

TM-505B/1005B

SERIES 176 — Toolmakers' Microscopes

The Mitutoyo TM Series is a toolmakers' microscope well suited for measuring dimensions and angles of machined metals. It also can be used to check the shape of screws and gears by attaching an optional reticle. The compact body makes it ideal for use on shop floors with limited space.

FEATURES

- Angle measurement is performed easily by turning the angle scale disc to align the cross-hair reticle with the workpiece image.

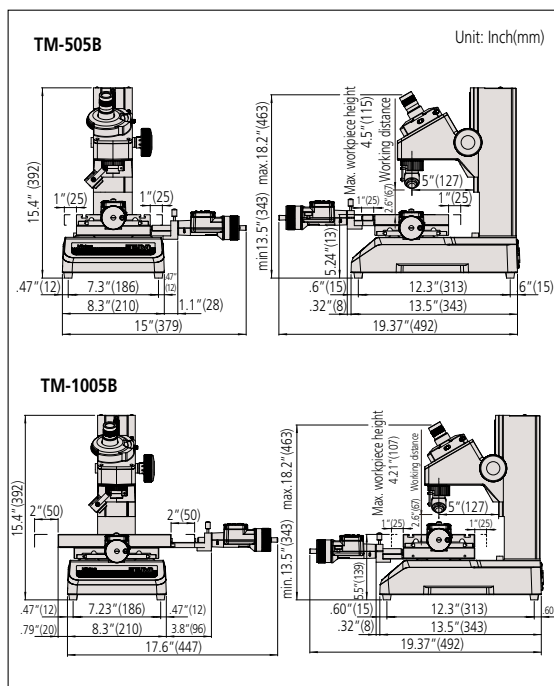
- Illumination intensity can be adjusted.
- Included standard accessories create an overall magnification of 30X. Magnifications can be changed from 20 - 200X by using optional objectives and/or eyepieces.



SPECIFICATIONS

Model No.	TM-505B	TM-A505B	TM-1005B	TM-A1005B
Order No.	176-818A	176-820A	176-819A	176-821A
Objective lens	Standard accessory: 2X, Options: 5X, 10X			
Microscope head	Maximum height of workpiece	4.53" / 115mm	4.21" / 107mm	
Illumination unit	Transmitted illumination	Stepless brightness adjustment, White LED light source, With green filter		
	Surface illumination	Oblique single-source type, Stepless brightness adjustment, White LED light source		
Cross-travel stage	Measuring range	2" x 2" / 50x50mm	4" x 2" / 100x50mm (An optional 2"/50mm gauge block is required to cover full range. A CERA block is recommended.)	
	Table size	6" x 6" / 152x152mm	9.44" x 6" / 240x152mm	
	Usable area of the stage glass	3.8" x 3.8" / 96x96mm	6" x 3.8" / 154x96mm	
Linear measurement method	Micrometer heads optional	Micrometer heads included	Micrometer heads optional	Micrometer heads included
Resolution	N/A	.00005"/1μm	N/A	.00005"/1μm
Micrometer head travel range	N/A	2"/50mm	N/A	2"/50mm

DIMENSIONS



Technical Data

Optical tube	<ul style="list-style-type: none"> • Monocular with 30° depression angle • 90° broken cross-hair reticle (176-126) • Erect image • Diopter adjustable
Eyepiece protractor	<ul style="list-style-type: none"> • Graduation: 1° • Protractor range: 360° • Minimum reading by vernier: 6'
Eyepiece (176-116)	<ul style="list-style-type: none"> • Magnification: 15X • Field number: 13
Objective (176-138)	<ul style="list-style-type: none"> • Magnification: 2X • Working distance: 2.638" (67mm) • Numerical aperture: 0.07
Total magnification	• 30X
Transmitted illumination	<ul style="list-style-type: none"> • 3W LED • GIF (green) filter • Stepless intensity adjustment
Reflected illumination	<ul style="list-style-type: none"> • 3W LED • Stepless intensity adjustment • Adjustable position
Power supply	120 V AC, 50/60Hz
Power consumption	4.2W
Mass	TM-505B: Approx. 30.8 lbs. (14kg) TM-1005B: Approx. 33 lbs. (15kg)

