

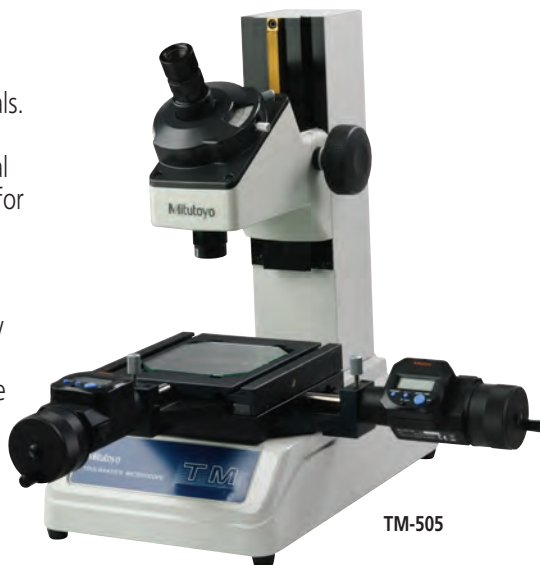
TM-505/510

SERIES 176 — Toolmaker's Microscopes

The Mitutoyo TM Series is a toolmaker's microscope well suited for measuring dimensions and angles of machined metals. It can also 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.

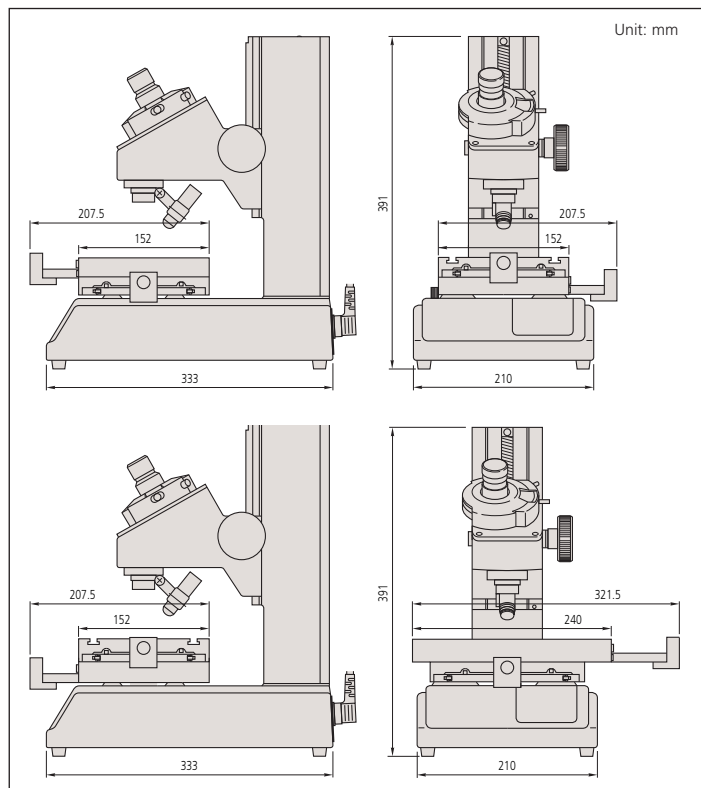


SPECIFICATIONS

Model No.	TM-505		TM-510	
Order No.	176-808A	176-811A	176-809A	176-812A
XY stage travel range	2 x 2" / 50 x 50mm		4 x 2" / 100 x 50mm	
Measurement method	Digimatic Micrometer Head IN/MM (164-164 2pc)	Optional*	Digimatic Micrometer Head IN/MM (164-164 2pc)	Optional*
XY stage table top size	6 x 6" / 152 x 152mm		9.4 x 6" / 240 x 152mm	
Effective area of table	3.8 x 3.8" / 96 x 96mm		6 x 3.8" / 154 x 96mm	
Max. workpiece height	4.5" / 115mm		4.2" / 107mm	
Max. stage loading	11lbs			

