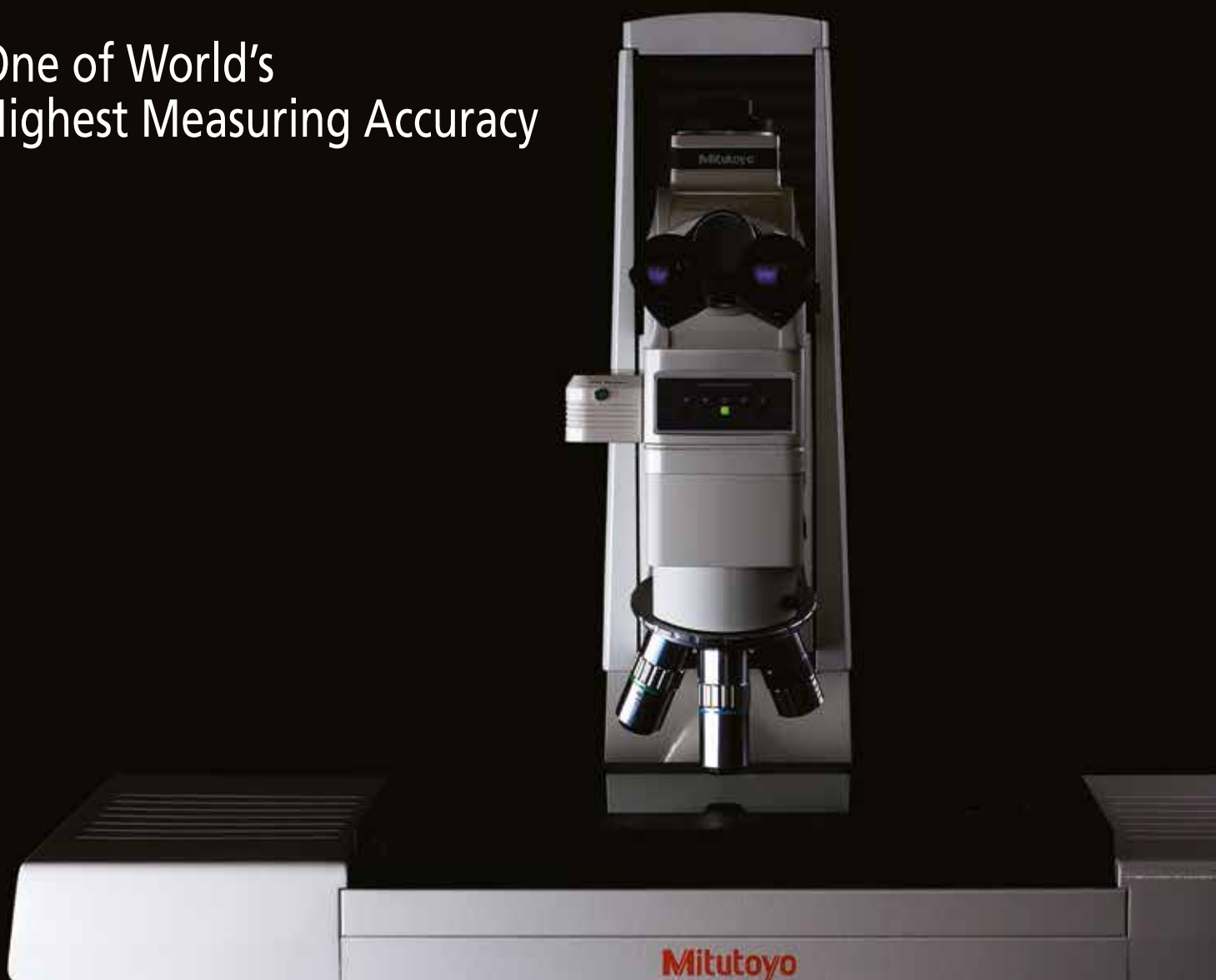


MEASURING MICROSCOPES HYPER MF / MF-U

CONCEPT, TECHNOLOGY AND DESIGN.



One of World's Highest Measuring Accuracy



Concept

Inspecting complex microstructures of ever-decreasing size demands ever-higher accuracy from measuring microscopes used to satisfy the manufacturing and quality control principle of Observation plus Measurement. Mitutoyo is committed to providing microscopes that meet this requirement as well as exceeding users' expectations in terms of sophisticated functionality and ergonomic features that allow fatigue-free use over extended periods of time.



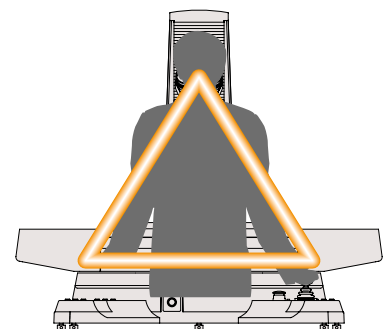
Core Technology

Over many years Mitutoyo has made significant contributions to the technologies that are key to the core technology of manufacturing industry: measurement. The experience and expertise gained is reflected in the design and manufacture of each individual component of these microscopes and can be seen most clearly in their sublime integration of optics, mechanics, and electronics.



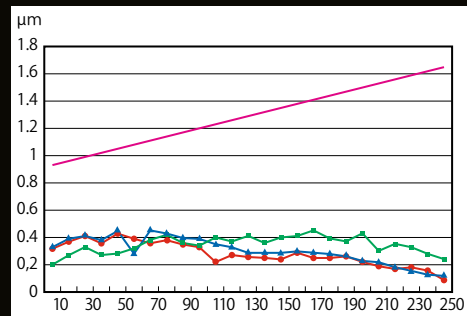
Ergonomic Design

The microscope main unit has been designed with the emphasis on user friendliness and ease of operation. Mitutoyo has executed the mechanical design to allow easy operation. Even after extended use, its fatigue-fighting design still provides a comfortable work-experience for the operator.



One of World's Highest Measuring Accuracy*

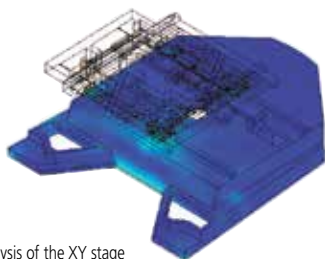
Measuring accuracy in the X- and Y-axes at full stroke surpasses class 0 of the JIS Standard for measuring microscopes (B7153-1995). This makes these microscopes ideal for high accuracy measurement of precision molds or cutting tools that require the best resolution, or for inspecting sub-miniature semiconductor / electronic parts such as wafers and integrated circuits.