Optional Accessories

- 176-115: 10X eyepiece (field number: 13mm)
- 176-116: 15X projection lens set (standard accessory)
- 176-117: 20X eyepiece (field number: 10mm)
- 176-138: Objective, 2X (W.D.: 67mm, N.A.: 0.07) (standard accessory)
- 176-139: Objective, 5X (W.D.: 33mm, N.A.: 0.10)
- 176-137: Objective, 10X (W.D.: 14mm, N.A.: 0.14)
- 164-163: Digimatic micrometer head (range: 50mm, reading: 0.001mm)
- 164-164: Digimatic micrometer head (range: 2"/50mm, reading: .00005"/0.001mm)
- 152-390: Micrometer head for X-axis (range: 25mm, reading: 0.005mm)
- 152-389: Micrometer head for Y-axis (range: 25mm, reading: 0.005mm)
- 152-392: Micrometer head for Y-axis (range: 1", reading: .0001")
- 152-391: Micrometer head for X-axis (range: 1", reading: .0001")
- 611201-531: Rectangular gauge block (1")
- 611202-531: Rectangular gauge block (2")
- 176-204: Dial indicator attachment for Z-axis measurement
- 959149: SPC cable (2m) for Digimatic micrometer head

Fixture and Stage Accessories

- 990561: Workpiece clip (2pcs./set)
- 176-106: Rotary table for TM-505B (effective dia.: 66mm)
- 172-196: Rotary table for TM-1005B (effective dia.: 100mm)
- 176-105: Swivel center support for TM-505B (max. workpiece dia.: 2.7" / 70mm)
- 172-197: Swivel center support for TM-1005B (max. workpiece dia.: 3.1" / 80mm)
- 172-378: V-block with clamp (max. workpiece dia.: 1" / 25mm)
- 176-107: Holder with clamp

Illumination Units

- 176-344A: Bifurcated fiber illuminator
- 64AAB214: LED variable ring light
- 176-208A: LED circular illumination

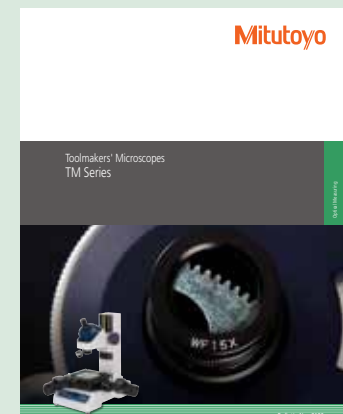
Reticles

- 176-126: Broken cross-hair (90°) (standard accessory)
- 176-111: Concentric circles (up to ø4mm, 0.05mm increment)
- 176-135: Concentric circle (up to ø.2", .01" increment)
- 176-114: 60° angle

Protractor eyepiece



LED ring light 64AAB214



Refer to Bulletin No. (2190) for more details.

MF

SERIES 176 — Measuring Microscopes

Technical Data

Optical tube	<ul style="list-style-type: none"> • Monocular or Binocular (Must Choose) • 25° depression angle • 90° broken cross-hair reticle (12AAG836) • Erect image • TV Mount 50/50
Observation image	• Erect Image
Observation type	• Bright Field
Eyepiece lens	<ul style="list-style-type: none"> • 10x (Included w/Tube) • 15x (Optional) • 20x (Optional)
Objective	<ul style="list-style-type: none"> • Magnification: 3X (Included) • W.D.: 3.03" (77mm); N.A.: .09 • Optional: 1x, 5x, 10x, 20x, 50x, 100x
Light source	<ul style="list-style-type: none"> • Halogen or LED (Must Choose) • Adjustable aperture diaphragms • Light intensity infinitely adjustable
Transmitted illumination	• Telecentric illumination
Reflected illumination	• Koehler illumination
Display Unit	
Number of axis	• 2 axes (MF-A Type) or 3 axes (MF-B Type)
Resolution	• 0.0001" / 0.00005" / 0.00001" (0.001 mm / 0.0005 mm / 0.0001 mm)
Functions	• Data output, Axis linear compensation, Metric or English Units, and more
Stage	<ul style="list-style-type: none"> • Precision travel (2.2+0.02L)µm accuracy • High-accuracy linear glass scales • Quick-release floating mode • Zero-set button
Power consumption	45W LED, 160W Halogen, 120V AC, 50/60 Hz
Mass	<ul style="list-style-type: none"> • 1010D - 148 lbs. / 67 kg • 2010D - 157 lbs. / 71 kg • 2017D - 326 lbs. / 148 kg • 3017D - 344 lbs. / 156 kg • 4020D - 357 lbs. / 162 kg

LED and Halogen Light Options for Transmitted and Reflected Illumination (Common to MF D and MF-U D)



Transmitted LED illumination unit (Common to MF/MF-U Series) | Reflected LED illumination unit (for MF Series) | Reflected LED illumination unit (for MF-U Series)



LED illumination | Halogen illumination

High Visibility Digital Display (Common to MF D and MF-U D)



Front of display | Rear of display

The MF measuring microscopes can be combined with Mitutoyo's vision unit to boost its performance and data management on a PC, further improving measuring efficiency and productivity.

