundance. The name MITUTOYO was selected with a sincere wish to see more complete men, to create a prosperous enterprise and to introduce righteous religion to all, along with the lasting wish for a peaceful world and fulfilment of meaningful life.

# Mitutoyo

The Mitutoyo Corporate Philosophy is essentially the perpetual 'core values' that our organization and employees shall uphold. It unites all the Mitutoyo Companies and their employees throughout the world in a common understanding and commitment.

### Our Founding Spirit

- To contribute to people's welfare through support of the advancement of Buddhist understanding.
- To see that Mitutoyo excels in its field of expertise and in its business conduct throughout the world.

### Our Corporate Motto

*'Good environment, good people, good technique'*

### Our Guiding Precepts

*'Sincerity, thoughtfulness, determined spirit'*

### Our Management Principles

To contribute to the wellbeing of society through precision measurement technologies. We shall conduct our business based on the following values to:

- Provide solution engineering to support our client business development.
- Contribute globally to the advancement of industrial measurement capability.
- Cultivate healthy relationships and common prosperity with trading partners.
- Support and promote global peace, human happiness and harmony with the environment.
- Apply business practices that reflect the integrity of Mitutoyo and our world-leading brand.
- Nurture a vibrant corporate culture that inspires a passion in our personnel to do their best... to be the best.



# Mitutoyo UK Facilities

Established in the UK for nearly 40 years



## Andover HQ

Mitutoyo UK Headquarters is located in Andover, Hampshire. This purpose-built facility is well positioned to serve the south of England and features an impressive Metrology Showroom that displays many of the latest Mitutoyo instruments and is equipped with state-of-the-art audio-visual technology.

Andover is also home to our National Distribution Facility, Service Base, Spares and Repairs Centre, and a Regional Training Centre, as well as our main Sales and Administrative Support Functions.

## Coventry

Serving the Midlands, the Coventry site houses our UKAS accredited Calibration Laboratory, along with a dedicated workshop for our Sub-Contract Measurement services. Alongside a modern Metrology Showroom, our Metrology Training Centre provides three classrooms offering the widest range of specialist Quality Control and Metrology Training available in the UK.

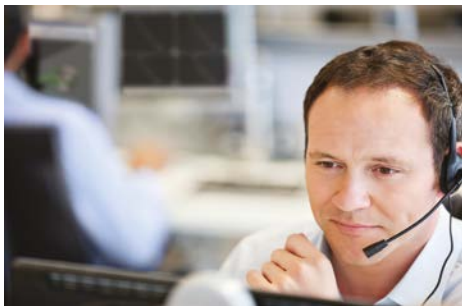
Coventry is also home to the Mitutoyo Gauging Technology division that provides a bespoke measurement solutions service.

## Halifax

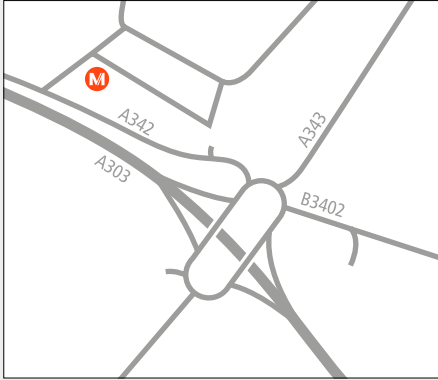
Our Halifax site located in Elland supports the North of England with a purpose-built Metrology Showroom, Training Facilities, Service Base and a dedicated workshop for our Sub-Contract Measurement services specializing in turbine-blade metrology.

## East Kilbride

Customers in Scotland are supported by our Metrology Showroom located in East Kilbride, where a wide range of our products is displayed.

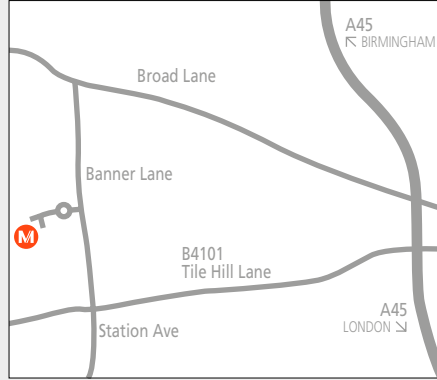


## Contact Details



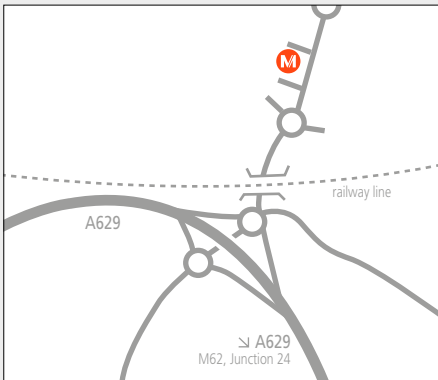
### Andover HQ

West Point Business Park, Joule Road, Andover,  
Hampshire SP10 3UX  
T +44 (0)1264 353123, F +44 (0)1264 354883



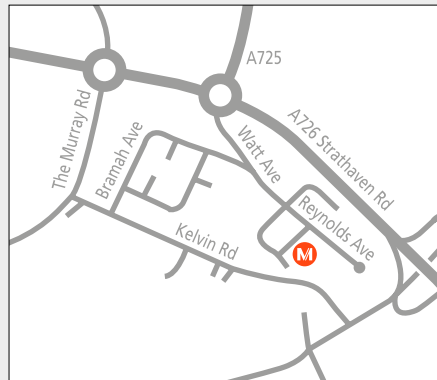
### Coventry Showroom

Unit 6, Banner Park, Wickmans Drive, Coventry,  
West Midlands CV4 9XA  
T +44 (0)2476 426300, F +44 (0)2476 426339



### Halifax Showroom

Lowfields Business Park, Navigation Close, Elland,  
West Yorkshire HX5 9HB  
T +44 (0)1422 375566



### East Kilbride Showroom

The Baird Building, Rankine Avenue, Scottish Enterprise  
Technology Park, East Kilbride G75 0QF  
T +44 (0)1355 581170, F +44 (0)1355 581171



# Calibration

Regular calibration ensures accuracy and repeatability



Calibration is an essential part of the activities of any company if quality control is taken seriously.

Measurement to a consistently high level of accuracy can only be achieved if instruments are periodically calibrated against traceable standards. Mitutoyo can provide a full range of services to meet this requirement at its environmentally controlled calibration laboratory in the Coventry Metrology

Centre, which has full UKAS accreditation and is equipped to handle every conceivable dimensional measurement need. It is recognised as one of the finest facilities of its kind in Europe.

Mitutoyo offers two types of service: a laboratory based Calibration Service at Coventry for portable measuring instruments, and an On-site Calibration Service for the larger type of instrument.

Our customers are assured of a fast turnaround on all calibration requirements involving dimensional instrumentation.



The scope of our Laboratory Calibration Service includes:

- Bore Gauges
- All types of Inside, Outside and Depth Micrometers
- Setting Rings
- Setting Standards
- Optical Parallels
- Vernier, Dial and DIGIMATIC Calipers
- DIGIMATIC Scales
- Height Gauges
- Depth Gauges
- Dial Gauges and Dial Test Indicators
- Thickness, Depth and Snap Gauges
- Dial Caliper Gauges
- Combination Sets
- Bevel Protractors
- Bench Centres
- Pin Gauges
- Steel Rules
- Height, Square and Check Masters
- Squares, Cylindrical Squares and Gauge Blocks and Accessories
- Calibration Testers
- Electronic and Bench Comparators

Our On-Site Calibration Service includes:

- Surface Tables
- Surface Plates
- Microscopes and Projectors
- Electronic and Optical Comparators
- CMMs
- Hardness Testing Machines



0332

# Services

Our commitment to our customers

## Spares and Repairs

Mitutoyo is well known for high-quality customer support and this is all down to our highly qualified and experienced staff. The Spares and Repairs department at our Andover headquarters deals with thousands of items every year, and the services that this facility offers are extensive. Our purpose-built workshop and calibration room is home to our team of trained technicians who share a wealth of skills from hand lapping to electronic fault diagnostics. Direct end-user contact is encouraged on all spares/repairs to enable a fast and cost-effective service – our dedicated customer support call centre team is always on hand for assistance.



## Field Service

When it comes to servicing and calibration in the field, Mitutoyo has no equal. Our team of field engineers operates across the country from our four regional metrology centres, providing an efficient service with the aim of delivering the fastest possible response to a request for support. In specialist areas such as CMMs, Optical Measurement and Hardness Testing, our engineers are UKAS accredited to provide dependable cover. The assurance of reliable after-sales service is just one reason why customers come back to Mitutoyo time after time.

## Maintenance

For high-specification measuring units, Mitutoyo also offers maintenance contracts for both hardware and software. Regular maintenance will ensure that your measuring instruments and machines stay precise, reliable and efficient.

## Sub-Contract Measurement



Mitutoyo is relied upon the world over for the quality and reliability of its products. It is this reputation that makes Mitutoyo the obvious choice for your sub-contract measurement requirements.

Whether calling on us due either to time or financial constraints, our Sub-Contract Measurement service ensures that the most cost-effective options are made available in order to meet the quality targets demanded worldwide. Our Coventry and Halifax Sub-Contract Measurement centres offer a full range of third-party measurement, reporting and programming services.

Halifax also provides specialist turbine blade measurement and programming resources. The most demanding components can be measured, profiled, analysed, scanned, programmed or compared to CAD data. In fact, any QC, QA production or SPC function can be carried out with speed and precision, causing the least possible disruption to your overall project plans.

Mitutoyo's Sub-Contract Measurement Centres feature the latest in measurement technology and are equipped to offer the following services:

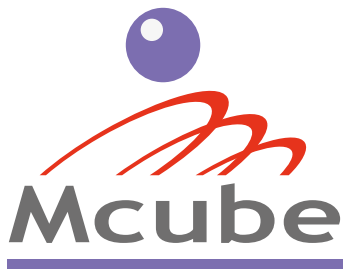
- Dimensional Measurement
- Hardness Testing
- Roundness Measurement
- Surface Finish Measurement
- Statistical Analysis
- Machine/Process Capability
- Initial Sample
- Inspection Reports
- Off-Line Programming (Geometry, Scanning, etc.)
- On-Site Programming
- Scanning/Digitising
- CAD/CAM Links and Reverse Engineering
- Profile Measurement and Comparison
- First-off/Last-off Verification
- Prototype Verification
- Mould and Die Measurement
- Design and Development Investigations

In today's ultra-competitive manufacturing environment, gaining a competitive advantage over the opposition is essential. This means that companies have to be quality focussed while at the same time remaining cost effective and reaching market as soon as possible.

Mitutoyo's Sub-Contract Measurement Service can help your company achieve these goals by providing a service that can free your resources, ensure you remain financially efficient and operate within project budgets.

# Mitutoyo Gauging Technology

Measurement solutions – meeting the needs of industry



Mitutoyo Gauging Technology provides a specialist service that aims to meet the increasing need for customised measurement solutions to support manufacturers' quality assurance operations. From one-off fixtures to a fully automated measurement system, Mitutoyo Gauging Technology can help you meet the simplest or the most complicated measurement challenge.

## A Specialist Service

Most measurement tasks encountered in the manufacturing industries are relatively straightforward and can be successfully handled by off-the-shelf products that are used as is, possibly with accessories from a standard range, or augmented by simple fixturing. These products are the end result of many years' experience and development and are, in many cases, extremely refined measuring instruments that incorporate the latest advances in mechanics, optics, electronics and software techniques.

However, many companies find that even these highly developed products do not fully meet their measurement needs for certain classes of workpiece and which therefore present – because of characteristics such as complex topology, dimensions or handling sensitivity, for example – a significant challenge to a company's engineering resources in devising a one-off, customised measurement solution.



The optimum solution often involves standard, high performance metrology products supported by a system incorporating a combination of mechanical, pneumatic, optical, hydraulic or electronic subsystems.