*As of July, 2006

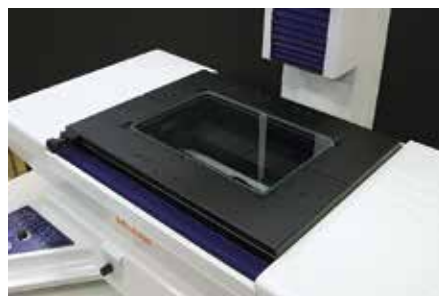
Large, Highly Accurate XY Stage

Mitutoyo uses a type of linear guideway on the large XY stage that is highly regarded for excellent straightness and stability. This is one key element in the strategy to maximize geometrical accuracy - another is FEM analysis. Our designers used FEM techniques extensively during the design phase to ensure stage stability was optimal in any measurement situation. Thus, the foundations for achieving the highest measuring accuracy were laid.



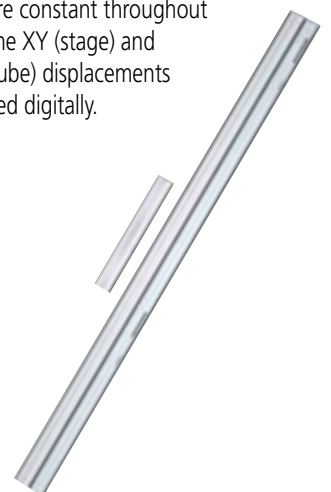
FEM analysis of the XY stage

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. Maximum stage loading is 30kg and a range of useful fixtures is available that includes a wafer holder and swivel-center support.

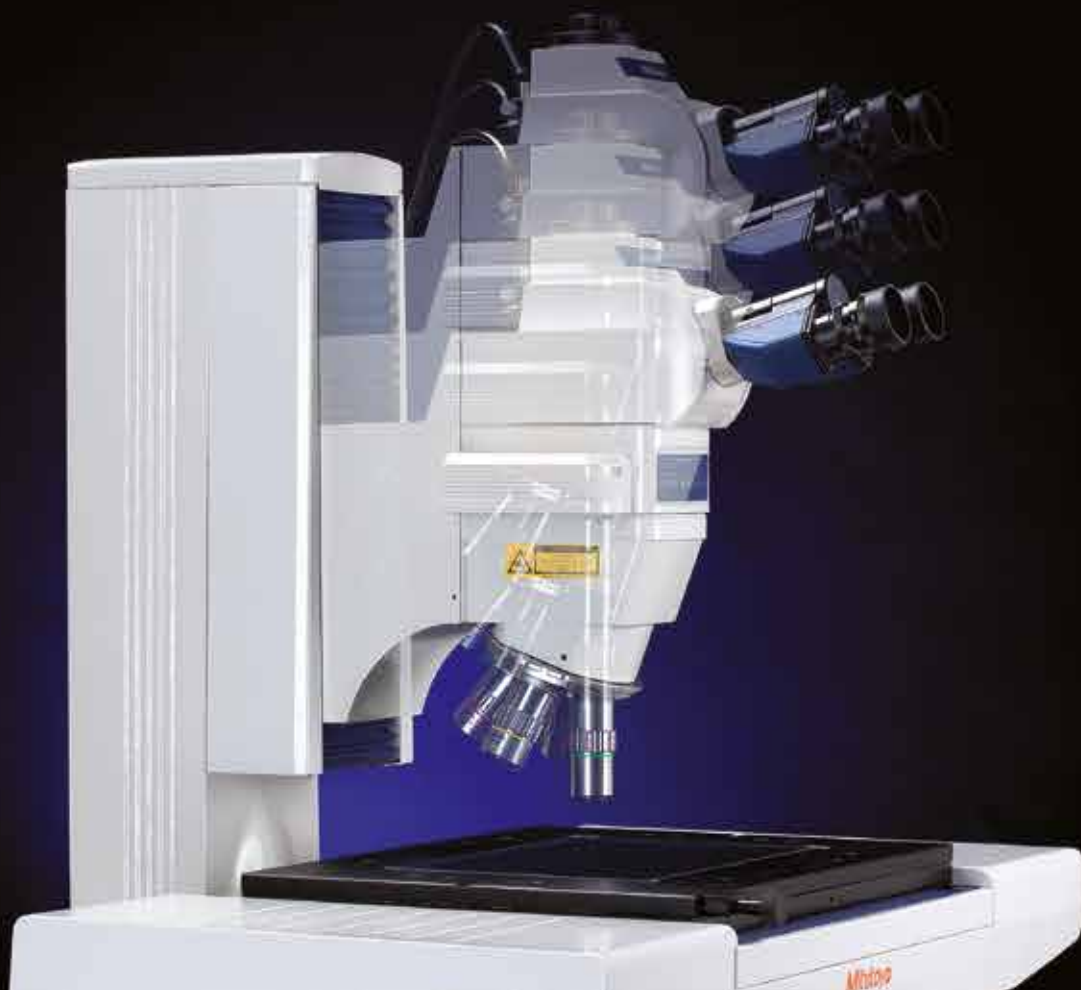


Highly Accurate Digital Scales

These microscopes are equipped with highly accurate digital glass scales on all three axes. Mitutoyo produces glass scales in an underground laboratory where the temperature and humidity are constant throughout the year. The XY (stage) and Z (optical tube) displacements are displayed digitally.

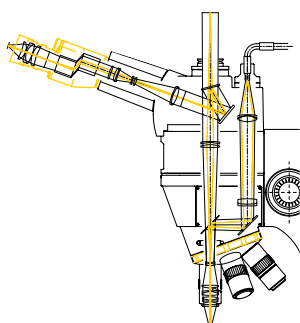


Excellent Operability and Solid Reliability



FS Optical System

The FS optical system is respected more than ever before for its ability to enable measurement, observation and analysis with a leading-edge combination of long working distance and high NA. This optical system ensures high operability when measuring deep holes, steps, etc., or when setting up workpieces for measurement.