FEATURES

- Observation with a crisp and high-resolution erect image and a wide field of view
- Measuring accuracy that is highest in its class (and conforms to JIS B 7153)
- ML series, high-NA objectives that are specially designed for the MF series (long working distance type)
- Illumination unit (reflected/transmitted) selectable from a high-intensity LED or halogen bulb (selection required)
- Variable aperture diaphragm (reflected/transmitted) allows observation measurement while suppressing light diffraction
- Variety of standardized stages in sizes up to 400x200mm
- Quick-release mechanism useful for moving the stage quickly 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
- Standard measuring microscope has a wide variety of optional accessories including a vision unit and various digital CCD cameras



MF-B2017D
XY stage travel range: 8 x 6.6" / 200 x 170mm (with optional binocular tube)



Using optional slide-type nosepiece with 2-lens mount (factory set option)

Selection of XY stage by travel range

1010D: 4 x 4" / 100 x 100mm



2010D: 8 x 4" / 200 x 100mm



2017D: 8 x 6.7" / 200 x 170mm



3017D: 12 x 6.6" / 300 x 170mm



4020D: 16 x 8" / 400 x 200mm



MF

SERIES 176 — Measuring Microscopes

SPECIFICATIONS

Model No. (XY stage size)	1010D	2010D	2017D	3017D	4020D	
Order No.	MF-A	176-861-10	176-862-10	176-863-10	176-864-10	176-865-10
	MF-B	176-866-10	176-867-10	176-868-10	176-869-10	176-870-10
XY stage travel range	4 x 4" 100 x 100mm	8 x 4" 200 x 100mm	8 x 7" 200 x 170mm	12 x 7" 300 x 170mm	16 x 8" 400 x 200mm	
Z-axis travel range	6" / 150mm			8.7" / 220mm		
Focusing method	Manual focusing (Coarse focusing: 30mm/rev., Fine focusing: 0.2mm/rev.)					
Measurement method	Linear encoder (2-axis model: X / Y-axis, 3-axis model: X / Y / Z-axis)					
Resolution (switchable)	.0001" / .00005" / .00001" (0.001mm / 0.0005mm / 0.0001mm)					
Measuring accuracy (at 20°C)	XY-axis: (2.2+0.02L) μ m, L = Measuring length (mm) when not loaded, JIS B 7153					
Indication accuracy (at 20°C)	Z-axis: (5+0.04L) μ m, L = Measuring length (mm), (MF-B type)					
Floating function	X and Y axes with Quick-release mechanism					
XY stage top size	11 x 11" 280 x 280mm	14 x 11" 350 x 280mm	16.1 x 13.4" 410 x 342mm	20.07 x 13.4" 510 x 342mm	24" x 13.4" 610 x 342mm	
Effective glass size	7 x 7" 180 x 180mm	10 x 6" 250 x 150mm	10.6 x 9.4" 270 x 240mm	14.5 x 9.4" 370 x 240mm	17.3 x 9.4" 440 x 240mm	
Swivel function	—		\pm 5° (left)		\pm 3° (left)	
Max. stage loading	22lbs / 10kg		44lbs / 20kg		33lbs / 15kg	
Max. workpiece height	6" / 150mm		8.7" / 220mm			

MF Selection of Machine Type (must select)

	1010	2010	2017	3017	4020	Counter	Motorized stage	Optics
A	176-861-10	176-862-10	176-863-10	176-864-10	176-865-10	X,Y	Manual	BF
B	176-866-10	176-867-10	176-868-10	176-869-10	176-870-10	X,Y,Z	Manual	BF
J	-	-	176-891A	176-892A	176-893A	X,Y,Z	Z only	BF

Example: MF-A1010D results in part number 176-861-10

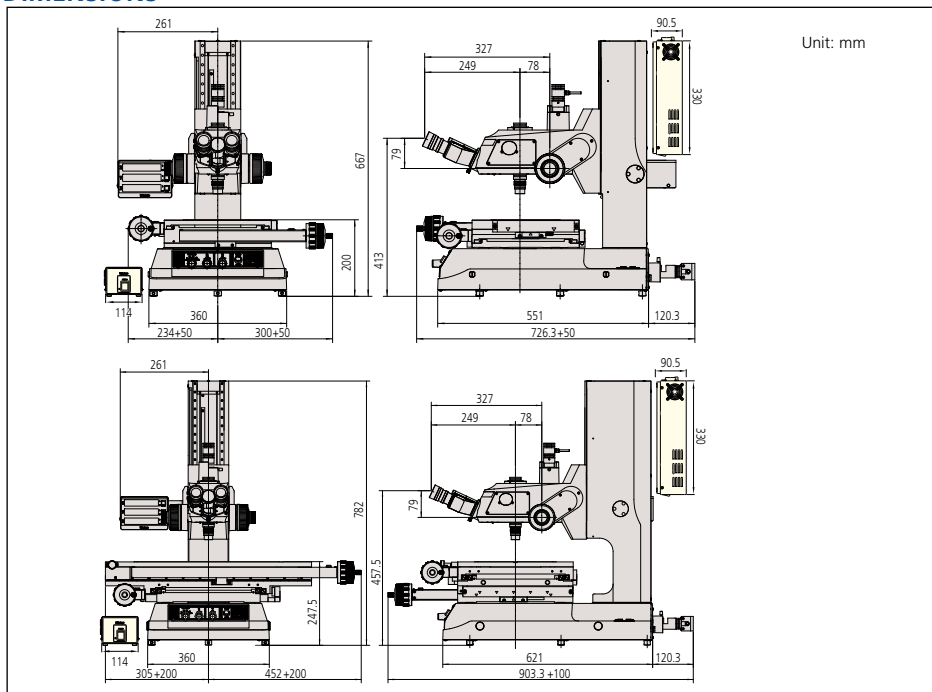
Illumination Unit (must select)