For many organisations, even if they have the expertise for this kind of task, it is simply not a sensible business proposition to take on this specialist task in-house. Competitive pressures dictate a strong focus on maintaining and improving core process efficiency and peripheral activities such as designing, building, testing and developing a bespoke measuring system can only be a cost-ineffective distraction.

This is where Mitutoyo Gauging Technology can be of immense service. The combination of a unique knowledge of the broadest line of measuring products in the world from a leader in measurement technology, together with wide-ranging expertise in materials handling and control system design means Mitutoyo Gauging Technology can offer you custom-built metrology for practically any measurement application in almost any industry.

Staffed by experts in many engineering disciplines who are dedicated to meeting your needs, Mitutoyo Gauging Technology can be your best partner in developing effective metrology solutions. High-precision instruments from the unrivalled Mitutoyo product portfolio, together with custom-built fixtures and automated systems are incorporated in the most cost-effective way possible. A turnkey solution, tailor-made to suit your exact requirements, is conceived, designed, built, developed and delivered to your premises with the minimum of disruption to your operations.







### A Winning Combination

This unique blend of expertise backed by unrivalled experience and knowledge of the finest products means that you can benefit by becoming more efficient and productive. Gauging Technology offers a complete range of systems and services that will meet any requirement, including:

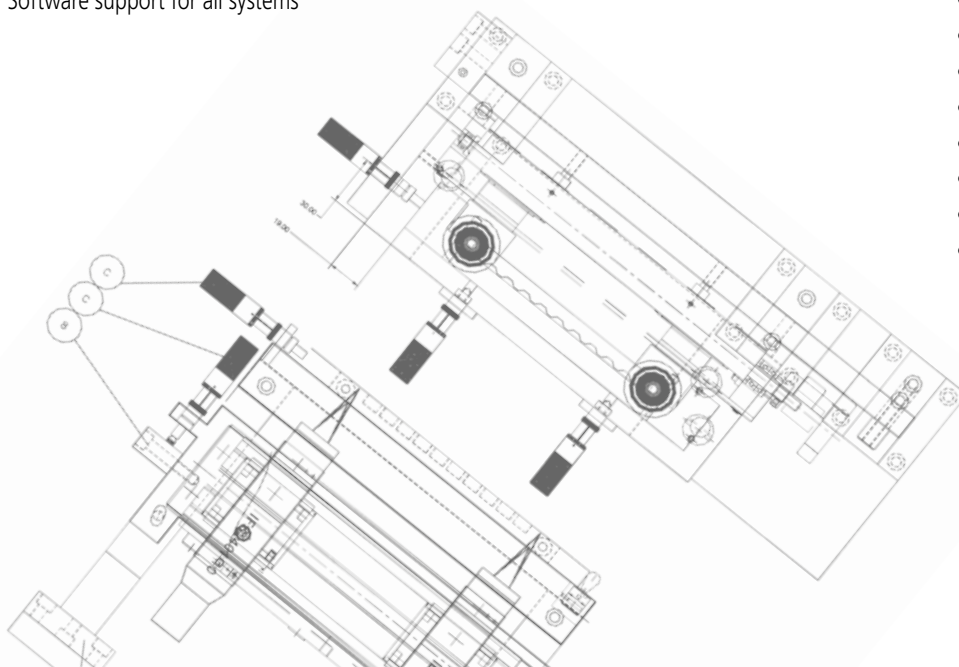
- All dimensional measurement applications including off-the-shelf measurement systems or custom-built specials
- All testing applications – Torque, Force, Pressure, Temperature and Sound
- Individual fixturing as stand-alone products or special systems designed to support existing Mitutoyo products
- Automated measurement systems
- All types of gauging and probing requirements
- Software support for all systems

### Making the Impossible, Possible

Using a combination of sophisticated CAD programming and years of experience with some of the best technical expertise around, Gauging Technology can cater for many different industries and applications. Every measurement requirement will be considered and no application is impossible.

Industry portfolio:

- Engineering
- Aerospace
- Printing
- Automotive
- Medical
- Transport
- Packaging
- Electronics
- Pharmaceutical
- Food



# Training

The future of UK industry depends on our ability to train and educate today – for the needs of tomorrow

We realise this and our commitment towards the raising of standards in measurement education starts from courses covering the fundamentals of precision measurement through to the most sophisticated of subject matter and product use/application.

We offer a wide range of training courses, all delivered by highly skilled Instructors who are specialists in their field and who have been carefully selected both for their academic record and industry experience. From Micrometers to CMMs there's probably a course to suit your needs or, if there isn't one that fits your exact requirements just ask, and we will design one to suit your specific demands.

Each of our courses is based on over 35 years of experience in offering help, advice and education to the manufacturing industries in the field of dimensional metrology. Designed to equip our trainees not only with theoretical knowledge but also to provide extensive *hands on* practical experience, great importance is attached to the practical communication of the contents.

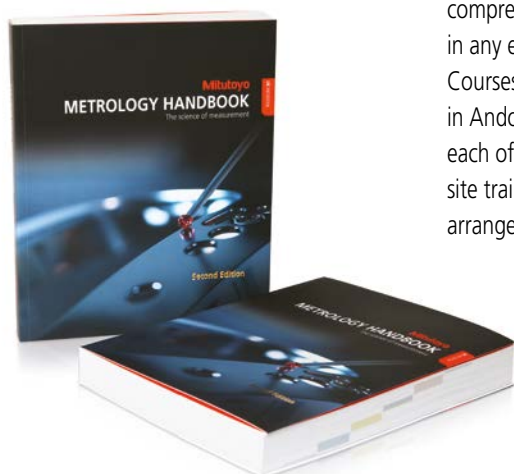


We currently offer 43 different training courses from the *Fundamentals of Dimensional Metrology* to advanced machine programming.

We at Mitutoyo are justifiably proud of our extensive resources and experience in the field of metrological training. Our facilities are second to none, and offer the most modern and comprehensive range of equipment to be seen in any educational establishment in our field. Courses are held at our four main training centres in Andover, Coventry, Halifax and East Kilbride, each offering superb facilities for Trainees. On-site training at Customers' premises can also be arranged.

Every trainee receives a selection of educational material when attending a course. To complement this material, Mitutoyo has exclusively produced the *Metrology Handbook - The Science of Measurement*. This 398-page reference book is primarily intended for anyone interested in gaining an understanding of the fundamentals of dimensional metrology and covers the basics of the subject right through to an overview of the most sophisticated and accurate inspection and calibration equipment available today. It is also a comprehensive reference resource for any reader whether you are a skilled engineer working in the field of metrology, an engineering apprentice or a student just starting out.

The *Metrology Handbook* is also available to purchase, priced £25.00, by calling our Sales Team on 01264 353123.




# European Network

Mitutoyo in Europe

## Mitutoyo Europe GmbH



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Since opening up the European market in the early sixties, Mitutoyo has been continuously consolidating its presence in this economically important region.

We had been preparing for the expansion of the European market well in advance of it becoming reality. As a result, a close network of production, sales and service facilities in more than 85 establishments in 33 countries is available to the customer.

In January 2010 Mitutoyo synchronised and strengthened the concerted pan-European activities by the establishment of a European headquarters at Neuss, near Dusseldorf, Germany.

Mitutoyo Europe GmbH oversees all the activities of Mitutoyo's sales, service and production facilities throughout Europe and adjacent markets, including business strategies of European operations.

A Mitutoyo Europe GmbH key objective is to promote coordination amongst its European Group Companies in order to optimise its sales and technical support services in the best interests of customer satisfaction.

## Overseas Dealer Spotlight

Mitutoyo in the United Arab Emirates



With over 30 years' experience in engineering, testing and calibration, General Tech Services is now an authorised distributor in the UAE, representing Mitutoyo to the highest standards of quality and service.



P.O. Box: 25898, Sharjah, UAE  
T +971 (6)5436933, F +971 (6)5437077  
[www.generaltech.ae](http://www.generaltech.ae)

# Terms and Conditions of Business

## Business to Business Supplies

### 1 Definitions

In these Terms and Conditions certain phrases shall be understood to have the following meanings:

"the Seller" means Mitutoyo (UK) Limited.

"Goods" means any product, Software\* and/or technology which is to be sold (or licensed out) by the Seller.

"the Buyer" means any person, company or organisation which buys or has agreed to buy Goods from the Seller on a 'business to business' basis whereby the purchased Goods are for business use. These terms are not applicable to 'consumer' purchases.

"Contract" means the written agreement between the Buyer and the Seller specifying the offer under which the Buyer agrees to buy and the Seller agrees to sell Goods.

\*Software is supplied on the basis of an End-User Licence Agreement (EULA) where title does not pass and use is non-transferable. In relation to all other conditions herein Software is treated the same as purchased/sold "Goods".

### 2 Acceptance of Order

- 2.1 These Terms and Conditions shall form part of every Contract of sale of Goods entered into by the Seller and no alteration shall be effective unless in writing, signed by an authorised officer of the Seller and referring to these Terms and Conditions.
- 2.2 The placing of an order by the Buyer, whether or not based upon a quotation, shall not be binding on the Seller, unless accepted by the Seller in writing.
- 2.3 No representations or undertakings made or given on the Seller's behalf prior to Contract shall be binding on the Seller, unless incorporated expressly in writing into the Contract.
- 2.4 Goods ordered by the Buyer which are out of stock will be placed on back-order unless the Buyer shall specify Ex-stock or Cancel the order.
- 2.5 The Seller shall have no obligation to accept the return of Goods which shall be surplus to the Buyer's requirements or ordered in error. Any decision by the Seller to accept the return of Goods for credit shall not affect the Buyer's obligation to pay the price thereof on the due date for payment and such credit shall not exceed 90% of the price of the Goods and shall be conditional upon the Goods and packaging being returned without any damage or marking within 30 days of the Seller's invoice.
- 2.6 If the Buyer shall require any change in the terms, conditions or arrangements for the performance of the Contract the Buyer shall inform the Seller promptly and shall not implement any change without the Seller's written consent.

### 3 Specification

- 3.1 All specification, drawings and data contained in the Seller's catalogues or otherwise supplied by the Seller are approximate only, unless otherwise stated in writing.
- 3.2 The Seller reserves the right without prior notice to effect modifications and design changes and to discontinue manufacture of any Goods as part of a continuous programme of product development.

### 4 Selection/Representation

- 4.1 The Buyer shall be responsible for determining whether the Goods ordered are suitable and sufficient for the intended purpose.
- 4.2 The Seller shall have no liability for the failure of the Goods to perform in accordance with specification when such failure shall be caused by their operation in environmental conditions that shall be unsuitable, unless the Buyer shall have stated in its order that such environmental conditions would apply and the Seller shall have accepted such stipulation in writing.
- 4.3 The Seller shall offer support to representing buyer Distributors in ensuring correct product specifications are furnished to satisfy End-user invitations to tender for the supply of Goods within its scope. However, the seller is not obliged to support a buyer Distributor if it shall fail to professionally present the Seller's Goods, in all essential features, particularly against an alternative offer and thus give cause to place a business opportunity at risk. In such circumstances the Seller reserves the right to facilitate direct End-user supply.

### 5 Prices

- 5.1 Prices quoted by the Seller are based upon its prices ruling at the date of quotation and the Seller reserves the right to adjust its

prices at the time of acceptance of order to reflect any increase in the cost of supplying the Goods or the publication of a new price list occurring after quotation.

- 5.2 Unless otherwise stated in writing, prices quoted by the Seller are exclusive of the cost of packaging and delivery and VAT.
- 5.3 The minimum order value (excluding packaging, delivery and VAT), shall be £75.00 nett.
- 5.4 The Buyer shall not be entitled to make any deduction from the price by way of set-off or counterclaim.