Tilting Optical Tube*

To reduce fatigue due to extended use, it is important that the operator use a microscope in an unforced posture. The eyepiece unit allows stepless adjustment of tilt angle so that, no matter what their physique, operators can always adjust the viewing position for comfortable working during any measuring task.

* Available for model MF-U only.



LAF Optical Tube*

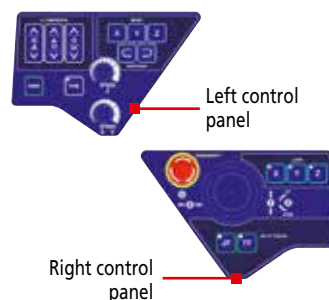
The LAF (Laser AF) optical tube can be selected as an option. The LAF system achieves high repeatability when measuring minute steps, etc., enabling difficult measurements with minimum fatigue.

* Available for model MF-U only



Front Operation

Controls are arranged to fall within easy reach of the operator on two control panels at the front of the microscope. This allows the operator to concentrate on measurement without having to look away from the eyepieces. Membrane technology makes the switches very durable.

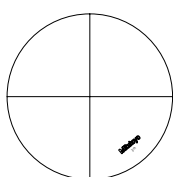


Measuring with Hyper MF - an Emotional Experience



Cross-hair Reticle

How accurately the reticle can be aligned with a workpiece feature is a very important feature in a measuring microscope. Taking ocular resolution into account, the thin-line reticle has been standardized on a broken, 90° cross hair with a line width of 5 μ m*. This allows precise positioning of the reticle.



* Cross-hair reticles of 3 μ m and 7 μ m line width are also available.

Fiber-optic Cold Light Illumination

A fiber-optic cold light illuminator and an IR absorption filter greatly reduce thermal effects on the instrument and workpiece that would otherwise have an adverse effect on measuring accuracy. Telecentric illumination is used for reflected light observation and Koehler illumination for viewing contours. Both systems use an aperture diaphragm for even, glare-free illumination with good image contrast.



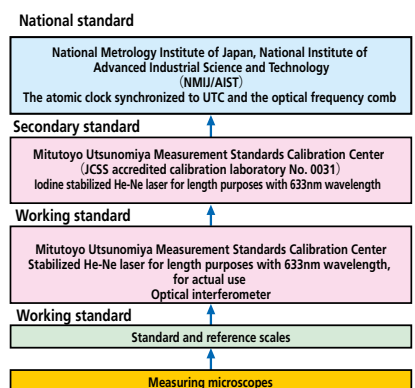
System Extensibility

A video port is standard on the optical tube, thereby allowing a digital camera unit and various vision analysis units to be added to a system.



Traceability to National Standards

To establish and maintain the traceability of measuring tools and instruments, Mitutoyo uses length standards traceable to the national standards in Japan to calibrate the standard used to calibrate measuring tools and instruments.



Main Specifications

MF/MF-U

One of Highest-in-Class Measuring Accuracy

Mitutoyo has achieved a measuring accuracy of $\pm (0.9+3L/1000)\mu\text{m}$ (L: Measured length in mm) in both X- and Y-axes. This performance surpasses Class 0* of JIS B7153:1995, Measuring Microscopes, and allows support of ultra-precise inspection and measurement of the smallest visible features to those extending across the full measuring range of these microscopes.

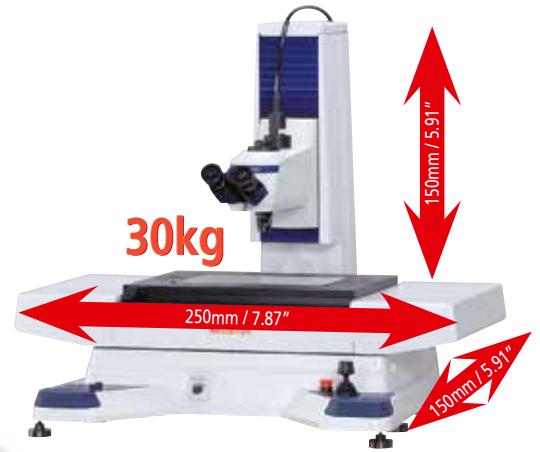
* Class 0: $(2+0.01L)\mu\text{m}$ or less, L: Measured length (mm)



MF/MF-U

Large, Highly Accurate XY Stage Handles Wide-field, Heavy-weight Workpieces

The pressures for diversification and up sizing of workpieces are increasing in various industrial fields, such as semiconductors, electronics, precision automotive parts and tools. These microscopes not only have the accuracy for the smallest workpiece but also have the power to handle larger components such as lead frames, precision cutting tools and molds.



Both center supports are equipped.

MF/MF-U

Three-axis Motor-driven Joystick Ensures High Operability from High Speed to Ultra-Low speed

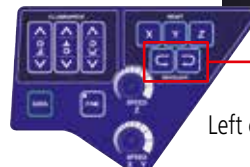
The X, Y, and Z axes are driven and controlled with one joystick that serves as the nerve center of front operation. Speed control is possible from high-speed traverse of the stage to ultra low-speed, minute positioning of a workpiece. Also, the lock mechanism is provided for each X, Y, and Z axis to support high-accuracy pitch measurement by single-axis displacement. The primary target is assumed to concentrate the operator on a workpiece.



MF-U

Remote-controlled Objective Magnification Change

The power turret in the optical tube is controlled with membrane switches on the left front panel. LEDs indicating each lens position on the upper part of the optical tube are linked to rotation of the turret so that the operator can see the current magnification at a glance.



Power Turret Drive Switches

Left control panel

Laser Auto Focus

LAF Optional Tube

The laser auto focus function provides high accuracy and high repeatability and brings significant advantage to the inspection of minute steps, multi-layer board detail, etc. A powerful function that helps avoid operator error and ensures high productivity.



... minute steps, multi-layer board detail, etc. A powerful function that helps avoid operator error and ensures high productivity.

LAF is available both in BF and BD optical tubes.

Selectable LAF Functions

Providing a choice of the Just Focus (JF) mode that functions quickly at the current point of interest and the Tracking Focus (TF) mode that tracks the focusing position to retain sharp focus as the stage moves has improved measurement efficiency.