Applicable Illumination Unit	LED	Halogen
Order No.	176-445A	176-447A

Eye Tube Selection (must select)

Monocular with 10X eyepiece	176-392
Binocular with 10X eyepiece	176-393

DIMENSIONS



Optional Accessories

- 176-392:** Monocular tube with 10X eyepiece
- 176-393:** Binocular tube with 10X eyepiece set
- 378-866:** 10X eyepiece set (view field dia.: 24mm)
- 378-857:** 15X eyepiece set (view field dia.: 16mm)
- 378-858:** 20X eyepiece set (view field dia.: 12mm)
- 375-043:** Protractor eyepiece (10X)
- 176-313:** Digital protractor eyepiece (10X)
- 375-036-2:** 1X objective (W.D.: 61mm, N.A.: 0.03)
- 375-037-1:** 3X objective (W.D.: 77mm, N.A.: 0.09) (std. accessory)
- 375-034-1:** 5X objective (W.D.: 61mm, N.A.: 0.13)
- 375-039:** 10X objective (W.D.: 51mm, N.A.: 0.21)
- 375-051:** 20X objective (W.D.: 20mm, N.A.: 0.42)
- 375-052:** 50X objective (W.D.: 13mm, N.A.: 0.55)
- 375-053:** 100X objective (W.D.: 6mm, N.A.: 0.7)
- 176-370-1:** Slide-type nosepiece (2-mount, parfocal)
- 176-370-2:** Slide-type nosepiece (2-mount, mag. adjusted)
- 12AAA643:** ND2 color filter (transmitted / surface)
- 12AAA644:** ND8 color filter (transmitted / surface)
- 12AAA645:** GIF filter (transmitted / surface) (std. accessory)
- 12AAA646:** LB80 color filter (transmitted / surface)
- 375-054:** 0.5X camera adapter (with C-mount adapter)
- 970441:** C-mount adapter
- 513667:** Halogen bulb (12V, 50W)
- 12BAB345:** Halogen bulb (long life type, 12V, 50W)
- 176-308:** Vibration damping stand
- 176-309:** Mounting stand
- 375-056:** Stage micrometer
- 12AAA165:** Lens cleaning kit
- 12AAA846:** Foot switch
- 382951:** Vinyl cover (standard accessory) 2010 or less
- 12BAM841:** Vinyl cover 2017 or greater

Illumination Units

- 176-367-2A:** LED ring illuminator
- 176-343A:** Twin fiber-optics illuminator
- 176-366A:** Ring fiber-optics illuminator
- 12AAG806:** GIF color filter (for fiber-optics illuminator)
- 12AAG807:** LB80 color filter (for fiber-optics illuminator)

Fixture and Stage Accessories

- 176-107:** Holder with clamp
- 172-378:** V-block with clamp
(max. workpiece dia.: 1" / 25mm)
- 172-197:** Swivel center support¹
(max. workpiece dia.: 3.1" / 80mm)
- 176-305:** Rotary stage with fine feed knob for 1010D/2010D models
- 176-306:** Rotary stage with fine feed knob for 2017D/3017D/4020D models

¹ Fixture mount adapter (**176-310**) is required for 2010D models. Fixture mount adapter (**176-304**) is required for 2017D/3017D/4020D models.



QM-Data200

- 2-D data processing unit
- 264-155A:** Stand-mount type
- 12AAA807:** Connecting cable set

Focus pilot FP-05

Focus assisting system



Vision Unit

PC-based vision measuring system

359-763

MF Motorized

SERIES 176 — Motorized Type Measuring Microscopes

- Motorized model of the MF Series. The Z-axis is motorized, and the stage can be operated using a remote box.
- Using the optional vision unit enables the image AF function.
- Illumination unit (reflected/transmitted)

- can be selected from a high-intensity LED or halogen bulb (selection required).
- Variable aperture diaphragm (reflected/transmitted) allows observation measurement while suppressing light diffraction.
- A wide variety of optional accessories are offered.
- ML series, high-NA objectives that are specially designed for the MF series (long-working distance type).
- High-magnification observation up to 2000X.