### 6 Payment

- 6.1 In the absence of agreed credit terms, payment shall be made in full in advance of delivery.
- 6.2 The Seller's credit terms are payment by the end of month following the month of invoice (tax point date).
- 6.3 Payment made by means of a cheque, bill or documentary credit shall be deemed to be effected when honoured and all costs of discounting and encashing shall be borne by the Buyer.
- 6.4 Time for payment shall be of the essence of the Contract.
- 6.5 In the event of delay in payment the Seller shall be entitled to charge interest at 4% per annum above HSBC plc base rate, without prejudice to the Seller's other rights.
- 6.6 During any such period of default and at any time when the Seller shall have reasonable grounds for doubting that any payment due from the Buyer will be made on the agreed date, the Seller shall be entitled to suspend work and withhold deliveries, without prejudice to its right to payment for Goods delivered and work done and expenses incurred in connection with undelivered Goods which shall become immediately due and payable.
- 6.7 If such default or other circumstances shall continue for a period of 14 days, the Seller shall be entitled to terminate the Contract by written notice to the Buyer, without prejudice to the Seller's other rights.
- 6.8 The granting by the Seller to the Buyer of time or other indulgence shall not prejudice or constitute a waiver of the Seller's rights under subclauses 6.6 and 6.7.
- 6.9 The Seller shall have a general lien over any Goods of the Buyer in the Seller's possession for all money due to it from the Buyer. If any lien is not satisfied within 14 days of such money becoming due, the Seller may sell the Goods as agent for the Buyer and apply the proceeds, after deducting the expenses of sale, towards the monies due and the balance (if any) shall be paid to the Buyer.

### 7 Delivery Times

- 7.1 The time for delivery shall be calculated from the date of acceptance of order by the Seller or from the date of its receipt of all information required to fulfil the order, if later.
- 7.2 The time for delivery shall not be of the essence of the Contract.
- 7.3 The Seller shall be entitled to make partial deliveries and this condition shall apply to each delivery.
- 7.4 The Seller shall endeavour to meet the Buyer's delivery requirements but shall not be liable for any loss or damage caused by delay in delivery and the Buyer shall not be entitled to cancel the Contract because of such delay.

### 8 Delivery

- 8.1 Unless otherwise agreed, delivery shall be effected at the premises of the Buyer or other place specified in the Contract for delivery and the method of carriage and choice of carrier shall be determined by the Seller.
- 8.2 The minimum carriage-paid order value (excluding VAT) shall be £150 nett for delivery in the UK mainland and £375 nett for delivery in the Republic of Ireland.
- 8.3 The Buyer shall be responsible for paying the Seller's carriage charges unless the Buyer shall make its own arrangements with the agreement of the Seller prior to the Seller arranging carriage. If the Goods shall be collected by the Buyer or by a carrier pursuant to arrangements made by the Buyer, delivery shall be deemed to take place on collection.
- 8.4 Upon the Seller notifying the Buyer that the Goods are ready for delivery, the Buyer shall agree to accept delivery. The Buyer shall be responsible for ensuring good access to the delivery site and providing such craneage and other assistance for unloading as may be specified in the Contract. If the Buyer should fail to give proper delivery instructions or to accept delivery when tendered or to provide such access or assistance, it shall be liable for all

additional costs incurred by the Seller.

- 8.5 If delivery should be delayed at the request of the Buyer the Seller may place the Goods in store at the Buyer's risk and the Buyer shall pay such storage cost and other costs incurred by the Seller as a result of such delay.

### 9 Installation

- 9.1 If the Seller shall undertake the installation of the Goods, the Buyer shall be responsible for ensuring that all necessary power, plant and labour and other facilities specified by the Seller shall be available when required and that the Seller shall be able to undertake such work, without interruption, during normal business hours.
- 9.2 Upon completion of the installation the Seller shall test the Goods. The Buyer shall be given the opportunity to attend such tests, but such test shall not be delayed in the event of the Buyer failing to attend.
- 9.3 The installation of the Goods shall be deemed to be satisfactory unless the Buyer shall give notice of any fault within 3 days of the testing of the Goods.
- 9.4 The provisions of subclauses 7.4 and 12.2 shall apply mutatis mutandis in respect of delays or defects in installation.
- 9.5 The Seller shall have no liability for redecoration or repair arising from the siting or installation of the Goods.

### 10 Title and Risk

- 10.1 Title to the Goods shall remain in the Seller until payment in full is made by the Buyer.
- 10.2 The provisions of subclause 10.1 shall not prevent the Buyer from fixing the Goods to any other product or selling the Goods in the normal course of business but in the event of sale to the extent of the Buyer's indebtedness to the Seller in respect of the Goods, the Buyer shall hold the proceeds of sale or the right to receive the same on trust for the Seller and shall, at the Seller's request, either (i) place the proceeds of sale in a separate account of the Buyer in such a way as to be identifiable as in the beneficial ownership of the Seller, or (ii) assign the right to receive the proceeds of sale to the Seller.
- 10.3 If the Buyer shall default in payment for any Goods and at any time when the Seller shall have reasonable grounds for doubting that payment for the Goods will be made on due date, the Seller, without prejudice to its other rights, may enter any land or premises where the Goods may be, to detach them if fixed and to recover possession of them.
- 10.4 The risk in the Goods shall pass to the Buyer on delivery or placing in store in accordance with subclause 8.5.

### 11 Damage in Transit

- 11.1 The Seller shall have no liability in respect of Goods lost or damaged in transit unless the Buyer or its agent notes such loss or damage on the delivery receipt and gives notice thereof in writing to the Seller and the carrier within 7 days of delivery or such shorter period as may be required by the carrier's conditions of carriage or, in the case of the whole consignment failing to arrive, gives notice thereof in writing to the Seller within 7 days of receipt of the Seller's invoice or despatch note or the estimated date of delivery, if later.
- 11.2 The Seller's liability in respect of Goods lost or damaged in transit shall be limited to repairing or replacing such Goods.

### 12 Warranty

- 12.1 Subject to Clause 3, the Seller warrants that the Goods will comply with specification and will be of merchantable quality but not that they shall be fit for any particular purpose.
- 12.2 The Seller will repair or replace any Goods which under proper use prove to be defective within the period of 12 months from the date of delivery due to faulty materials or bad workmanship or, subject to Clause 3, the Seller's failure to supply Goods of the specification or quality ordered, provided as follows: (i) that in the case of defects which would have been apparent on reasonable inspection on delivery, the Buyer shall notify the Seller of the defect in writing within 7 days of the date of delivery; (ii) that in the case of any other defect, the Buyer shall notify the Seller of the defect in writing within 10 days of the date when the defect became apparent and, in any event, within 12 months from the date of delivery; (iii) that the Buyer and any user of the Goods shall have complied with the instructions of the Seller or manufacturer of the

- Goods as to the maintenance and operation; (iv) that the Buyer shall give to or procure for the Seller the opportunity to inspect and test the Goods and, if requested, shall return the Goods to the Seller, carriage paid, such carriage charges to be refunded by the Seller if the defect shall constitute a valid claim under this Clause.
- 12.3 Subject to any statutory provision to the contrary, the liability of the Seller under this Clause shall be in lieu of and to the exclusion of any other condition, warranty, or other term, whether express or implied by law, as to the quality of the Goods or their fitness for any particular purpose or otherwise and, subject as aforesaid, the Seller shall have no liability, whether arising in Contract, tort or otherwise, in respect of any defect in the Goods or any injury, damage or loss resulting from such defect.
- 13 Indemnity**  
Subject to any statutory provision to the contrary, the Seller shall have no liability for any loss or damage suffered by any third party caused directly or indirectly by the Goods, whether as the result of their operation or use or otherwise and whether as the result of any defect therein or otherwise and the Buyer shall indemnify the Seller from any claim arising from any such loss or damage.
- 14 Force Majeure**  
The Seller shall not be liable for any loss or damage sustained by the Buyer by reason of any act of God, war, riot, fire, strike, lock out, governmental control or regulation, abnormal weather conditions, accident, breakdown or any other circumstances beyond the Seller's control and in such event, insofar as the Contract shall not have been performed, the Seller may either terminate the Contract and return any advance payment received or delay delivery for such period as may be necessary.
- 15 Confidentiality**  
15.1 All drawings, documents and artefacts supplied by one party to the other shall remain the copyright and property of the party supplying the same and may not be copied or reproduced without its consent and such documents shall be returned in the event of the Contract not being made or completed.  
15.2 Any trade secret or confidential information supplied by either party to the other shall be kept confidential and shall not be disclosed to any third party without the consent of the party supplying the same. The Seller shall take all reasonable measures not to disclose such confidential information during the course of performing physical examination, calibration or a measurement activity when an artefact may be visually exposed.
- 16 Infringement**  
16.1 The Buyer shall notify the Seller immediately of any circumstances coming to its attention which may be likely to give rise to any claim that the Goods infringe the rights of any third party and shall permit the Seller to conduct any action or negotiations in respect thereof in the name of the Buyer but at the Seller's expense.  
16.2 In the event of any such claim being successful, the Seller shall indemnify the Buyer against any liability it may sustain to such third party, but shall have no other liability to the Buyer in respect thereof.
- 17 Notices**  
Any notice to be given by either party to the other shall be properly given if sent by email, fax or post to the party to be served at its head office or last known address and shall be deemed to have been served, in the case of postal delivery, when in the normal course of post it would have been delivered.
- 18 Export/Import/Movement Control/Goods and Technologies**  
18.1 Export: the Buyer shall inform the Seller of any Goods to be purchased, or licensed, or technical information sought, that is intended for export as the Terms and Conditions herein are primarily for the UK home market. It is the responsibility of the Buyer to declare to the Seller the intended final destination, the end-user

- and nature of use of all such Goods. The Seller shall then offer advice on its Goods known to be subject to export controls. The Buyer is ultimately responsible for ensuring that all such exports comply fully with the UK Department of International Trade (DIT) Export Control Joint Unit (ECJU) and any related legislation that may apply following the UK leaving the EU (Brexit). The Seller will not entertain the service or support of any Goods that have been exported without due evidence of export control compliance. The Seller will report to the appropriate authorities any known or suspected violation of export control requirements that may come to its attention.
- 18.2 Movement Control: the Seller has certain Goods that are classed as "Dual-use", i.e. may be used for civil or military application. The Buyer shall purchase the Goods on the understanding that they are equipped with a "movement sensor" that will disable operation should excessive vibration or movement be detected. Resetting of the sensor may be undertaken, at no charge to the Buyer, subject to the Seller being afforded advance notice of the intended move or event that may trip the sensor. In the event of the Goods relocation, the Buyer must ensure the destination and use shall not contravene applicable export controls.
- 18.3 Goods and Technologies: technology is defined in terms of "information relating to controlled Goods or Software" and may be transferred by various means such as drawings, emails, manuals and instructions etc. Such transfer of technology is also subject to export control where it is required for the development, production or use of listed Goods or Software. Technical assistance for repair, training or consultancy is not deemed as technology transfer but relating documentation and "relevant use" of the technologies may be subject to licensing. The Buyer should therefore make the Seller aware of any intended or consequential overseas transfer of technology in relation to the Seller's provision of Goods and technologies. The Buyer shall be bound by the assurance (as per Clause 19) given to the Seller as an integral part of these Terms and Conditions of business. This shall cover all of the Seller's Goods and technologies, their permitted use and the strict adherence to export controls. The Seller may seek additional assurances from the Buyer as the Seller and Control Authorities deem necessary.
- 18.4 Import: the majority of the Seller's Goods do not require an export licence from the country of manufacture or an import licence into the UK. However, where certain Goods do require licensing, supply will be conditional on the Buyer's ability to fulfil the criterion used by the Seller, and the appropriate authorities, to determine the ability to meet the licence conditions. This may include the completion of detailed information relative to the status of the Buyer, the end-user, destination of use and application of the Goods. The Buyer shall be bound by the assurance (as per Clause 19) and where certain Goods do require a specific Export Licence from the country of manufacture, the Buyer may also need to furnish to the Seller an individual "Letter of Assurance" and "End user" undertaking in order to satisfy licence application requirements. Furthermore, any Buyer supplying Goods directly or indirectly to the UK Defence Industry or to any body where use is connected with a military application will need to satisfy the Seller's additional security control assessment procedures as demanded by the Export/Import Control Authorities. This shall include evidence detailing the status of the Buyer's customer, related supply approvals and details, in so far as confidentiality will permit, of the products or services to which they are contracted to supply. Disclosure of insufficient information to satisfy the requirements of the licensing authorities will result in the export licence application being declined. The Seller is unable to accept any liability in the event of this decision.
- 19 Assurance**  
The Buyer, in entering into a business transaction with the Seller does so on the Terms and Conditions herein including this assurance that as a Company, person or organisation, responsibility shall be accepted for ensuring strict adherence to the Seller's Export/Import control compliance procedures and the UK Export