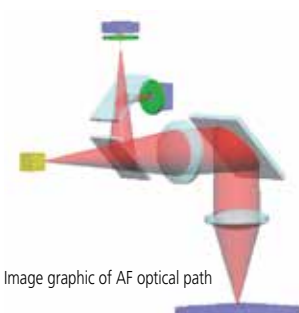


Image graphic of AF optical path

Visible Semiconductor Laser 690nm

ultra-precision small-sized gear 10X



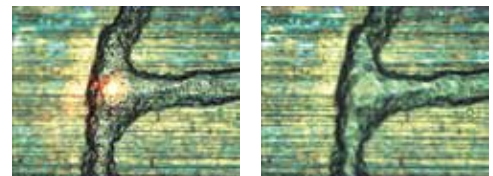
Wafer 20X



Metal slope 20X



Metal marking 20X



LAF Effective in the Smallest Area

An LAF spot diameter of $\phi 1\mu\text{m}$ or less is achieved using an objective with a magnification of 50X or more. This performance supports a wide range of measurement tasks.

The spot diameters are a logical value determined by calculation.

Objective	Spot diameter
MplanApo 2X	16 μm / 630 μinch
MplanApo 5X	6 μm / 240 μinch
MplanApo 10X	3 μm / 120 μinch
MplanApo 20X	1.5 μm / 60 μinch
MplanApo 50X	0.8 μm / 3 μinch
MplanApo 100X	0.6 μm / 2 μinch

The AF function delivers highly repeatable focusing on areas with different surface textures and slopes.

Laser Beam Class

The LAF (factory-fit option) function uses a low-power laser that corresponds to Class 2 (visible light) of JIS C6802/1997, Safety of Laser Products.



Main Unit Specifications



Hyper MF-U
An optical tube, turret, and objective lens are optional.

Model No.	HyperMF-B2515B	HyperMF-UB2515B	HyperMF-UD2515B	HyperMF-UE2515B	HyperMF-UF2515B
Order No.	176-430*1	176-431*1	176-432*1	176-433*1	176-434*1
Optical tube	Finite correction optical system —	Infinity-correction optical system BF (Bright field)	Infinity-correction optical system BD (Bright / Dark field)	Infinity-correction optical system BF (Bright field) with the LAF function	Infinity-correction optical system BD (Bright / Dark field) with the LAF function
Standard reticle (Built-in)	90° broken-cross line (line width 5µm)				
Pupil distance adjustment	Siedentoph type Adjustment range: 51 to 76mm / 2.01" to 2.99"				
Optical path switching ratio	Observation/TVphotomicrography = 50/50				
Vertical tilt angle	25°	Tilting			
TV port	Provided as standard				
Observation image	Erect image				
Eyepiece Magnification	10X, 15X, 20X				
Objective lens (optional)	Selectable from the monocular unit (equipped with an eyepiece) or binocular tube (equipped with two eyepieces)	Equipped with two 10X eyepieces			
ML series objective lens	1X, 3X, 5X, 10X, 20X, 50X, 100X	—			
BF (Bright field)	—	M Plan Apo, M plan Apo SL, G plan Apo			
BD (Bright / Dark field)	—	BD Plan Apo, BD Plan Apo SL			
Turret (optional)	—	(Equipped with a four-hole manual sensor / motorized five-hole sensor*2)			
BD (Bright / Dark field)	—	(Equipped with a four-hole manual sensor / motorized four-hole sensor*3)			
Focusing section	Maximum height of workpiece	150mm / 5.91"			
Measuring accuracy	(1.5+0.01L) µm L: Measuring length (mm)				
Drive method	Motorized control with the use of a joystick				
Illumination unit	Transmitted illumination device	Telecentric system, Built-in aperture diaphragm, Halogen bulb (12V, 50W), 100-step light intensity control, Fiber optics cable cold light illumination			
Reflected illumination unit	Koehler illumination, Variable aperture diaphragm mechanism, Halogen bulb (12V, 100W), 100-step light intensity control, Fiber optics cable cold light illumination				
Workstage	Measuring range (XxY)	250mmx150mm / 9.84"x5.91"			
Measuring accuracy*4 (When no load is put on the X- or Y-axis)	(0.9+0.003L) µm L: Measuring length (mm)				
Dimensions of the top plane	460mmx350mm / 18.11"x13.78"				
Usable dimensions of the stage glass	300mmx200mm / 11.81"x7.87"				
Swiveling angle	±3°				
Maximum loading mass	30kgf / 66lbf				
Drive method	Motorized control with the use of a joystick				
Detector	High precision digital scale (Patented)				
Digital display	Resolution	0.01µm / .0004µinch			
Axes to be displayed	X, Y, Z				
Data processing unit	QM-Data200 or Vision Unit				
Operation section	Joystick lock	Available			
Fine pitch	Available				
Data output	Available				
Digital display reset	Available				
Illumination light intensity control:	Available				
LAF (just focus)	—	—	—	Available	
LAF (tracking focus)	—	—	—	Available	
Turret remote control	Available (when installing a motorized turret)				
External dimensions	Microscope main unit	880mmx913mmx730mm / 34.65"x35.94"x28.74"	880mmx913mmx770mm / 34.65"x35.94"x30.31"		
Power unit	160mmx476mmx381mm / 6.30"x18.74"x15"				
Mass	Microscope main unit	Approx. 250kg / 551.2lb		Approx. 255kg / 562.2lb	
Power unit	14kg / 30.86lb				
Power supply	100 - 240V AC, 50/60 Hz Maximum power consumption: 700W				