Refer to No. (E14003) for more details.



MF-J2017D

* The binocular tube, eyepieces, and LED illumination unit are optional accessories.

SPECIFICATIONS

Model No.	MF-J2017D	MF-J3017D	MF-J4017D	
Order No.	176-891A	176-892A	176-893A	
Observation image	BF (Bright field)/Erect image			
Eyepiece	10X (field number: 24), 15X, 20X			
Objective lens	ML series 3X objective lens (standard accessory), 1X, 5X, 10X, 20X, 50X, 100X			
Illumination unit (One of the two options must be selected.)	LED illumination unit	Transmitted illumination: Telecentric system, Built-in aperture diaphragm, White LED light source, stepless light intensity control, with cooling fan Reflected illumination: Koehler illumination, Variable aperture diaphragm mechanism, White LED light source, stepless light intensity control Control unit: Power ON/OFF switch (main switch), 100 - 240V AC power input connector		
	Halogen illumination unit	Transmitted illumination: Telecentric system, Built-in aperture diaphragm, Halogen bulb (12V, 50W), stepless light intensity control, with cooling fan Reflected illumination: Koehler illumination, Variable aperture diaphragm mechanism, Halogen bulb (12V, 50W), stepless light intensity control, with cooling fan Control unit: Power ON/OFF switch (main switch), 100 - 240V AC power input connector		
Vision AF ^{*1}	Available Option			
XY-axis Vision	Measuring range	200×170mm	300×170mm	400×200mm
Z-axis	Measuring range	220mm		
Measuring accuracy ^{*2}	(When no load is put on the X- or Y-axis)	(2.2+0.02L) μm L: Measuring length (mm)		
Digital counter	Resolution	1/0.5/0.1μm .0001"/.00005"/.00001" switchable		

*1: Vision Unit **359-763** and an image AF cable **12AAN358** are sold separately.

*2: Measuring method complies with JIS B7153.

Bulb replacement for transmitted/reflected illumination Standard: Halogen bulb (12V, 50W) (No.513667)
Bulb life: 1,100 hours

MF-U

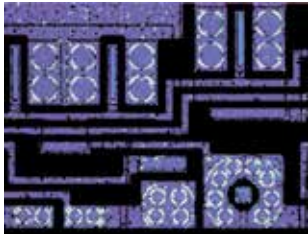
SERIES 176 — High-power Multi-function Measuring Microscopes

FEATURES

- Observation with a clear and flareless erect image and a wide field of view
- Measuring accuracy that is highest in its class (and conforms to JIS B 7153)
- 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 high-accuracy measurement solution
- Illumination unit (reflected/transmitted) selectable from a high-intensity LED or halogen bulb (required)
- Variable aperture diaphragm (reflected/transmitted) allows for contrast adjustment
- Variety of standardized stages in sizes up to 400 x 200 mm
- Quick-release mechanism useful for moving the stage quickly when measuring workpieces that are large in size or quantity
- High-magnification eyepiece observation up to 4000X



MF-UB3017D
XY stage travel range: 12 x 6.7" / 300 x 170mm
(with optional turret, objective and fiber illumination)



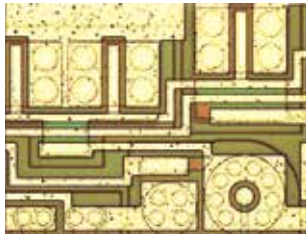
Polarized light observation:
Observing only the filtered light that vibrates in one direction. Used for observing materials with special optical characteristics, such as mineral and liquid crystal.



Dark field (DF) observation:
Observing only the scattered light by shutting down the direct light to the objectives. The scratches and dust that cannot be viewed in the bright view field can be observed by this method in high-contrast.



Differential interference contrast (DIC) observation:
Effective in detecting fine scratches and steps on the surface of metal, liquid crystal, and semiconductors.



Bright field (BF) observation:
Most common method of observation. Observing directly the light reflected from the surface of the workpiece.