Control Act 2002 (and subsequent amendments) as well as those related to 'controlled goods' for any destination following the UK leaving the EU. The Buyer will actively support all measures to combat terrorism and promote global peace and harmony. The Buyer will not use or deliver, directly or indirectly, any Goods, Software and/or technology ("Goods") acquired from the Seller and/or any of its affiliated or subsidiary Companies to any customer and/or to any party that are, to the best of the Buyer's knowledge, involved or engaged in development, production, utilisation, application, enhancement, or distribution of nuclear, chemical or biological weapons, and/or transportation for such weapons of mass destruction. Furthermore, the Buyer commits to observing the independent embargo measures for combating international terrorism so as to ensure that it shall not deliver, directly or indirectly, the Goods to any party or any body listed by the U.S. "Denied Persons List", U.S. "Entity List" and EU "List of terrorists". The Buyer acknowledges that prohibitions and restrictions concerning the combating of terrorism have to be observed and followed. The Buyer, as a Company, person or organisation, shall be required to immediately inform the responsible authorities of any knowledge acquired concerning transactions involving the Goods with Companies or individuals mentioned in the above respective lists. The Buyer recognises that supply of certain Goods will be subject to the completion and verification of "end-user" and "end-use" particulars, as will be sought by the Seller. The Buyer accepts that facts to be provided must be to the satisfaction and acceptance of the Seller and the Ministry of Economy, Trade and Industry, Japan (Export Control Authority). Following installation of the Goods, the Buyer shall notify the Seller of any subsequent change of the Goods location or transfer of ownership. The Buyer is fully responsible for seeking authorisation from the UK Department of International Trade (Export Control Joint Unit) ECJU in the event of the need for transfer or export from the UK mainland of the Goods. The Buyer must notify the Seller of any such requirements and the Seller will provide advice and relocation assistance (including the resetting of any applied movement sensor) when evidence of the appropriate authorisation has been attained.

**20 Bribery Act 2010**

The Seller, as part of its ethics policy, is committed to prevention, detection and elimination of all forms of corrupt business practise. The Seller will not tolerate any form of bribery or corruption and expects its business partners and buyers to comply with the Act and follow the principles of good business conduct.

**21 Equal Opportunities/Equality and Diversity**

The Seller applies an equal opportunity/equality and diversification policy and will not discriminate either directly or indirectly on the grounds of race, nationality, ethnic origin, gender, marital status, pregnancy, age, disability, sexual orientation, ethnicity, culture or religious beliefs. The seller shall not engage with any buyer, individual or organisation known to contradict this policy.

**22 GDPR**

The Seller currently complies with the EU General Data Protection Regulation (GDPR) and shall treat all personal data accordingly. The UK Data Protection Act 2018 remains in place however following the UK leaving the EU it is intended to bring GDPR directly into UK law with most principles, rights and obligations remaining the same. Personal Information submitted by the Buyer and contact details will only be used to communicate in relation to the subject matter and should any further personal information be sought or need to be used it will be on the basis of receiving the persons explicit consent.

**23 Law**

The Contract shall be governed by English law and the English courts shall have jurisdiction to determine any dispute between the parties in relation thereto.

E&OE. Although every care has been taken the company cannot warrant that the information provided in this catalogue is complete or without error. If a particular product feature is important to your purchase of that product then please verify the exact product specification with the Sales Team at the time of placing an order. Illustrations and specifications given in this catalogue are not binding, as design and construction of measuring instruments and gauges may be influenced by further development. Reprint of text and illustrations, complete or in parts, is not allowed without explicit permission in writing from Mitutoyo (UK) Ltd.

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# Series Number Index

This is an index to the Series Numbers associated with the products shown in this catalogue

No.	Description	Page
<b>1 - 199</b>		
1	Back Plunger Dial Indicators	F-36
1	Compact Dial Indicators	F-21, F-22
1	One Revolution Dial Indicators	F-29, F-30
2	0.001 mm and 0.005 mm Graduation Dial Indicators	F-25, F-26
2	0.01 mm Graduation Dial Indicators	F-23, F-24
2	Back Plunger Dial Indicators	F-36
2	Inch Reading Dial Indicators	F-27, F-28
2	Long Stroke Dial Indicators	F-31, F-32
2	One Revolution Dial Indicators	F-29, F-30
2	Special Purpose Dial Indicators	F-35
3	Long Stroke Large Dial Indicators	F-33, F-34
4	Long Stroke Large Dial Indicators	F-33, F-34
7	Dial Depth Gauges	D-59
7	Dial Gauge Stands	F-69
7	Dial Thickness Gauges	F-59, F-60
7	Magnetic Stands	F-67, F-68
7	Micro Jack	B-88
102	Economy Micrometer	B-14
102	Ratchet Thimble Micrometer	B-13
103	Economy Micrometer	B-15, B-16
104	Interchangeable Anvil Micrometer	B-20, B-21
105	Anvil Extension Collar Micrometer	B-22 to B-24
110	Differential Screw Micrometer Head	B-74
111	Spline Micrometer	B-45
112	Crimp Height Micrometers	B-55
112	Point Micrometer	B-47
114	Five-Flute V-Anvil Micrometer	B-50
114	Three-Flute V-Anvil Micrometer	B-49
115	Cylindrical/Spherical Anvil Tube Micrometers	B-43
115	Spherical Anvil and Spindle Tube Micrometers	B-42
115	Tube Micrometers	B-41
116	Interchangeable Anvil Universal Micrometer	B-27
117	Uni-Mike Interchangeable Anvil Micrometers	B-56
118	Sheet Metal Micrometer	B-40
122	Blade Micrometer	B-52
123	Disc Micrometer	B-34
124	Interchangeable Anvil Gear Tooth Micrometer	B-35, B-36
125	Screw Thread Micrometer	B-28
126	Interchangeable Anvil Screw Thread Micrometer	B-30
128	Depth Micrometer	D-53
129	Interchangeable Rod Depth Micrometer	D-51
133	Tubular Inside Micrometer	C-15, C-16
137	Extension Tube Inside Micrometer	C-18
139	Long Range Extension Tube Inside Micrometer	C-20
140	Long Range Extension Tube Inside Micrometer	C-20
141	Interchangeable Rod Inside Micrometer	C-23
143	Caliper Anvil Micrometer	B-26

No.	Description	Page
145	Inside Caliper Micrometer	C-22
146	Groove Micrometer	B-59, B-60
146	Non-Rotating Spindle Groove Micrometer	B-60
147	Can Seam Micrometers	B-53
147	Hub Micrometer	B-54
147	Wire Micrometer	B-54
148	Adjustable Thimble Small Standard Micrometer Head	B-78
148	Locking Screw Micrometer Head	B-79
148	Short Body Micrometer Head	B-76
148	Short Range Small Micrometer Head	B-75
148	Small Standard Micrometer Head	B-77
149	Carbide Tipped Spindle Small Standard Micrometer Head	B-80
150	Carbide Tipped Spindle Medium Standard Micrometer Head	B-81
151	ø8 mm Spindle Medium Standard Micrometer Head	B-82
152	Large Diameter Thimble Micrometer Head	B-83
152	XY-Stage Micrometer Head	B-84
153	Large Diameter Thimble High Accuracy Micrometer Head	B-86
153	Non-Rotating Spindle Micrometer Head	B-85
154	Small Hole Gauge Set	B-62
155	Telescoping Gauge Set	B-63
156	Micrometer Stands	B-68
157	Optical Parallels	B-64
158	Optical Flats	B-64
160	Vernier Nib Jaw Thumbwheel Caliper	D-23
164	Digimatic Rotatable Display Micrometer Head	B-72
167	Setting Standards for Outside Micrometers	B-65, B-66
167	Setting Standards for Screw Thread Micrometers	B-67
167	Setting Standards for V-Anvil Micrometers	B-67
169	Non-Rotating Spindle Disc Micrometer	B-38
169	Paper Thickness Micrometer	B-32
170	i-Checker	F-54
170	UDF-2 Dial Indicator Tester	F-55
172	PH-3515F Profile Projector	J-26
172	PH-A14 Profile Projector	J-27
174	2/3-Axis KA Counters	H-10
176	Hyper MF / Hyper MF-U Microscopes	J-08
176	Illumination Units	J-18
176	MF Microscope	J-06
176	MF-U Microscope	J-07
176	TM Microscope	J-05
176	Turrets for MF-U Microscopes	J-21
177	Steel Setting Rings	C-37, C-38
178	Surftest Extreme SV-3000CNC	L-13
178	Surftest Extreme SV-M3000CNC	L-14
178	Surftest SJ-210	L-03
178	Surftest SJ-310	L-04
178	Surftest SJ-410	L-07, L-08
178	Surftest SJ-500	L-09

No.	Description	Page
178	Surftest SJ-500P	L-10
178	Surftest SV-3200	L-11, L-12
180	Combination Square Set	E-18
181	Magnetic V-Block	F-74
181	V-Block Set	F-73
182	Steel Rules	E-19
183	Clear Loupe Magnifier	J-04
183	Interchangeable Reticle Magnifier	J-03
183	Pocket Magnifiers	J-04
183	Reticles	J-03
183	Zoom Loupe Magnifier	J-04
184	Thickness Gauges	E-20
186	Radius Gauges	E-21
187	Digital Universal Protractor	E-22
187	Universal Bevel Protractor	E-22
188	Thread Pitch Gauges	E-21
191	CRYSTA-Apex EX	N-07, N-08
191	CRYSTA-Apex S	N-05, N-06
192	Digimatic Double Column Height Gauge	D-43, D-44
193	Mechanical Counter Micrometer	B-17
196	CRYSTA-Plus M	N-04
197	Large Diameter Thimble Non-Rotating Spindle Micrometer Head	B-87
<b>200 - 299</b>		
201	Dial Snap Gauges	F-66
209	Coolant Proof Inside Dial Caliper Gauge	F-65
209	Coolant Proof Outside Dial Caliper Gauge	F-63
209	Digimatic Coolant Proof Inside Caliper Gauge	F-64
209	Digimatic Coolant Proof Outside Caliper Gauge	F-62
211	Roundtest Extreme RA-2200CNC	L-43
211	Roundtest Extreme RA-H5200CNC	L-44
211	Roundtest RA-10	L-37
211	Roundtest RA-120	L-38
211	Roundtest RA-120P	L-39
211	Roundtest RA-1600	L-40
211	Roundtest RA-2200	L-41
211	Roundtest RA-H5200	L-42
215	Comparator Stands	F-70
215	Granite Comparator Stands	F-71
218	Contracer CV-2100M4	L-18
218	Contracer CV-2100N4	L-17
218	Contracer CV-3200	L-19
218	Contracer CV-4500	L-20
227	ABSOLUTE Digimatic Adjustable Measuring Force Micrometer	B-12
264	Digimatic Input Tools	A-17
264	Digimatic Multiplexers	A-18
264	DigiStore	A-20
264	DP-1VA LOGGER Digimatic Mini-Processor	A-21, A-22
264	QM-Data200 2D Data Processing Unit	J-19, J-28
264	U-WAVEfit	A-13, A-14
293	ABSOLUTE Digimatic High-Accuracy Micrometer	B-03, B-04
293	ABSOLUTE Digimatic Quickmike Micrometer	B-11