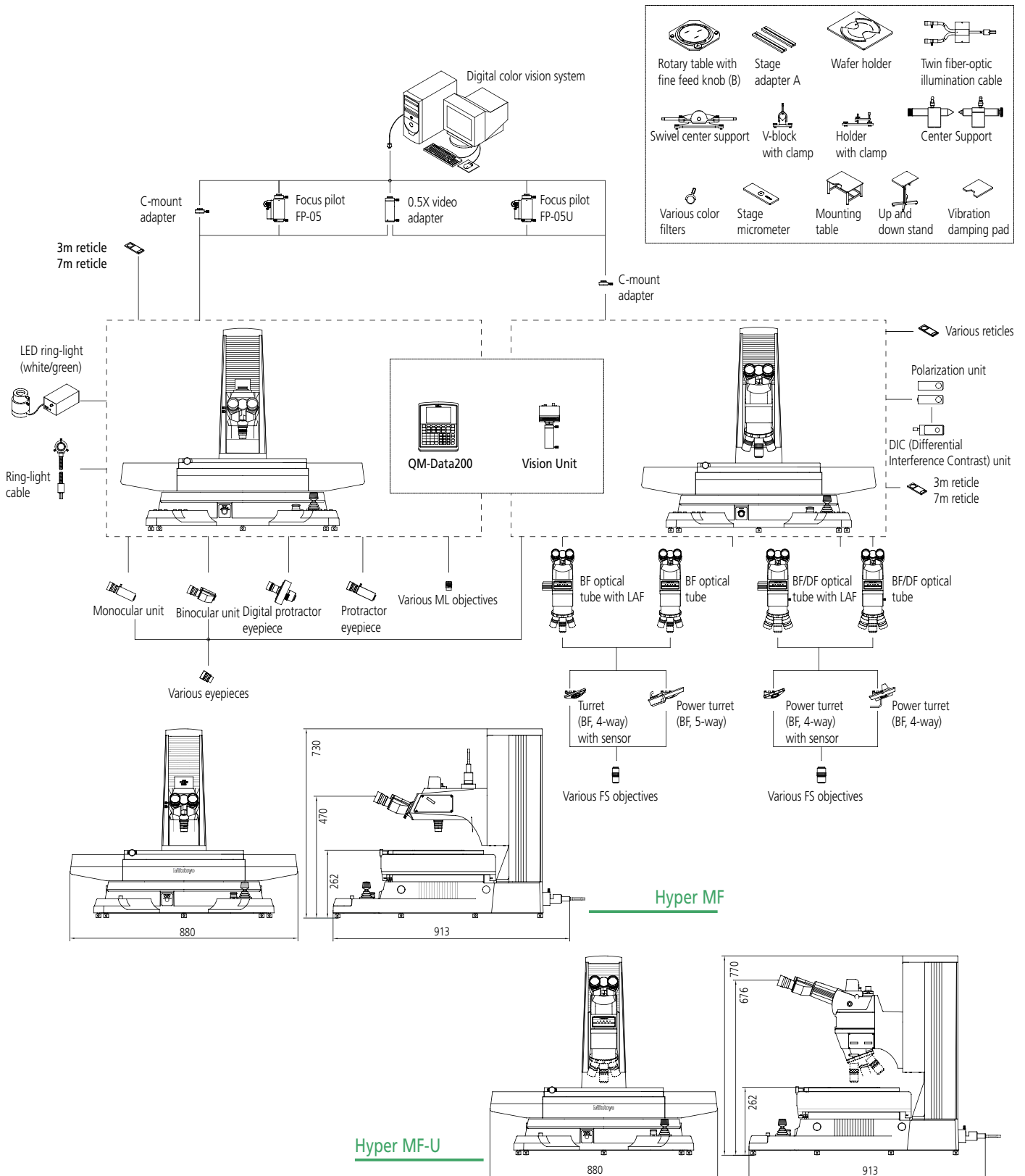
*1: To denote your AC power cable add the following suffixes to the order No.: A for UL/CSA, D for CEE, DC for CCC, E for BS, K for KC, C and No suffix are required for PSE.

*2 and *3 are the factory-installed options.

*4: Measurement accuracy complies with JIS B7153.

When replacing the bulb, please request a halogen bulb for transmitted illumination (12V, 50W) (No.02APA527) or for Reflected illumination (12V, 100W) (No.517181). A high-intensity model (12V, 100W) (No.12BAD602) is also available.

System Configuration



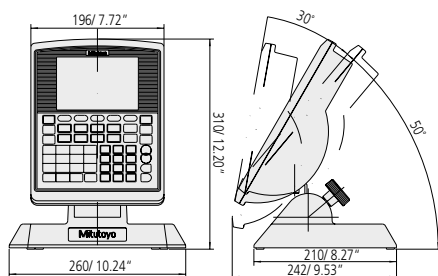
Data Processing System - 2D Calculating System -



Specifications

Order No.	264-159
Display languages	Japanese, English, German, French, Italian, Spanish, Portuguese, Czech, Traditional Chinese, Simplified Chinese, Korean, Turkish, Swedish, Polish, Dutch, and Hungarian
Measurement value unit	Length: mm, angle: Switchable between decimal degree and sexagesimal notation
Resolution	0.01µm
Programming function	Creating, performing, and editing of the measurement procedures
Statistical processing	Number of data, maximum value, minimum value, mean value, standard deviation, range, histogram Statistics classified by each measurement function (Statistics classified by each command)
Number of elements in memory	Maximum 1000 elements
Element call	Point, line, circle, distance, ellipse, square hole, slotted hole, point and angle of intersection
Element key-in	Point element line element, circle element
Display unit	Color graphic LCD (equipped with a backlight)
Measurement result file output	RS-232C output (CSV format, MUX-10 format)
Power supply	100 to 240VAC, 50/60Hz (AC adapter used)
Maximum power consumption	17W (excluding optional accessories)
External dimensions	Approx. 260x242x310mm (including the stand) / 10.24"x9.53"x12.20"
Mass	Approx. 2.9kg / 6.39lbs

Dimensions



Features

- > Powerful 2D measurement capabilities with graphic display functions that make the most of the large LCD screen
- > Graphical help on the screen guides the operator during measurement sequences.
- > Measurement results are displayed automatically
- > Measurement procedures (Part Programs) can be learnt by the system and easily repeated with position navigation help on screen
- > Frequently-used combination measurements (e.g. circle-to-circle) are single-key operations
- > The Automatic Identification (AI) function recognizes the feature type automatically, making preselection unnecessary
- > Macros to initiate learned measuring sequences can be created at a keystroke
- > Custom menus to suit specific requirements can be created
- > Tolerance comparisons and various statistical evaluation options are possible for every measurement result.
- > Measurement results can be output to MS Excel®* in table form (CSV)
- > Measurement results and Measurement procedure can be stored on the USB-Memory stick available as an optional accessory
- > A free-standing table version with tilting device is available
- > The next measurement can be started even while the last is printing out

* MS-Excel® is a registered trademark of Microsoft Corporation.

USB-Memory Stick

No. 12AAH034

- Used for saving / reading files of part programs, user macros, measurement results, etc.



USB-FDD Unit

No. 12AAH035

- Used for saving / reading files of part programs, user macros, measurement results, etc.