Technical Data

Observation image:	Erect image
Optical tube:	Siedentoph type (pupil distance adjustment: 51 - 76mm), 1X tube lens, Binocular tube (depression: 30°), Reticle projection method, with TV mount, Optical path ratio (eyepiece/TV mount: 50/50)
Eyepiece lens:	10X (field No.: 24mm), Optional: 15X, 20X
Turret (optional):	Manual or power
Objective (optional):	M / BD Plan Apo objective from 1X to 200X
Transmitted illumination	
• Light source:	Halogen bulb (12V, 50W) or LED
• Optical system:	Telecentric illumination with adjustable aperture diaphragms
• Functions:	Light intensity adjustable, Non-stepped brightness adjustment
Surface illumination	
• Light source:	Optional halogen illumination unit (fiber-optic cold light illumination) or LED
• Optical system:	Koehler illumination with adjustable aperture diaphragms
• Functions:	Light intensity adjustable, Non-stepped brightness adjustment
Display unit:	
• No. of axis:	2 axes or 3 axes
• Resolution:	.0001" / .00005" / .00001" / 0.001mm / 0.0005mm / 0.0001mm
• Functions:	Zero-setting, Direction switching, Data output (via RS-232C interface)
Power supply:	120V AC, 50/60Hz
Mass:	148lbs/67kg (1010D) / 157lbs/71kg (2010D) / 326lbs/148kg (2017D) / 344lbs/156kg (3017D) / 357lbs/162kg (4020D)

Selection of XY stage by travel range



1010D: 4 x 4" / 100 x 100mm



2010D: 8 x 4" / 200 x 100mm



2017D: 8 x 6.7" / 200 x 170mm



4020D: 16" x 8" / 400 x 200mm

Optional Accessories

- 378-866:** 10X eyepiece set (view field dia.: 24mm) (standard accessory)
378-857: 15X eyepiece set (view field dia.: 16mm)
378-858: 20X eyepiece set (view field dia.: 12mm)

Turret (Nosepiece) **must select**

- 378-018:** Adjustable manual BF turret (4 port)
378-216A: Adjustable power BF turret (5 port)
176-211: Adjustable manual BF/DF turret (4 port)
176-212A: Adjustable power BF/DF turret (4 port)

Objectives
 See page I-28 for objective selection

Manual and Power Turrets



- Filters
378-092: Polarization unit
378-076: DIC unit for 100X, SL80X, SL50X objective
378-078: DIC unit for 50X, SL20X objective
378-079: DIC unit for 20X objective
378-080: DIC unit for 10X, 5X objective
12AAA643: ND2 color filter (for halogen illuminator, **176-448A**)
12AAA645: GIF filter (standard accessory)
12AAA646: LB80 color filter (for halogen illuminator, **176-448A**)

Camera Mounts

- 375-054:** 0.5X camera adapter (with C-mount adapter)
970441: C-mount adapter

Bulbs

- 513667:** Halogen bulb (12V, 50W)
12BAB345: Halogen bulb (long life type, 12V, 50W)
517181: Halogen bulb (12V, 100W)
12BAD602: High intensity halogen bulb (12V, 100W)

Illumination Units

- 176-315A:** Halogen illumination unit (12V, 100W)
176-316A: Halogen illumination unit (12V, 150W)
176-343A: Twin fiber-optics illuminator
12AAG806: GIF color filter (for **176-315A** and **176-343A**)
12AAG807: LB80 color filter (for **176-315A** and **176-343A**)

Fixture and Stage Accessories

- 176-107:** Holder with clamp
172-378: V-block with clamp (max. workpiece dia.: 1" / 25mm)
172-197: Swivel center support* (max. workpiece dia.: 3.1" / 80mm)
176-305: Rotary stage with fine feed knob for 1010D/2010D models
176-306: Rotary stage with fine feed knob for 2017D/3017D/4020D models

*Fixture mount adapter (**176-310**) is required for 2010D models.
 Fixture mount adapter (**176-304**) is required for 2017D/3017D/4020D models.

Misc.

- 176-308:** Vibration damping stand
176-309: Mounting stand
375-056: Stage micrometer
937179T: Foot switch
 Reticle See page I-21

MF-U

SERIES 176 — High-Power Multi-Function Measuring Microscopes

SPECIFICATIONS

Model No. (XY stage size)	1010D	2010D	2017D	3017D	4020D
Order No.	MF-UA	176-871-10	176-872-10	176-873-10	176-874-10
	MF-UB	176-876-10	176-877-10	176-878-10	176-879-10
	MF-UC	176-881-10	176-882-10	176-883-10	176-884-10
	MF-UD	176-886-10	176-887-10	176-888-10	176-889-10
XY stage travel range	4 x 4" 100 x 100mm	8 x 4" 200 x 100mm	8 x 6.7" 200 x 170mm	12 x 6.7" 300 x 170mm	16 x 8" 400 x 200mm
Z-axis travel range	6" / 150mm			8.7" / 220mm	
Focusing method	Manual focusing (coarse focusing: 10mm/rev., fine focusing: 0.1mm/rev.)				
Measurement method	Linear encoder (2-axis model: X / Y-axis, 3-axis model: X / Y / Z-axis)				
Resolution (switchable)	.0001" / .00005" / .00001" (0.001mm / 0.0005mm / 0.0001mm)				
Measuring accuracy (at 20°C)	XY-axis: (2.2+0.02L)µm, L = Measuring length (mm) when not loaded, JIS B 7153				
Indication accuracy (at 20°C)	Z-axis: (5+0.04L)µm, L = Measuring length (mm)				
Floating function	X and Y axes with Quick-release mechanism				
XY stage top size	11 x 11" 280 x 280mm	14 x 11" 350 x 280mm	16 x 13.6" 410 x 342mm	20 x 13.6" 510 x 342mm	24 x 13.6" 610 x 342mm
Effective glass size	7.1 x 7.1" 180 x 180mm	10 x 6" 250 x 150mm	10.6 x 9.6" 270 x 240mm	14.6 x 9.6" 370 x 240mm	17.3 x 9.6" 440 x 240mm
Swivel function	—		±5° (left)		±3° (left)
Max. stage loading	22lbs / 10kg		44lbs / 20kg		33lbs / 15kg