No.	Description	Page
293	Digimatic Micrometer	B-09
293	Digital Micrometer	B-10
293	IP65 Digimatic Micrometer	B-07, B-08
293	QuantuMike Fast Action Waterproof Digimatic Micrometer	B-05, B-06

### 300 - 399

302	PJ-A3000 Profile Projector	J-23
303	PJ-H30 Profile Projector	J-24
304	PV-5110 Profile Projector	J-25
313	Three-Wire Units	B-31
314	Digimatic V-Anvil Micrometer	B-48
317	Digimatic Uni-Mike Interchangeable Anvil Micrometers	B-56
318	Litematic	G-12
323	Digimatic Disc Micrometer	B-33
324	Digimatic Interchangeable Anvil Gear Tooth Micrometer	B-35
326	Digimatic Interchangeable Anvil Screw Thread Micrometer	B-29
329	Digimatic Interchangeable Rod Depth Micrometer	D-51
331	Digimatic Spline Micrometer	B-44
332	OPTOEYE-200 Image Edge Sensor	J-29
337	Digimatic Extension Tube Inside Micrometer	C-17
339	Digimatic Long Range Extension Tube Inside Micrometer	C-19
340	Digimatic Interchangeable Anvil Micrometer	B-19, B-21
342	Digimatic Crimp Height Micrometer	B-55
342	Digimatic Point Micrometer	B-46
343	Digimatic Caliper Anvil Micrometer	B-25
345	Digimatic Inside Caliper Micrometer	C-21
350	Digimatic Micrometer Head	B-73
355	FALCIO G	N-10
355	STRATO-Apex	N-09
356	LEGEX	N-11
357	MACH-Ko-Ga-Me	N-12
359	Quick Scope	K-05
359	Vision Unit	J-20
360	MACH-3A	N-13
360	MACH-V	N-14
361	Quick Image	K-03
363	Hyper Quick Vision WLI	K-15
363	Quick Vision ACCEL	K-11
363	Quick Vision Active	K-07
363	Quick Vision Apex	K-08
363	Quick Vision Hyper	K-09
363	Quick Vision STREAM PLUS	K-10
363	Quick Vision ULTRA	K-12
364	MiSCAN Vision System	K-17
364	Quick Vision TP	K-16
364	UMAP Vision System Type 2	K-18
365	Quick Vision HYBRID Type 1	K-13
365	Quick Vision HYBRID Type 4	K-14
368	Holtest (Type II) Three-Point Bore Micrometer	C-11, C-12

No.	Description	Page
368	Holtest Three-Point/Two-Point Bore Micrometers	C-07 to C-10
369	Digimatic Non-Rotating Spindle Disc Micrometer	B-37
375	Focus Pilot FP-05	J-21
375	Stage Micrometer	J-21
378	Eyepieces for Measuring Microscopes	J-12
378	Microscope Head FS70	J-11
378	Microscope Video Unit VMU	J-09
378	Objectives for Measuring Microscopes	J-12 to J-17
378	Wide-Field Microscope Video Unit	J-10
389	Digimatic Sheet Metal Micrometer	B-39
395	Digimatic Cylindrical/Spherical Anvil Tube Micrometers	B-43
395	Digimatic Spherical Anvil and Spindle Tube Micrometer	B-42
395	Digimatic Tube Micrometer	B-41

### 400 - 499

406	Digimatic Non-Rotating Spindle Micrometer	B-18
422	Digimatic Blade Micrometer	B-51
468	Digimatic Holtest Three-Point Bore Micrometer	C-03, C-04
468	Digimatic Holtest Three-Point Bore Micrometer Interchangeable-Head Sets	C-05
468	Digimatic Holtest Three-Point Bore Micrometer Non-Interchangeable-Head Sets	C-06

### 500 - 599

500	ABSOLUTE Digimatic Caliper	D-07, D-08
500	ABSOLUTE Digimatic Coolant Proof Caliper	D-05, D-06
500	ABSOLUTE Digimatic Coolant Proof Solar SuperCaliper	D-03, D-04
500	ABSOLUTE Digimatic Long Beam Caliper	D-09
500	ABSOLUTE Digimatic Solar Caliper	D-10
505	Dial Caliper	D-25
506	Vernier Adjustable Scale Height Gauge	D-40
510	Indicating Micrometer	B-57
511	ABSOLUTE Digimatic Bore Gauge	C-34
511	Blind Hole Bore Gauge	C-33
511	Bore Gauge	C-29, C-30
511	Micrometer Head Bore Gauge	C-31, C-32
511	Small Hole Bore Gauge	C-27, C-28
513	Horizontal Dial Test Indicator	F-45, F-46
513	Pocket Dial Test Indicator	F-49
513	Universal Dial Test Indicator	F-50
513	Vertical and Parallel Face Dial Test Indicators	F-47, F-48
514	Vernier Adjustable Scale Height Gauge	D-40
515	CERA Caliper Checker	D-45
515	Check Master	E-17
515	Depth Micro Checker	D-61
515	Dial Bore Gauge Checker	C-36
515	Height Master	E-15, E-16
515	High Accuracy Check Master	E-17

No.	Description	Page
515	Inside Micro Checker	C-24
516	Caliper Inspection Gauge Block Set	E-06
516	Gauge Block Accessory Sets	E-11
516	Inch Gauge Block Sets	E-05
516	Maintenance Kit for Gauge Blocks	E-13
516	Metric Gauge Block Sets	E-05
516	Micrometer Inspection Gauge Block Set	E-06
516	Wear Block Sets	E-10
517	Black Granite Surface Plates	E-26
518	Linear Height	D-47, D-48
518	QM-Height	D-49, D-50
519	Transfer Stand	F-72
521	Calibration Tester	F-56
523	Dial Snap Meter	B-58
525	Formtracer CS-3200	L-27
525	Formtracer Extreme CS-5000CNC/CS-H5000CNC	L-28
525	Formtracer Extreme SV-C4500CNC	L-25, L-26
525	Formtracer SV-C3200/SV-C4500	L-23, L-24
526	Extra Small Hole Bore Gauge	C-25, C-26
527	Dial Fine Adjustment Depth Gauge	D-58
527	Vernier Depth Gauge	D-56
528	Straight Edge	E-18
530	Vernier Caliper	D-11, D-12
531	Vernier Thumb Clamp Caliper	D-14
532	Vernier Thumbwheel Caliper	D-13
534	Vernier Long Jaw Thumbwheel Caliper	D-24
536	Vernier Blade Caliper	D-30
536	Vernier Hook Jaw Caliper	D-36
536	Vernier Inside Groove Caliper	D-32
536	Vernier Knife Edge Inside Caliper	D-31
536	Vernier Moving Jaw Caliper	D-37
536	Vernier Neck Jaw Caliper	D-34
536	Vernier Offset Centreline Caliper	D-27
536	Vernier Offset Jaw Caliper	D-26
536	Vernier Point Caliper	D-29
536	Vernier Point Jaw Inside Caliper	D-33
536	Vernier Tube Thickness Caliper	D-35
539	AT116 Slim Spar Economy Linear Scale	H-08
539	AT715 ABSOLUTE Coolant Proof Linear Scale	H-09
542	EB Counter	G-07
542	EC Counter	A-19, F-18, G-06, H-03
542	EH Counter	G-08
542	EV Counter	G-09
542	LGB Extra-Slim Linear Gauge	G-04
542	LGF Linear Gauge	G-03
543	ABSOLUTE Digimatic Bore Gauge Indicator ID-C	F-14
543	ABSOLUTE Digimatic Calculating Indicator ID-C	F-12
543	ABSOLUTE Digimatic Indicator ID-CX	F-09, F-10
543	ABSOLUTE Digimatic Indicator ID-F	F-15
543	ABSOLUTE Digimatic Indicator ID-N/B	F-05, F-06
543	ABSOLUTE Digimatic Indicator ID-S	F-16
543	ABSOLUTE Digimatic Peak Value Hold Indicator ID-C	F-11

# Series Number Index

This is an index to the Series Numbers associated with the products shown in this catalogue

No.	Description	Page
543	ABSOLUTE Digimatic Signal Output Indicator ID-C	F-13
543	ABSOLUTE Digimatic Solar Indicator ID-SS F-03, F-04	F-03, F-04
543	Digimatic Indicator ID-H	F-07, F-08
544	LSM-500S	G-13
544	LSM-501S	G-14
544	LSM-503S	G-15
544	LSM-506S	G-16
544	LSM-512S	G-17
544	LSM-516S	G-18
544	LSM-6200	G-21
544	LSM-902H-6900	G-19
544	LSM-9506	G-20
546	Contact Force Gauge	F-61
547	ABSOLUTE Digimatic Depth Gauge	D-60
547	ABSOLUTE Digimatic Thickness Gauge	F-57, F-58
550	ABSOLUTE Digimatic Nib Jaw Caliper	D-15
551	ABSOLUTE Digimatic Nib/Standard Jaw Caliper	D-16
552	ABSOLUTE Digimatic Coolant Proof Carbon Fibre Caliper	D-17, D-18
552	ABSOLUTE Digimatic Coolant Proof Ceramic Jaw Carbon Fibre Caliper	D-20
552	ABSOLUTE Digimatic Coolant Proof Interchangeable Jaw Carbon Fibre Caliper	D-21, D-22
552	ABSOLUTE Digimatic Long Jaw Carbon Fibre Caliper	D-19
568	ABSOLUTE Digimatic Borematic Snap-Open Bore Gauge	C-13, C-14
570	ABSOLUTE Digimatic Height Gauge	D-41, D-42
571	ABSOLUTE Digimatic Coolant Proof Depth Gauge	D-54
571	ABSOLUTE Digimatic Coolant Proof Hook End Depth Gauge	D-57
571	ABSOLUTE Digimatic Depth Gauge	D-55
572	ABSOLUTE Digimatic Coolant Proof Scale	H-04
572	ABSOLUTE Digimatic Scales	H-05 to H-07
573	ABSOLUTE Digimatic Back Jaw Centreline Caliper	D-28
573	ABSOLUTE Digimatic Coolant Proof Blade Caliper	D-30
573	ABSOLUTE Digimatic Coolant Proof Inside Groove Caliper	D-32
573	ABSOLUTE Digimatic Coolant Proof Knife Edge Inside Caliper	D-31
573	ABSOLUTE Digimatic Coolant Proof Neck Jaw Caliper	D-34
573	ABSOLUTE Digimatic Coolant Proof Offset Centreline Caliper	D-27
573	ABSOLUTE Digimatic Coolant Proof Offset Jaw Caliper	D-26
573	ABSOLUTE Digimatic Coolant Proof Point Caliper	D-29
573	ABSOLUTE Digimatic Coolant Proof Point Jaw Inside Caliper	D-33
573	ABSOLUTE Digimatic Coolant Proof Tube Thickness Caliper	D-35
573	ABSOLUTE Digimatic Low Force Caliper	D-38

No.	Description	Page
573	ABSOLUTE Digimatic Snap Caliper	D-39
575	ABSOLUTE Digimatic Indicator ID-U	F-17
575	LGS ABSOLUTE Coolant Proof Linear Gauge	G-05
<b>700 - 799</b>		
700	QUICKmini	B-61
<b>800 - 899</b>		
810	Impact Type Hardness Tester	M-07
810	Micro-Vickers Hardness Testing Machines	M-03
810	Rockwell Hardness Testing Machines	M-05
810	Vickers Hardness Testing Machines	M-04
811	Dial Readout Durometers	M-09
811	Digimatic Durometers	M-08
<b>900 - 999</b>		
950	Digital Protractor	E-23
960	Precision Frame Level	E-24
960	Precision Level	E-24
963	Rockwell Hardness Testing Machines	M-06
967	Bench Centres	E-25