Printer

No. 12AAD032

- Used to print measurement results.



[Optional accessories]

No. 908353

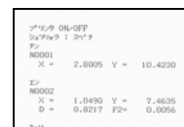
Printer paper (5 rolls)

* An external printer (color/monochrome) compatible with ESC/P is also available.

Printer control code system: ESC/P, compatible with MS-DOS.

Pin-out: 24 pins

ESC/P printer cable(No.12AAA804): 2m- - - Option



Receipt printer print example

Print method	Serial-matrix thermosensitive method
Number of print digits	40 digits
Print speed	Maximum 52.5cps (normal character)
External dimensions (WxDxH)	160x170x65.5mm (printer main unit) / 6.30"x5.59"x2.58"
Standard accessories	Printer cable, printer paper (1 roll), AC adapter (for 100V)

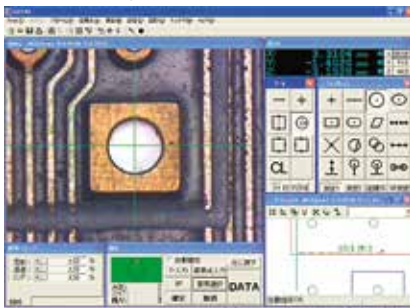


Features

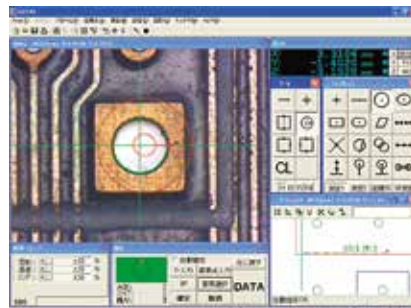
- > Automatic edge detection tool and measurement macro icons enable single-key measurement
- > Graphics and measurement navigation function support ease of use
- > Image capturing / saving function
- > Tolerancing calculation results and statistical processing for each item
- > Measurement results can be exported to MS-Excel®* in CSV format (allows unique inspection sheets to be created on the same PC)
- > Supports total measurement on a single screen.
- > Automatic light equalizing function faithfully reproduces illumination conditions

* MS-Excel® is a registered trademark of Microsoft Corporation.

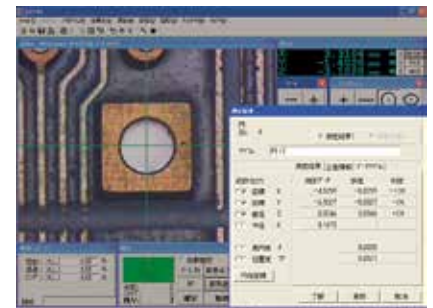
Measuring a Workpiece Feature



1) Display the feature to be measured on the monitor, adjust the illumination and focus with the microscope main unit, and then select the feature and the edge detection tool.



2) Click in the vicinity of the feature with the mouse to automatically detect its edge and perform the measurement / calculation.



3) The measurement results for the feature selected are displayed on the monitor.

Specifications

	Vision Unit
Magnification of the optical system	When installed on the microscope 0.5X (using the 0.5X TV adapter)
Image detection	High-sensitivity 1/2" color CMOS camera 3 million pixels
Resolution	0.1µm
Measuring accuracy for each axis (Measurement environment: 20°C)	Depends on the accuracy specification of the Mitutoyo measuring microscope to which the unit is fitted.
Accuracy (Measurement environment: 20°C)	Depends on the accuracy of Mitutoyo measuring microscopes. For reference: When using an ML series 3X objective lens (In an inspection using a sample workpiece based on the Mitutoyo standards) Measurement accuracy in the screen: Less than ±2.5µm Repetitive accuracy in the screen (±2σ): Less than ±1µm
Software (option)	QSPAK Vision Unit Edition

Note: QSPAK and a data processor are required separately.



Lens and Illumination

Eyepieces

Monocular unit MF



No. 176-302
With one eyepiece 10X /24

Binocular Unit MF



No. 176-393
With two eyepiece 10X /24

Eyepiece MF/MF-U



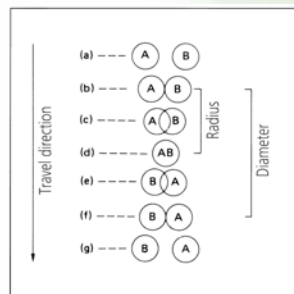
Part name	WF10X / 24	WF15X / 16	WF20X / 12
No. (1-piece pack)	378-856-5	378-857-5	378-858-5
No. (2-piece pack)	378-856	378-857	378-858
Magnification	10X	15X	20X
Field number	24	16	12

Double-image eyepiece MF

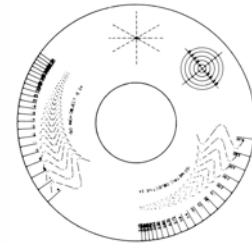


No. 375-044
Aids accurate measurement of hole-to-hole distances, hole diameters and sections using the double image generate when the feature under inspection is not aligned with the optical axis of the microscope.

- Magnification: 10X
- Field number: 22



Rotary template eyepiece MF



No. 176-357
Uses a template to superimpose screw thread forms (metric UST, Uni-field Screw Thread), concentric circles, and crosshairs on the workpiece image for quick and efficient measurement by comparison.

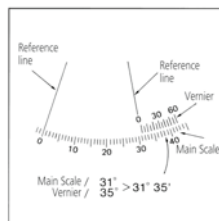
- Magnification: 10X
- Field number: 21

Protractor eyepiece MF



No. 375-043
Measures angle between workpiece edges by successive alignment with two crosshairs whose separation is adjustable and calibrated through 360°

- Field number: 21
- Resolution: 5'



ISO metric screw pitch (for 3X objective)	0.25, 0.3, 0.4, 0.45, 0.5, 0.6, 0.7, 0.75, 0.8, 0.9, 1, 1.25, 1.5, 1.75, 2, 2.5, 3, 3.5, 4
ISO unified screw thread / inch (for 3X objective)	80, 75, 64, 56, 48, 44, 40, 36, 32, 28, 24, 20, 18, 16, 14, 13, 12, 11, 10, 9, 8, 7, 6
Concentric circles with cross hairs (for 3X objective)	ø1, ø2, ø3, ø4, ø5
Dotted-line cross scale	60°, 90°

Digital protractor eyepiece MF



No. 176-313
Measures angle between workpiece edges by successive alignment with reticle cross hairs whose rotation is digitally calibrated. Switching or resetting the resolutions is controlled with the standard accessory counter. Data output to an RS-232C equipped PC is possible.