Selection of machine type

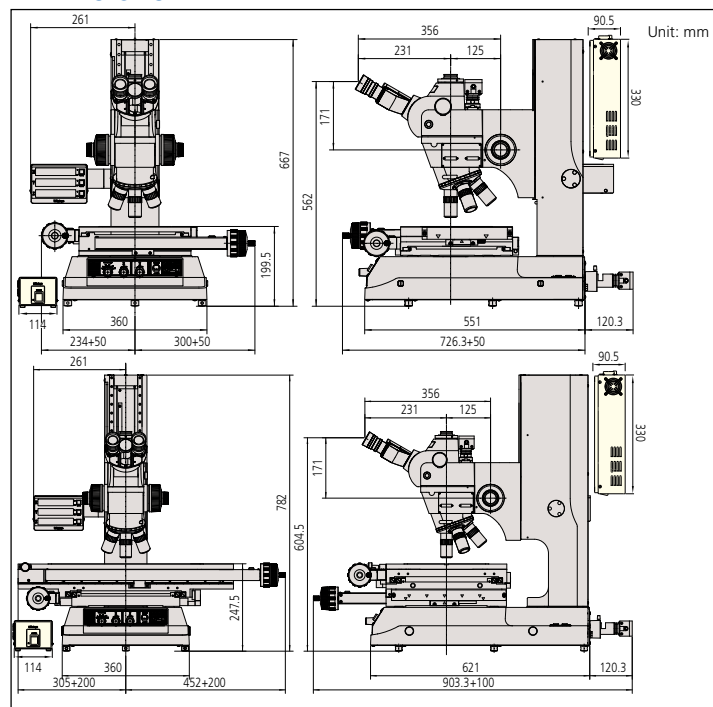
Machine type	MF-UA	MF-UB	MF-UC	MF-UD
Observation type	Bright field (BF)	Bright field (BF)	Bright / Dark field (BF/DF)	Bright / Dark field (BF/DF)
Measurement system	X and Y-axis (2 axes)	X, Y and Z-axis (3 axes)	X and Y-axis (2 axes)	X, Y and Z-axis (3 axes)

Illumination Unit (**must select LED or Halogen illumination unit**)

Applicable Illumination Unit	LED	Halogen
Order No.	176-446A (transmitted & reflected)	176-448A (transmitted) 176-316A (reflected)

Note: illumination unit not included. If halogen transmitted illumination is selected, then either 176-315A or 176-316A must be chosen.

DIMENSIONS



MF-U Motorized

SERIES 176 — Motorized-Type Universal Measuring Microscopes

- Motorized model of the MF-U Series. The Z-axis is motorized, and can be operated using a remote box.
- Using the optional vision unit enables the image AF function.
- Illumination unit (reflected/transmitted) can be selected from a high-intensity LED or halogen bulb (required).
- Variable aperture diaphragm (reflected/transmitted) allows observation measurement while suppressing light diffraction.
- A wide variety of optional accessories are offered.
- Proven high-NA objectives from the FS optical system (long working distance type).
- Integration of metallurgical and measurement microscope functions provide high-resolution observation and a high-accuracy measurement solution.
- High-magnification observation up to 4000X.



MF-UJ2017D

* The turret, objectives, and LED illumination unit are sold separately.