# Alphabetical Index

This is an index to products by name as shown in this catalogue

Description	Page
<b>A</b>	
AAT	L-41
Adjustable Measuring Force Micrometer	B-12
Adjustable Scale Height Gauge	D-40
Adjustable Thimble Small Standard Micrometer Head	B-78
Anvil Extension Collar Micrometer	B-22 to B-24
AT116	H-08
AT715	H-09

<b>B</b>	
Back Jaw Centreline Caliper	D-28
Back Plunger Dial Indicators	F-36
Bench Centres	E-25
Bidirectional Touch-Trigger Probe	D-44
Blade Calipers	D-30
Blade Micrometers	B-51, B-52
Blind Hole Bore Gauge	C-33
Bore Gauge	
Blind Hole	C-33
Borematic	C-13, C-14
Checker	C-36
Digimatic	C-13, C-14, C-34
Extension Rods	C-35
Extra Small Hole	C-25, C-26
Indicator ID-C	F-14
Micrometer Head	C-31, C-32
Setting Rings	C-37, C-38
Small Hole	C-27, C-28
Snap Open	C-13, C-14
Standard	C-29, C-30
Bore Micrometers	C-03 to C-12

<b>C</b>	
Cables	A-11, A-12, A-16
Calculating Indicator ID-C	F-12
Calibration Chart	K-21
Calibration Service	II, III, U-07
Calibration Stand	L-34
Calibration Tester	F-56
Caliper	
Anvil Micrometer	B-25, B-26
Back Jaw Centreline	D-28
Blade	D-30
Carbon Fibre	D-17 to D-22
Ceramic Jaw	D-20
Checker	D-45
Depth Gauge Attachment	D-62
Dial	D-25
Digimatic (see Digimatic Caliper)	
Gauges	F-62 to F-65
Hook Jaw	D-36
Inside Groove	D-32
Inspection Gauge Block Set	E-06
Interchangeable Jaw	D-21, D-22
Knife Edge Inside	D-31

Description	Page
Long Beam	D-09
Long Jaw	D-19, D-24
Low Force	D-38
Micrometer	C-21, C-22
Moving Jaw	D-37
Neck Jaw	D-34
Nib Jaw	D-15, D-23
Nib/Standard Jaw	D-16
Offset Centreline	D-27
Offset Jaw	D-26
Point	D-29
Point Jaw Inside	D-33
Snap	D-39
Solar	D-03, D-04, D-10
Standard Vernier	D-11 to D-14
Tube Thickness	D-35
Can Seam Micrometers	B-53
Carbon Fibre Calipers	D-17 to D-22
Centre Probe	D-46
Centre Support	J-22, J-30, L-34
CERA Caliper Checker	D-45
CERA Gauge Blocks	E-05, E-10
Ceramic Jaw Carbon Fibre Caliper	D-20
Ceraston Gauge Block Maintenance Stone	E-14
Check Master	E-17
Chuck	L-35, L-47
Clamping Systems	K-22, N-18
Clear Loupe Magnifier	J-04
Collets	L-47
Combination Square Set	E-18
Compact Dial Indicators	F-21, F-22
Company Profile	U-03
Comparator Stands	F-70, F-71
Compensation Chart	K-21
Conformance	IV
Contact Details, UK Sites	U-06
Contact Force Gauge	F-61
Contact Points	F-37 to F-40
Contact Sensor	D-46
Conracer	
CV-2100M4	L-18
CV-2100N4	L-17
CV-3200	L-19
CV-4500	L-20
Styli	L-21, L-22
Contract Measurement	U-08
Coordinate Measuring Machine	
CRYSTA-Apex EX	N-07, N-08
CRYSTA-Apex S	N-05, N-06
CRYSTA-Plus M	N-04
FALCIO G	N-10
LEGEX	N-11
MACH-3A	N-13
MACH-Ko-Ga-Me	N-12
MACH-V	N-14
MiStar	N-03
Probes	N-15, N-16

Description	Page
Software	N-19, N-20
STRATO-Apex	N-09
Styli	N-17
Corporate Philosophy	U-04
Counter	
EB	G-07
EC	A-19, F-18, G-06, H-03
EH	G-08
EV	G-09
KA	H-10
Crimp Height Micrometers	B-55
Cross-Travel Table	L-33
CRYSTA-Apex EX	N-07, N-08
CRYSTA-Apex S	N-05, N-06
CRYSTA-Plus M	N-04
CS-3200	L-27
CS-5000CNC	L-28
CS-H5000CNC	L-28
CV-2100M4	L-18
CV-2100N4	L-17
CV-3200	L-19
CV-4500	L-20
Cylindrical Anvil Tube Micrometers	B-43

<b>D</b>	
DAT	L-38 to L40, L-48
Data Cables	A-11, A-12, A-16
Data Processing Unit	J-19, J-28
Depth Gauge Attachment	D-46, D-48, D-62
Depth Gauge Extension Base	D-62
Depth Gauges	D-51 to D-60
Depth Micro Checker	D-61
Depth Micrometer	D-51 to D-53
Detectors	L-05
D-EV Display Unit	G-10
Dial Bore Gauge Checker	C-36
Dial Caliper	D-25
Dial Caliper Gauges	F-63, F-65
Dial Depth Gauge	D-58, D-59
Dial Durometer	M-09
Dial Gauge Contact Points	F-37 to F-40
Dial Gauge Limit Stickers	F-43
Dial Gauge Stands	F-69
Dial Gauges	F-21 to F-36
Dial Indicator Tester	F-55
Dial Indicators	F-21 to F-36
Dial Snap Gauges	F-66
Dial Snap Meter	B-58
Dial Test Indicator Accessories	F-51 to F-53
Dial Test Indicators	F-44 to F-50
Dial Thickness Gauges	F-59, F-60
Differential Screw Micrometer Head	B-74
Digimatic Bore Gauges	C-13, C-14, C-34
Digimatic Caliper Gauges	F-62, F-64
Digimatic Calipers	D-03 to D-10, D-15 to D-22, D-26 to D-35, D-38, D-39

# Alphabetical Index

This is an index to products by name as shown in this catalogue

Description	Page
Digimatic Counters	A-19, F-18, G-06 to G-09, H-03, H-10
Digimatic Depth Gauges	D-54, D-55, D-57, D-60
Digimatic Durometer	M-08
Digimatic Hardness Testing Machines	M-03 to M-08
Digimatic Height Gauges	D-41 to D-44, D-47 to D-50
Digimatic Indicators	F-03 to F-17
Digimatic Input Tools	A-17
Digimatic Linear Gauges	G-03 to G-05
Digimatic Litematic	G-12
Digimatic Micrometer Heads	B-72, B-73
Digimatic Micrometers, Bore	C-03 to C-06
Digimatic Micrometers, Depth	D-51
Digimatic Micrometers, Inside	C-17, C-19, C-21
Digimatic Micrometers, Outside	B-03 to B-09, B-11, B-12, B-18, B-19, B-21, B-25, B-29, B-33, B-35, B-37, B-39, B-41 to B-44, B-46, B-48, B-51, B-55, B-56
Digimatic Mini-Processor	A-21, A-22, L-05
Digimatic Multiplexers	A-18
Digimatic Protractor	E-22
Digimatic Remote Data Collection	A-20
Digimatic Scales	H-03 to H-07
Digimatic Signal Cables	A-11
Digimatic Surface Roughness Testers	L-03 to L-14, L-23 to L-28
Digimatic Thickness Gauges	F-57, F-58
Digimatic USB Cables	A-12
Digimatic Wireless Data System	A-13 to A-16
DigiStore	A-20
Digital Adjustment Table	L-38 to L40, L-48
Digital Protractor	E-23
Disc Micrometer	B-33, B-34, B-37, B-38
Display Unit	
D-EV	G-10
EB Counter	G-07
EC Counter	A-19, F-18, G-06, H-03
EH Counter	G-08
KA Counter	H-10
LSM-6200	G-21
Double Column Height Gauge	D-43
DP-1VA	A-21, A-22, L-05
Durometer	
Dial	M-09
Digimatic	M-08
<b>E</b>	
EASYPAG	K-20
EB Counter	G-07
EC Counter	A-19, F-18, G-06, H-03
eco-fix	N-18
Edge Sensor	J-29
EH Counter	G-08
EV Counter	G-09
Extension Tube Inside Micrometer	C-17 to C-20

Description	Page
Extra Small Hole Bore Gauge	C-25, C-26
Eyepieces	J-12
<b>F</b>	
Facilities	U-05, U-06
FALCIO G	N-10
Focus Pilot FP-05	J-21
Force Gauge	F-61
FORMTRACERPAK	K-04, K-06, K-14, K-20, L-10, L-11, L-13, L-14, L-19, L-20, L-24, L-25, L-27, L-28
Formtracer	
CS-3200	L-27
Extreme CS-5000CNC	L-28
Extreme CS-H5000CNC	L-28
Extreme SV-C4500CNC	L-25, L-26
SV-C3200	L-23, L-24
SV-C4500	L-23, L-24
Frame Level	E-24
FS70	J-11
<b>G</b>	
Gauge	
Block Accessory Sets	E-11, E-12
Block Maintenance	E-11 to E-14
Blocks	E-05 to E-10
Bore	C-13, C-14, C-25 to C-34
Contact Force	F-61
Depth	D-54 to D-60
Dial Snap	F-66
Inside Caliper	F-64, F-65
Magnification Calibration	L-48
Origin-Point	L-48
Outside Caliper	F-62, F-63
Radius	E-21
Small Hole	B-62
Telescoping	B-63
Thickness	E-20, F-57 to F-60
Thread Pitch	E-21
Gauging Technology	U-09, U-10
Granite Surface Plates	E-26
Groove Micrometers	B-59, B-60
<b>H</b>	
Hardmatic HH-300	M-08, M-09
Hardmatic HH-411	M-07
Hardness Indenters	M-10
Hardness Test Blocks	M-10
Hardness Testing Equipment	M-03 to M-09
Height Gauge	
Accessories	D-46, D-48, D-50
Digimatic	D-41 to D-44, D-47 to D-50
Double Column	D-43, D-44
Ergonomic	D-41
Linear Height	D-47, D-48
QM-Height	D-49, D-50
Vernier	D-40
Height Master	E-17, E-18

Description	Page
HH-300	M-08, M-09
HH-411	M-07
HM-200	M-03
Holtest	
Borematic Snap-Open Bore Gauge	C-13, C-14
Setting Rings	C-37, C-38
Three-Point Bore Micrometers	C-03 to C-10
Three-Point Bore Micrometers (Type II)	C-11, C-12
Two-Point Bore Micrometers	C-07 to C-10
Hook End Depth Gauge	D-57
Hook Jaw Caliper	D-36
Horizontal Dial Test Indicator	F-45, F-46
HR-110MR	M-06
HR-320MS	M-06
HR-430MS	M-06
HR-530	M-05
Hub Micrometer	B-54
HV-100	M-04
Hyper MFMF-U	J-08
Hyper Quick Vision WLI	K-15
<b>I</b>	
i-Checker	F-54
ID-C	F-11 to F-14
ID-CX	F-09, F-10
ID-F	F-15
ID-H	F-07, F-08
ID-N/B	F-05, F-06
ID-S	F-16
ID-SS	F-03, F-04
ID-U	F-17
Illumination Units	J-18
Inch Gauge Blocks	E-05, E-09, E-10
Inch Reading Dial Indicators	F-21, F-27 to F-36
Indenters	M-10
Indicating Micrometer	B-57
Indicator	
Backs, Interchangeable	F-41
Calibrator	F-54 to F-56
Contact Points	F-37 to F-40
Dial	F-21 to F-36
Dial Test	F-44 to F-50
Digimatic	F-03 to F-17
ID-C	F-11 to F-14
ID-CX	F-09, F-10
ID-F	F-15
ID-H	F-07, F-08
ID-N/B	F-05, F-06
ID-S	F-16
ID-SS	F-03, F-04
ID-U	F-17
Limit Stickers	F-43
Plunger Caps	F-43
Plunger Lifting Aids	F-42
Solar	F-03, F-04
Stands	F-67 to F-72