- Magnification: 10X • Field number: 18 • Reticle: 90° solid line, 45° broken line
- Angular resolution: 0.00° or 1° • Power supply: 9VAC, 600mA • Maximum power consumption: 4W • Maximum angle value: ±369.99° or ±369.59'

Objective

ML Objective

MF

Model name	ML1X	ML3X	ML5X	ML10X	ML20X	ML50X	ML100X
Order No.	375-036-1	375-037-1	375-034-1	375-039	375-051	375-052	375-053
Magnification	1X	3X	5X	10X	20X	50X	100X
Numerical aperture N.A.	0.03	0.09	0.13	0.21	0.42	0.55	0.7
Working distance WD	61mm / 2.40"	77mm / 3.03"	61mm / 2.40"	51mm / 2.32"	20mm / .79"	13mm / .51"	6mm / .24"
Focal depth	306µm / 12.05µinch	34µm / 1.33µinch	23µm / .91µinch	6.2µm / .24µinch	1.6µm / .06µinch	0.9µm / .94µinch	0.6µm / .02µinch

FS Objective Bright field (BF)

MF-U

Model name	MplanApo 1X	MplanApo 2X	MplanApo 5X	MplanApo10X	MplanApo 20X	MplanApo 50X	MplanApoHR50X	MplanApo100X	MplanApoHR100X
Order No.	378-800-3	378-801-6	378-802-6	378-803-3	378-804-3	378-805-3	378-814-4	378-806-3	375-815-4
Magnification	1X	2X	5X	10X	20X	50X	50X	100X	100X
Numerical aperture N.A.	0.025	0.055	0.14	0.28	0.42	0.55	0.75	0.7	0.9
Working distance WD	11mm / .43"	34mm / 1.33"	34mm / 1.33"	34mm / 1.34"	20mm / .79"	13mm / .51"	5.2mm / .20"	6mm / .24"	1.3mm / .05"
Focal depth	440µm / 17.32µinch	91µm / 3.58µinch	14µm / .55µinch	3.5µm / .14µinch	1.6µm / .06µinch	0.9µm / .04µinch	0.48µm / .02µinch	0.6µm / .02µinch	0.34µm / .01µinch

Model name	MplanApoSL20X	MplanApoSL50X	MplanApoSL80X	MplanApoSL100X	MplanApoSL200X	GplanApo20X(t2.5)	GplanApo50X(t3.5)
Order No.	378-810-3	378-811-3	378-812-3	378-813-3	378-816-3	378-847	378-848-3
Magnification	20X	50X	80X	100X	200X	20X	50X
Numerical aperture N.A.	0.28	0.42	0.5	0.55	0.62	0.28	0.5
Working distance WD	30.5mm / 1.2"	20.5mm / .81"	15mm / .59"	13mm / .51"	13mm / .51"	29.42mm / 1.16"	13.89mm / .55"
Focal depth	3.5µm / .14µinch	1.6µm / .09µinch	1.1µm / .04µinch	0.9µm / .04µinch	0.7µm / .03µinch	3.5µm / .14µinch	1.1µm / .04µinch

FS Objective Bright / dark field (BD)

MF-U

Model name	BDplanApo2X	BDplanApo5X	BDplanApo10X	BDplanApo20X	BDplanApo50X	BDplanApoHR50X	BDplanApo100X	BDplanApoHR100X
Order No.	378-831-7	378-832-7	378-833-7	378-834-7	378-835-7	378-845-7	378-836-7	378-846-7
Magnification	2X	5X	10X	20X	50X	50X	100X	100X
Numerical aperture N.A.	0.055	0.14	0.28	0.42	0.55	0.75	0.7	0.9
Working distance WD	34mm / 1.34"	34mm / 1.34"	33.5mm / 1.32"	20mm / .79"	13mm / .51"	5.2mm / .20"	6mm / .24"	1.3mm / .05"
Focal depth	91µm / 3.58µinch	14µm / .55µinch	3.5µm / .15µinch	1.6µm / .96µinch	0.9µm / .04µinch	0.48µm / .03µinch	0.6µm / .02µinch	0.34µm / .01µinch

Model name	BDplanApoSL20X	BDplanApoSL50X	BDplanApoSL80X	BDplanApoSL100X
Order No.	378-840-7	378-841-7	378-842-7	378-843-7
Magnification	20X	50X	80X	100X
Numerical aperture N.A.	0.28	0.42	0.5	0.55
Working distance WD	30.5mm / 1.2"	20mm / .79"	13mm / .51"	13mm / .51"
Focal depth	3.5µm / .14µinch	1.6µm / .09µinch	1.1µm / .04µinch	0.9µm / .04µinch

Twin fiber-optics illuminator

MF/MF-U



No. 176-416

This uses the surface illumination light source in microscope main unit. The light equalizing function and condenser lens are included. 12V100W
*10X lens or less is applicable.

Fiber-optics ring-light

MF-U



No. 176-417

This uses the surface illumination light source in microscope main unit. The light equalizing function and condenser lens are included. 12V100W
*10X lens or less is applicable.

LED ring-light

MF



No. 176-367-2
(white LED)

Position is adjustable so as to be appropriate for the light equalizing function and working distance. 12V 7.7W, outside diameter: 70mm/2.76"
*10X lens or less is applicable.

LED ring-light (for FS Objectives)

MF-U



Consult your local Mitutoyo office for the Order No. (white LED)

Position is adjustable so as to be appropriate for the light equalizing function and working distance. 12V7.7W, outside diameter: 70mm/2.76"
*10X lens or less is applicable.