MF-U Selection of Machine Type

↓	2017	3017	4020	Counter	Motorized stage	Optics
J	176-894A	176-895A	176-896A	X,Y,Z	Z only	BF
K	176-897A	176-898A	176-899A	X,Y,Z	Z only	BF/DF

SPECIFICATIONS

		MF-UJ2017D	MF-UJ3017D	MF-UJ4020D
BF (Bright field)	Model No.	MF-UJ2017D	MF-UJ3017D	MF-UJ4020D
	Order No.	176-894A	176-895A	176-896A
BD (Bright / Dark field)	Model No.	MF-UK2017D	MF-UK3017D	MF-UK4020D
	Order No.	176-897A	176-898A	176-899A
Observation image		BF (Bright field), DF (Dark field), Polarization, Differential Interference Contrast (DIC) / Erect image		
Eyepiece	Diopter adjustment	10X (standard accessory) (Field number: 24), 15X, 20X		
	BF (Bright field)	M Plan Apo, M Plan Apo HR, M Plan Apo SL, G Plan Apo		
Objective lens (optional)	BD (Bright / Dark field)	BD Plan Apo, D Plan Apo HR, BD plan Apo SL		
	LED illumination unit	Transmitted illumination: Telecentric system, Built-in aperture diaphragm, White LED light source, stepless light intensity control, with cooling fan Reflected illumination: Koehler illumination, Variable aperture diaphragm mechanism, White LED light source, Non-step light intensity control Control unit: Power ON/OFF switch (main switch), 100 - 240V AC power input connector		
Illumination unit (One of the two options must be selected.)	Halogen illumination unit	Transmitted illumination: Telecentric system, Built-in aperture diaphragm, Halogen bulb (12V, 50W), stepless light intensity control, with cooling fan Reflected: BF/BD Kohler illumination with adjustable aperture diaphragm, 12V100W or 12V15W halogen lamp (selectable), external fiber illumination, stepless brightness adjustment Control unit: Power ON/OFF switch (main switch), 100 - 240V AC power input connector		
	Vision AF*1	✓		
XY-axis	Measuring range	8×6.7" / 200×170mm	12×6.7" / 300×170mm	16×8" / 400×200mm
Z-axis	Measuring range	8.7" / 220mm		
Measuring accuracy	(When no load is put on the X- or Y-axis)	(2.2+0.02L) μm L: Measuring length (mm)		
Digital counter	Resolution	1/0.5/0.1μm .0001"/.00005"/.00001" switchable		

*1: Vision unit and an image AF cable are separately required.

*2: Measuring method complies with JIS B7153.

Bulb replacement for transmitted illumination Standard: Halogen bulb (12V, 50W) (No.513667), Bulb life: 1,100 hours
For replacement for reflected illumination (from separate light source) Standard: Halogen bulb (12V, 100W) (No.517181),
High-intensity bulb (12V, 100W) (No.12BAD602)

*At the time of purchase, a standard bulb and a high-intensity bulb are provided. (Only for the reflected illumination models.)

Vision Unit

SERIES 359 — Vision System Retrofit for MF and MF-U Microscopes

SPECIFICATIONS

Projected Image	Inverted Image
Onscreen Magnification	19x-1900x (22" Monitor)
Camera Unit	
Image Sensor Size	1/2" Color CMMOS
Image Sensor Resolution	3 MP
Interface	USB 2.0
Dimensions (WxDxH)	2.28 x 2.32 x 3.27" 58 x 59 x 83mm
Adapter Unit	
Measurement Software	QSPak VUE (optional)
Dimensions (DXH)	1.77 x 4.84" / 45 x 123mm
Magnification	0.5x
Optional Accessory:	Foot Switch (12AAJ088)

QSPAK, 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

For repeated measurement/ auto-measurement

- Quick navigation function
- Playback function
- Graphic function
- External data output function
- Statistical calculation function

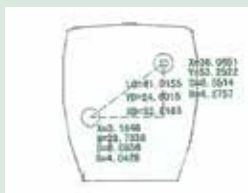
One-click Edge Detection

By clicking the mouse near the edge of a workpiece, QSPAK automatically scans the edge and detects it, showing its coordinates. This function also works with the point tool, box tool, circle tool and auto-focus tool.



Graphic Window

The measurement results and measured elements are plotted in the graphic window in real-time. By using this function, the user can check the current measuring position at a glance. The graphic window can be used for geometrical calculation.

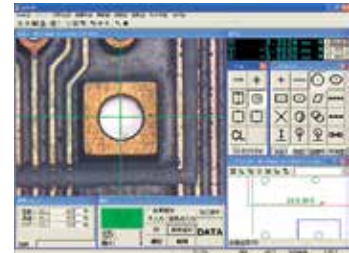


FEATURES

- The automatic edge-detection tools and various macro icons allow measurement in one easy step.
- The graphics and measurement navigation functions facilitate operation.
- Image data input/storage function.
- Measurement results are output in CVS format. This lets the user generate an inspection table in MS-Excel®.
- Allows the tolerance zone measurement of measurement results and various types of statistical processing for each item.
- Combined use with the focus pilot provides high-accuracy height measurements. (Patent pending)

- A series of measuring operations can be performed using just one screen display.
- The auto-brightness control function reproduces the type and degree of illumination required. (This function is limited to the MF/MF-U series.)

QSPAK Measurement Window



The PC system, QSPAK software and microscope are optional.

Vision Unit
No.: 359-763 (for MF D)