* See page I-12

DIMENSIONS



Technical Data

- Observation image: Erect image
 Optical tube: Monocular (diopter adjustable)
 Depression angle: 30°
 Reticle: 90° broken cross-hair (176-126)
 Range: 360°
 Angle reading: Minimum reading: 6' (by vernier)
 Eyepiece: 15X (176-116), View field dia.: 0.5" / 13mm
 Objective: 2X (176-138), Working distance: 2.6" / 67mm
 Optional: 5X, 10X
 Total magnification: 30X
 Contour illumination
 • Light source: Tungsten bulb (24V, 2W)
 • Functions: With green filter, Light intensity adjustable
 Surface illumination:
 • Light source: Tungsten bulb (24V, 2W)
 • Functions: Light intensity adjustable
 Power supply: 120V AC, 50/60Hz
 Mass: 30lbs / 13.5kg (32lbs / 14.5kg: TM-510)

Optional Accessories

- 176-115: 10X eyepiece (view field dia.: 13mm)
 176-116: 15X projection lens set*
 176-117: 20X eyepiece (view field dia.: 10mm)
 176-139: Objective, 5X (W.D.: 33mm, N.A.: 0.10)
 176-137: Objective, 10X (W.D.: 14mm, N.A.: 0.14)
 164-161: 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)
 152-391: Micrometer head for X-axis (range: 1", reading: .0001")
 152-392: Micrometer head for Y-axis (range: 1", reading: .0001")
 611201-531: Rectangular gauge block (1")
 611202-531: Rectangular gauge block (2")
 383038: Halogen bulb (24V, 2W)
 176-204: Dial indicator attachment for Z-axis measurement
 965013: SPC cable (2m) for Digimatic micrometer head

Fixture and Stage accessories

- 990561: Workpiece clip (2pcs/set)
 176-106: Rotary table for TM-505 (effective dia.: 66mm)
 172-196: Rotary table for TM-510 (effective dia.: 100mm)
 176-105: Swivel center support for TM-505 (max. workpiece dia.: 2.7" / 70mm)
 172-197: Swivel center support for TM-510 (max. workpiece dia.: 3.1" / 80mm)
 172-378: V-block with clamp (max. workpiece dia.: 1" / 25mm)
 176-107: Holder with clamp

Illumination units

- 176-366: Fiber-optic ring light
 176-203: Twin-bulb reflected illumination unit
 176-344: Bifurcated fiber illuminator

Reticles

- 176-111: Concentric circles (up to ø4mm, 0.05mm increment)
 176-135: Concentric circle (up to ø.2", .01" increment)
 176-113: 55° angle
 176-114: 60° angle
 176-109: Metric screw threads (pitch = 0.25 - 1mm)
 176-110: Metric screw threads (pitch = 1.25 - 2mm)
 176-140: ISO metric screw threads (pitch = 0.075 - 0.7mm)
 176-141: ISO metric screw threads (pitch = 0.75 - 2mm)
 176-142: ISO unified screw threads (80 - 28TPI)
 176-143: ISO unified screw threads (24 - 14TPI)
 176-144: ISO unified screw threads (13 - 10TPI)
 176-123: Unified screw threads (80 - 28TPI)
 176-124: Unified screw threads (24 - 14TPI)
 176-125: Unified screw threads (13 - 10TPI)
 176-120: Whitworth screw threads (60 - 26TPI)
 176-121: Whitworth screw threads (24 - 18TPI)
 176-122: Whitworth screw threads (16 - 11TPI)
 176-127: NF screw threads (80 - 28TPI)
 176-128: NF screw threads (24 - 14TPI)
 176-129: NF screw threads (13 - 10TPI)
 176-130: 14.5° involute gear teeth (normal rack type)
 176-112: 20° involute gear teeth (normal rack type)

MF

SERIES 176 — Measuring Microscopes

Technical Data

Observation image: Erect image
 Optical tube (optional): Monocular or binocular tube (depression: 25°), Reticle projection method, with TV mount, Optical path ratio (eyepiece/TV mount: 50/50)
 Eyepiece lens (optional): 10X, 15X, 20X
 Objective: 3X (**375-037**), W.D.: 72.5mm
 Optional: 1X, 5X 10X, 20X, 50X, 100X