Description	Page
Tester	F-55
Input Tools	A-17
Inside Caliper	
Gauge	F-64, F-65
Groove	D-32
Knife Edge	D-31
Micrometer	C-21, C-22
Point Jaw	D-33
Inside Micro Checker	C-24
Inside Micrometer	
Extension Tube	C-17 to C-20
Interchangeable Rod	C-23
Setting Rings	C-37, C-38
Tubular	C-15, C-16
Inspection Gauge Block Sets	E-06
Integrated Scale Units	H-03 to H-07
Interchangeable Anvil Gear Tooth Micrometer	B-35, B-36
Interchangeable Anvil Micrometer	B-19 to B-21, B-27, B-29, B-30, B-35, B-36, B-56
Interchangeable Anvil Screw Thread Micrometer	B-29, B-30
Interchangeable Anvil Universal Micrometer	B-27
Interchangeable Backs	F-41
Interchangeable Jaw Carbon Fibre Caliper	D-21, D-22
Interchangeable Reticle Magnifier	J-03
Interchangeable Rod Depth Micrometer	D-51, D-52
Interchangeable Rod Inside Micrometer	C-23
IP Codes	V
<b>K</b>	
KA Counters	H-10
Knife Edge Inside Calipers	D-31
<b>L</b>	
Large Dial Indicator	F-33, F-34
Large Diameter Thimble Micrometer Heads	B-83, B-84, B-86, B-87
Laser Scan Micrometer	
Accessories	G-22
Display Unit	G-21
LSM-500S	G-13
LSM-501S	G-14
LSM-503S	G-15
LSM-506S	G-16
LSM-512S	G-17
LSM-516S	G-18
LSM-902H-6900	G-19
LSM-6200	G-21
LSM-9506	G-20
LEGEX	N-11
Levelling Table	L-33, L-35
Levels	E-24

Description	Page
LGB	G-04
LGF	G-03
LGS	G-05
Limit Stickers	F-43
Linear Gauge	
LGF	G-03
LGB	G-04
LGS	G-05
Linear Height	D-47, D-48
Linear Scale	
AT116 Slim Spar	H-08
AT715 Coolant Proof	H-09
Litematic	G-12
Locking Screw Micrometer Head	B-79
Long Beam Caliper	D-09
Long Jaw Caliper	D-19, D-24
Long Range Extension Tube	
Inside Micrometer	C-19, C-20
Long Stroke Dial Indicators	F-31 to F-34
Loupe Magnifier	J-04
Low Force Caliper	D-38
LSM-500S	G-13
LSM-501S	G-14
LSM-503S	G-15
LSM-506S	G-16
LSM-512S	G-17
LSM-516S	G-18
LSM-902H-6900	G-19
LSM-6200	G-21
LSM-9506	G-20
<b>M</b>	
MACH-3A	N-13
MACH-Ko-Ga-Me	N-12
MACH-V	N-14
Magnetic Stands	F-67, F-68
Magnetic V-Block	F-74
Magnification Calibration Gauge	L-48
Magnification Checking Kit	L-48
Magnifier	J-03, J-04
MCOSMOS	N-19
Measurement Data Collection Software	A-10
MeasureReportQV	K-20
MeasurLink 9	A-05 to A-09
Mechanical Counter Micrometer	B-17
Metric Gauge Blocks	E-05 to E-08, E-10
MF Microscope	J-06
MF-U Microscope	J-07
MGT	U-09, U-10
MiCAT Planner	N-20
Micro-Chuck	L-35, L-47
Micro Jack	B-88
Micrometer	
Adjustable Measuring Force	B-12
Anvil Extension Collar	B-22 to B-24
Blade	B-51, B-52
Bore	C-03 to C-12

Description	Page
Caliper Anvil	B-26
Can Seam	B-53
Crimp Height	B-55
Cylindrical Anvil Tube	B-43
Depth	D-51, D-53
Disc	B-33, B-34, B-37, B-38
Economy	B-14 to B-16
Fast Action	B-05, B-06, B-11
Groove	B-59, B-60
High Accuracy	B-03, B-04
Hub	B-54
Indicating	B-57
Inside	C-15 to C-20, C-23
Inspection Gauge Block Set	E-06
Interchangeable Anvil	B-19 to B-21, B-27, B-29, B-30, B-35, B-36, B-56
Interchangeable Anvil Gear Tooth	B-35, B-36
Interchangeable Anvil Screw Thread	B-29, B-30
Interchangeable Anvil Universal	B-27
Interchangeable Rod Depth	D-51, D-52
Laser Scan	G-13 to G-20
Mechanical Counter	B-17
Non-Rotating Spindle	B-11, B-12, B-18, B-27, B-32, B-37, B-38, B-60
Non-Rotating Spindle Disc	B-37, B-38
Non-Rotating Spindle Groove	B-60
Oil	B-69
Paper Thickness	B-32
Point	B-46, B-47
QuantuMike	B-05, B-06
Quickmike	B-11
QUICKmini	B-61
Ratchet Cover	B-70
Ratchet Thimble	B-13
Screw Thread	B-28 to B-30
Sheet Metal	B-39, B-40
Speeder Cover	B-70
Spherical Anvil and Spindle Tube	B-42
Spherical Anvil Tube	B-43
Spindle Attachment Tips	B-69
Spline	B-44, B-45
Stage	J-21
Standard, Analogue	B-14 to B-16
Standard, Digimatic	B-07 to B-09
Standard, Digital	B-10
Stands	B-68
Tube	B-41 to B-43
Uni-Mike Interchangeable Anvil	B-56
V-Anvil	B-48 to B-50
Wire	B-54
Micrometer Head	
Adjustable Thimble	B-78
Bore Gauge	C-31, C-32
Carbide Tipped Spindle	B-80 to B-83, B-85 to B-87
Differential Screw	B-74

# Alphabetical Index

This is an index to products by name as shown in this catalogue

Description	Page
Digimatic	B-72, B-73
Large Diameter Thimble	B-83, B-84, B-86, B-87
Locking Screw	B-79
Medium Standard	B-82
Micro Jack	B-88
Non-Rotating Spindle	B-72, B-84 to B-87
Rotatable Display	B-72
Selection Guide	B-71
Short Body	B-76
Short-Range	B-75
Small	B-75 to B-80
Ultra-Fine Feed	B-74
XY Stage	B-72, B-84
Microscope	
Data Processing Unit	J-28
Eyepieces	J-12
Focus Pilot	J-21
Head FS70	J-11
Hyper MF/MF-U	J-08
Illumination Units	J-18
Measuring	J-06 to J-08
MF	J-06
MF-U	J-07
Objectives	J-12 to J-17
Stage Micrometer	J-21
TM	J-05
Toolmakers	J-05
Turrets	J-21
Video Unit VMU	J-09, J-10
Vision Unit	J-20
Micro-Vickers Hardness Testing Machines	M-03
MiSCAN	K-17
MiStar	N-03
M-NanoCoord	K-19
Modular Display Unit	A-19, F-18, G-06, H-03
Moving Jaw Caliper	D-37
MPP-NANO Probe	K-17
Multi-Function Indicator IDF	F-15
Multiplexers	A-18
<b>N</b>	
Neck Jaw Calipers	D-34
Nib Jaw Caliper	D-15, D-23
Nib/Standard Jaw Caliper	D-16
Non-Rotating Spindle Disc Micrometer	B-37, B-38
Non-Rotating Spindle Groove Micrometer	B-60
Non-Rotating Spindle Micrometer	B-11, B-12, B-18, B-27, B-32, B-37, B-38, B-60
Non-Rotating Spindle Micrometer Head	B-72, B-84 to B-87
<b>O</b>	
Objectives	
Measuring Microscope	J-12 to J-17
Vision Measuring System	K-21

Description	Page
Offset Centreline Caliper	D-27
Offset Jaw Caliper	D-26
One Revolution Dial Indicators	F-29, F-30
Optical Flats	B-64
Optical Parallels	B-64
OPTI-FIX	K-22
OPTOEYE-200	J-29
Outside Caliper Gauge	F-62, F-63
<b>P</b>	
Paper Thickness Micrometer	B-32
Parallel Face Dial Test Indicators	F-47, F-48
Peak Value Hold Indicator ID-C	F-11
PFF	K-20
PH-3515F	J-26
PH-A14	J-27
PJ-A3000	J-23
PJ-H30	J-24
Plunger Caps	F-43
Plunger Lifting Aids	F-42
Pocket Comparators	J-03
Pocket Dial Test Indicator	F-49
Pocket Magnifiers	J-04
Point Calipers	D-29
Point Jaw Inside Calipers	D-33
Point Micrometer	B-46, B-47
Portable Hardness Testing Instruments	M-07 to M-09
Portable Surface Roughness Testers	L-03 to L-09
Precision Levels	E-24
Probe Systems	N-15, N-16
Profile Projector	
Data Processing Unit	J-28
Image Edge Sensor	J-29
PH-3515F	J-26
PH-A14	J-27
PJ-A3000	J-23
PJ-H30	J-24
PV-5110	J-25
Scales	J-29
Protractor	
Digimatic Universal	E-22
Digital	E-23
Universal Bevel	E-22
PV-5110	J-25
<b>Q</b>	
QIPAK	K-04
QM-Data200	J-19, J-28
QM-Height	D-49, D-50
QS CAD-IMPORT/EXPORT	K-04, K-06
QS-L	K-05
QSPAK	K-06
QSPAK VUE	J-20
QuantuMike	B-05, B-06
Quick Chuck	L-35, L-47
Quick Image	K-03

Description	Page
Quick Scope	K-05
Quick Vision	
ACCEL	K-11
Active	K-07
Apex	K-08
HYBRID Type 1	K-13
HYBRID Type 4	K-14
Hyper	K-09
Index Head	K-21
STREAM PLUS	K-10
TP	K-16
ULTRA	K-12
Quickmike	B-11
QUICKmini	B-61
Quick-Rail Kit	N-18
QUICKTOOL	G-21
QV Index Head	K-21
QV PartManager	K-20
QV3DCAD-OnLine	K-20
QV3DPAK	K-20
QV-CAD I/F	K-20
QVEio	K-20
QVPAK	K-20
<b>R</b>	
RA-10	L-37
RA-120	L-38
RA-120P	L-39
RA-1600	L-40
RA-2200	L-41
RA-2200CNC	L-43
Radius Gauges	E-21
RA-H5200	L-42
RA-H5200CNC	L-44
Ratchet Cover	B-70
Ratchet Thimble Micrometer	B-13
Reading Scales	J-29
Reference Hemisphere	L-48
Remote Data Collection Device	A-20
Reticles	J-03, J-12
Rockwell Hardness Testing Machines	M-06
Rotary Vice	J-22, J-30, L-34
ROUNDPAK	L-39 to L-44
Roundtest	
Extreme RA-2200CNC	L-43
Extreme RA-H5200CNC	L-44
RA-10	L-37
RA-120	L-38
RA-120P	L-39
RA-1600	L-40
RA-2200	L-41
RA-2200CNC	L-43
RA-H5200	L-42
RA-H5200CNC	L-44
Rules, Steel	E-19