Main Optional Accessories

Polarization Unit



No.378-092
Bright field (BF)
Bright and dark field (BD)

DIC Unit



No.378-080: For 5X, 10X
No.378-079: For 20X
No.378-078: For 50X, SL20X
No.378-076: For 100X, SL80X, SL50X

Illumination Filter



No.12AAA643:ND2
No.12AAA644:ND8
No.12AAA645:GIF
No.12AAA646:LB80

Centering, Parfocal Turret



No.378-018
Objectives: Up to 4
Visual field adjustment range:
 $\pm 0.5\text{mm}/.02''$
Parfocal adjustment range:
 $\pm 0.5\text{mm}/.02''$

Power Turret (for BF)



No.176-411
Objectives: Up to 5
Visual field adjustment range:
 $\pm 0.5\text{mm}/.02''$
Positioning accuracy:
 $2\sigma=3\mu\text{m}/120\mu\text{inch}$
Drive life: 1,000,000 movements

V Block with Clamp



No.172-378
Maximum clamp diameter:
 $\phi 25\text{mm}/.98''$
Mass: 0.8kg/ 1.76lb
* Stage Adapter A is used together.

Swivel Center Support



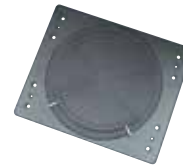
No.172-197
A tilt angle of $\pm 10^\circ$ can be supported.
Minimum reading of angle: 1°
Maximum support size:
 $\phi 80 \times 140\text{mm}/3.15'' \times 5.51''$ in
horizontal orientation $\phi 65 \times 140\text{mm}/$
 $2.56'' \times 5.52''$ at a tilt angle of 10°
Mass: 2.5kg/ 5.51lb
* Stage Adapter A is required.

Holder with Clamp



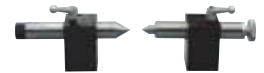
No.176-107
Maximum workpiece thickness:
35mm/ 1.38''
Mass: 0.4kg/ .88lb
* Stage Adapter A is required.

Wafer Holder



No.176-414
Wafer size: 3 to 8 inches
Rotary Holder (**No.378-363**) attached
Mass: 3.2kg/ 7.06lb

Center Support



No.176-415
Maximum support length:
250mm/9.84''
Maximum support diameter:
 $\phi 150\text{mm}/5.91''$
Maximum diameter allowing external
apex observation: $\phi 140\text{mm}/5.51''$
Effective stroke of the center-clamping
mechanism: 22mm/ .87''
Mass: 13kg/ 28.66lb

Stage Adapter A



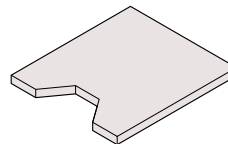
No.176-304
pieces pack Mass: 1.5kg/ 3.31lb

Rotary table with fine feed knob (B)



No.3176-306
Effective glass diameter: $\phi 240\text{mm}/9.45''$
Rotary table rotation angle:
Approx. 51.5° (per full turn of the
fine feed knob)
Mass: 6.5kg/ 14.33lb

Vibration Damping Pad



No.176-419
Spring pad type
Float unit material: SUS304
WxDxH = 800x900x49mm/31.50''x3
5.43''x1.93''
Mass: 58kg/ 127.9lb

Machine Stand



No.176-418
Max. loading: 400kgf/ 881.8lbf
WxDxH = 1100x900x650mm/433.07''
x35.43''x26.59''
Mass: 45kg/99.21lb

Measuring Microscope Line-up

Demand for measuring microscopes that can perform observational tasks as well as measurement is increasing rapidly in various sectors of industry such as semiconductors, electronic parts, precision auto parts and tools. The following summarizes Mitutoyo's line-up of measuring microscopes actively participating in many industries. Mitutoyo intends to widen the appeal of measuring microscopes that can determine miniscule part dimensions on a workpiece and make them serve as the Basic Machine for non-contact measurement.

High-accuracy Measuring Microscopes

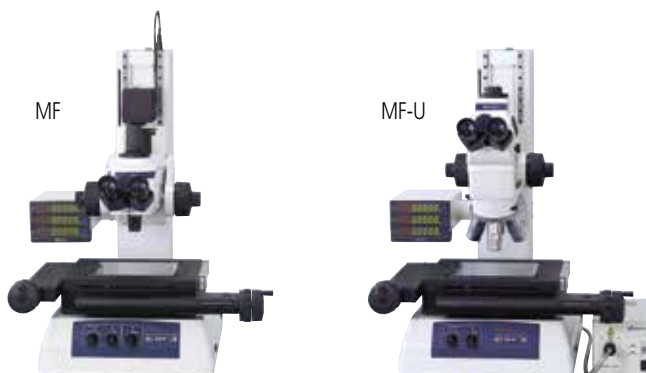
Hyper MF/MF-U



Series name	Hyper MF	Hyper MF-U
Optical tube	Standard (Finite correction)	Metallurgical microscope (Infinity-correction)
Measuring range (X-Y-Z)	250-150-150mm	
Control system/reading unit	3-axis motor-driven with Joystick/digital scale	
Resolution	0.01 μ m	
Data processing unit	QM-DATA200/vision unit	
Video port	Standard equipment	

Measuring Microscopes

MF-B/UB



Series name	MF	MF-U
Optical tube	Standard (Finite correction)	Metallurgical microscope (Infinity-correction)
Measuring range (X-Y-Z)	100-100-150/200-100-150/200-170-220/ 300-170-220/400-200-220mm	
Control system/reading unit	3-axis motor-driven with Joystick/digital scale	
Resolution	0.1 / 0.5 / 1 μ m	
Data processing unit	QM-DATA200/vision unit	
Video port	Standard equipment	

Toolmaker's Microscope

TM



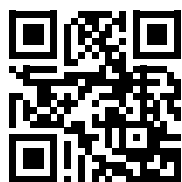
Series name	TM
Optical tube	Standard (Finite correction)
Measuring range (X-Y-Z)	50-50-115/100-50-107mm
Control system/reading unit	Manual/micrometer head
Resolution	1 (MHD head)
Data processing unit	QM-DATA200
Video port	None



Whatever your challenges are, Mitutoyo supports you from start to finish.

Mitutoyo is not only a manufacturer of top quality measuring products but one that also offers qualified support for the lifetime of the equipment, backed up by comprehensive services that ensure your staff can make the very best use of the investment.

Apart from the basics of calibration and repair, Mitutoyo offers product and metrology training, as well as IT support for the sophisticated software used in modern measuring technology. We can also design, build, test and deliver bespoke measuring solutions and even, if deemed cost-effective, take your critical measurement challenges in-house on a sub-contract basis.



Find additional product literature and our product catalogue

www.mitutoyo.eu

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