Description	Page
<b>S</b>	
Scale	
Coolant Proof	H-04
Counter, KA	H-10
Integrated	H-03 to H-07
Linear	H-08 to H-09
Reading	J-29
Standard	J-29
Screw Thread Micrometer	B-28 to B-30
Scriber	D-46
SENSORPAK	G-11
Services	U-07 to U-11
Setting Rings	C-37, C-38
Setting Standards	
Inside Micrometer	C-24, C-37, C-38
Outside Micrometer	B-65, B-66
Screw Thread Micrometer	B-67
V-Anvil Micrometer	B-67
Sheet Metal Micrometer	B-39, B-40
Short Body Micrometer Head	B-76
Short Range Micrometer Head	B-75
Signal Cables	A-11
Signal Output Indicator ID-C	F-13
SJ-210	L-03
SJ-310	L-04
SJ-410	L-07, L-08
SJ-500	L-09
SJ-500P	L-10
SJ-Printer	L-05
SJ-Tools	L-06, L-08
Small Hole Bore Gauge	C-25, C-28
Small Hole Gauge Set	B-62
Small Micrometer Head	B-75 to B-80
Snap Caliper	D-39
Snap Gauge	F-66
Snap Meter	B-58
Snap-Open Bore Gauge	C-13, C-14
Software	
CMM	N-19, N-20
Data Collection	A-10
Database Management Systems	A-05 to A-09
Form (see FORMTRACEPAK)	
Laser Scan Micrometer	G-21
Linear Gauge	G-11
SJ-Tools	L-06, L-08
Vision Measuring System	K-04, K-06, K-14, K-20
Solar Caliper	D-03, D-04, D-10
Solar Indicator	F-03, F-04
Special Purpose Dial Indicators	F-35
Speeder Cover	B-70
Spherical Anvil and Spindle Tube Micrometers	B-42
Spherical Anvil Tube Micrometers	B-43
Spindle Attachment Tips	B-69
Spline Micrometers	B-44, B-45
Stage Micrometer	J-21

Description	Page
Standard Calipers, Digimatic	D-05 to D-09
Standard Calipers, Vernier	D-11 to D-14
Standard Micrometers	B-07 to B-10, B-14 to B-16
Standard Scales	J-29
Stands	
Auxiliary Workpiece	L-48
Calibration	L-34
Comparator	F-70, F-71
Indicator	F-67 to F-72
Magnetic	F-67, F-68
Micrometer	B-68
Transfer	F-72
Steel Gauge Blocks	E-05 to E-10
Steel Rules	E-19
Steel Setting Rings	C-37, C-38
Straight Edge	E-18
STRATO-Apex	N-09
Styli	
CMM	N-17
Contracer	L-21, L-22
Dial Test Indicator	F-51, F-52
Formtracer	L-29 to L-32
Roundtest	L-45, L-46
Surftest	L-15, L-16
UMAP	K-18
Sub-Contract Measurement	U-08
SuperCaliper	D-03, D-04
Surface Plates	E-26
Surfstand	L-08
Surftest	
Detectors	L-05
Extreme SV-3000CNC	L-13
Extreme SV-M3000CNC	L-14
SJ-210	L-03
SJ-310	L-04
SJ-410	L-07, L-08
SJ-500	L-09
SJ-500P	L-10
SV-3200	L-11, L-12
SV-3000CNC	L-13
SV-3200	L-11, L-12
SV-C3200	L-23
SV-C4500	L-23
SV-C4500CNC	L-25, L-26
SV-M3000CNC	L-14
Swivel Centre Supports	J-22, J-30, L-34
<b>T</b>	
Table	
θ1-Axis	L-35
θ2-Axis	L-35
3-Axis Adjustment	L-33
Cross-Travel	L-33
Levelling	L-35
Y-Axis	L-35
TAF	K-20
Telescoping Gauge Set	B-63
Terms and Conditions of Business	U-13, U-14

Description	Page
Test Blocks	M-10
Thickness Gauges	E-20, F-57 to F-60
Thread Measuring Units	B-31
Thread Pitch Gauges	E-21
Three-Wire Units	B-31
TM Toolmakers Microscope	J-05
Touch-Trigger Probe	D-44
Tracking Auto Focus	K-09, K-21
Training	U-11
Transfer Stand	F-72
Tube Micrometers	B-41 to B-43
Tube Thickness Calipers	D-35
Tubular Inside Micrometer	C-15, C-16
Turrets	J-21
<b>U</b>	
UDT-2	F-55
ULTRA Quick Vision	K-12
UMAP	K-18
Uni-Mike	B-56
Universal Dial Test Indicator	F-50
Universal Protractors	E-22
USB Cables	A-12
USB Input Tool Direct	A-17
USB-ITPAK	A-10
U-WAVE	A-13 to A-16
U-WAVE PAK	A-14, A-15
U-WAVE-T Connecting Cables	A-16
<b>V</b>	
V-Anvil Micrometers	B-48 to B-50
V-Block	
Jig	L-47
Levelling Table	L-33
Magnetic	F-74
Set	F-73
With Clamp	J-22, J-30, L-34
Vernier Calipers	D-11 to D-14, D-23 to D-27, D-29 to D-37
Vernier Depth Gauges	D-56, D-58
Vernier Height Gauges	D-40
Vertical Face Dial Test Indicators	F-47, F-48
Vertical Holder	J-22, J-30
Vibration Isolator	L-48
Vice	
Precision	L-34
Rotary	J-22, J-30, L-34
Vickers Hardness Testing Machines	M-04
Video Units	J-09, J-10
Vision Measuring System	
Calibration Chart	K-21
Clamping System	K-22
Compensation Chart	K-21
Hyper Quick Vision WLI	K-15
MISCAN	K-17
M-NanoCoord	K-19
Objective Lenses	K-21

# Alphabetical Index

This is an index to products by name as shown in this catalogue

Description	Page
Quick Image	K-03
Quick Scope	K-05
Quick Vision ACCEL	K-11
Quick Vision Active	K-07
Quick Vision Apex	K-08
Quick Vision HYBRID Type 1	K-13
Quick Vision HYBRID Type 4	K-14
Quick Vision Hyper	K-09
Quick Vision STREAM PLUS	K-10
Quick Vision TP	K-16
Quick Vision ULTRA	K-12
Software	K-04, K-06
Tracking Auto Focus	K-09, K-21
UMAP	K-18
Vision Unit	J-20
VMU, Video Unit	J-09, J-10

## W

Wear Block Sets	E-10
Wire Micrometer	B-54
Wireless Data Communication System	A-13 to A-16

## X

X-Axis Stop	L-47
XY Cross-Travel Table	L-33
XY Laser Micrometer	G-22
XY Levelling Table	L-35
XY-Stage Micrometer Head	B-84

## Y

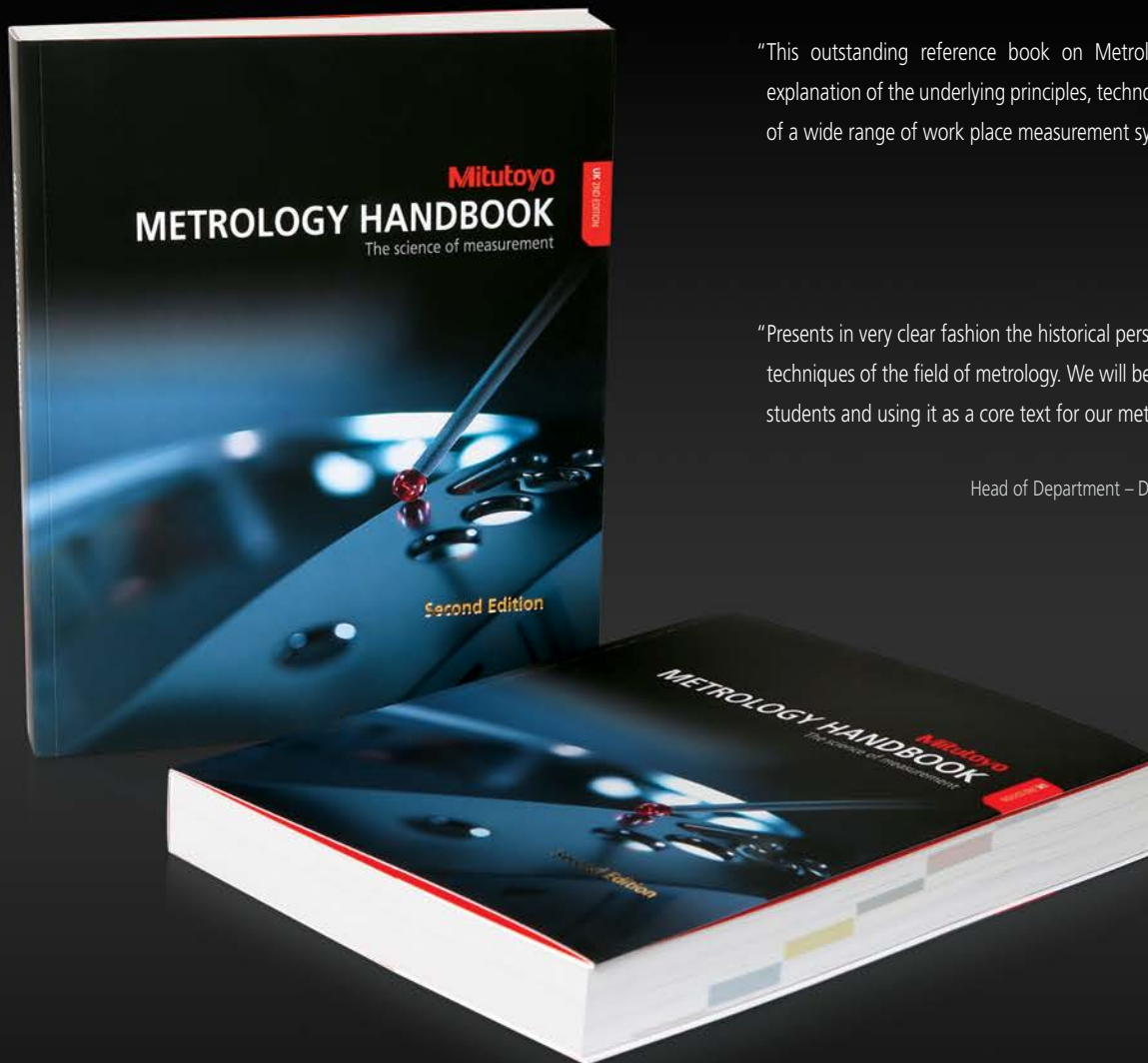
Y-Axis Table	L-35
--------------	------

## Z

Z-Axis Scale Unit	L-48
Zoom Loupe Magnifier	J-04
Zoom Microscope Head FS70	J-11

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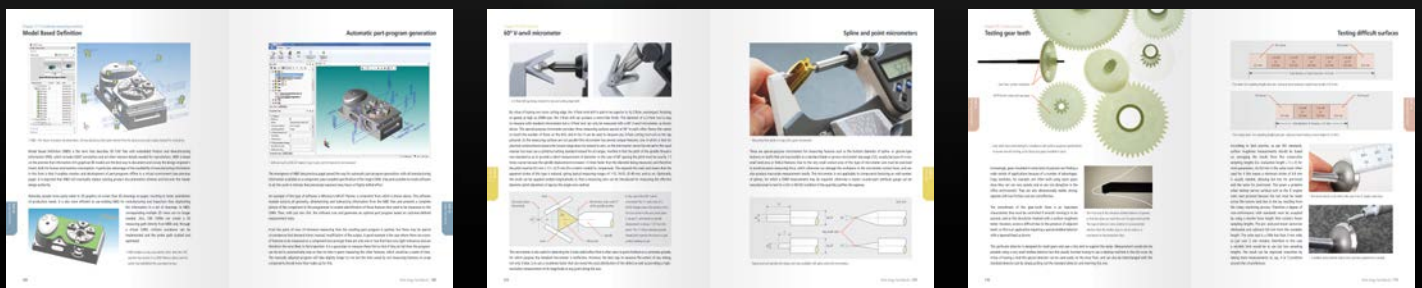


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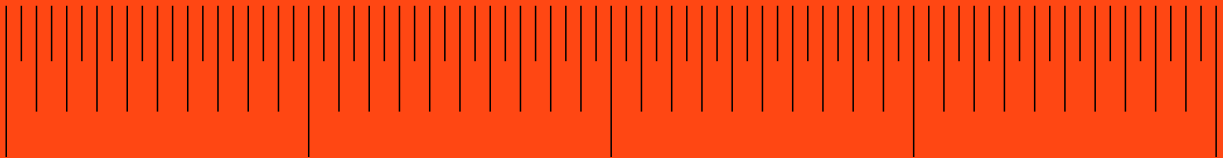
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