Transmitted illumination
 • Light source: Halogen bulb or LED (12V, 50W)
 • Optical system: Telecentric illumination with adjustable aperture diaphragms
 • Functions: Light intensity adjustable, Non-stepped brightness adjustment

Surface illumination
 • Light source: Halogen bulb or LED (12V, 50W)
 • Optical system: Koehler illumination with adjustable aperture diaphragms
 • Functions: Light intensity adjustable, Non-stepped brightness adjustment

Display unit:
 • No. of axis: 2 axes (MF-A type) or 3 axes (MF-B type)
 • 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: 145lbs / 65.5kg (505C, 1010C) / 153lbs / 69.5kg (2010C) / 287lbs / 130kg (2017C) / 304lbs / 138kg (3017C) / 317lbs / 144kg (4020C)

Optional Reticles for 3X Eyepiece

- 12AAG838 (12AAG878): Cross-hair (7 μ m width)
 - 12AAG836 (12AAG877): Cross-hair (5 μ m width)
 - 12AAG873 (12AAG876): Cross-hair (3 μ m width)
 - 12AAG839 (12AAG879): Cross-hair and 45° angle
 - 12AAG840 (12AAG880): Broken cross-hair and 60° angle
 - 12AAG841 (12AAG881): Zeiss type chart
 - 12AAG842*: 20mm scale (0.1mm reading)
 - 12AAG843*: Concentric circle (ϕ 1.2 - ϕ 18mm)
 - 12AAG844*: 10mm scale (0.1mm reading)
 - 12AAG845*: 5mm scale (0.05mm reading)
 - 12AAG846*: 10x10mm section (1mm min.)
 - 12AAG847*: Metric screw thread (P = 0.25-1.0)
 - 12AAG848*: Metric screw thread (P = 1.25-2.0)
 - 12AAG849*: Involute gear tooth (14.5°), module = 0.1 - 1.0
 - 12AAG850*: Involute gear tooth (20°), module = 0.1 - 1.0
 - 12AAG851*: Unified screw thread (80 - 28TPI)
 - 12AAG852*: Unified screw thread (24 - 14TPI)
 - 12AAG853*: Unified screw thread (13 - 10TPI)
 - 12AAG854*: Concentric circle (ϕ .01" - ϕ .2")
- () : for MF-U models, * : MF/MF-U compatible

Reticle mount
 (standard accessory)



for MF models

Cross-hair and 45° angle
 (standard accessory)



12AAG839

The MF measuring microscopes' expandability, such as when used in combination with Mitutoyo's vision unit to boost its performance or data management on a PC, promises further improved measuring efficiency.

FEATURES

- Observation with a clear and flare-less erect image and a wide field of view
- Measuring accuracy that is the 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 (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 that has a wide variety of optional accessories including a Vision Unit and various digital CCD cameras



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

MF-B2017C

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

Selection of XY stage by travel range

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



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



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



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



MF

SERIES 176 — Measuring Microscopes

SPECIFICATIONS

Model No. (XY stage size)	1010C	2010C	2017C	3017C	4020C	
Order No.	MF-A	176-662-10	176-663-10	176-664-10	176-665-10	176-666-10
	MF-B	176-682-10	176-683-10	176-684-10	176-685-10	176-686-10
XY stage travel range	4 x 4" 100 x 100mm	8 x 4" 200 x 100mm	8 x 6.7" 200 x 170mm	6 x 6.7" 300 x 170mm	16 x 8" 400 x 200mm	
Z-axis travel range	6" / 150mm	6" / 150mm	8.7" / 220mm	8.7" / 220mm	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)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) (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	
Swiveling function	—	—	±5° (left)	±5° (left)	±3° (left)	
Max. stage loading	22lbs / 10kg	22lbs / 10kg	44lbs / 20kg	44lbs / 20kg	33lbs / 15kg	
Max. workpiece height	6" / 150mm	6" / 150mm	8.7" / 220mm	8.7" / 220mm	8.7" / 220mm	

Selection of machine type

Machine type	MF-A	MF-B
Measurement system	X and Y-axis (2-axis type)	X, Y and Z-axis (3-axis type)

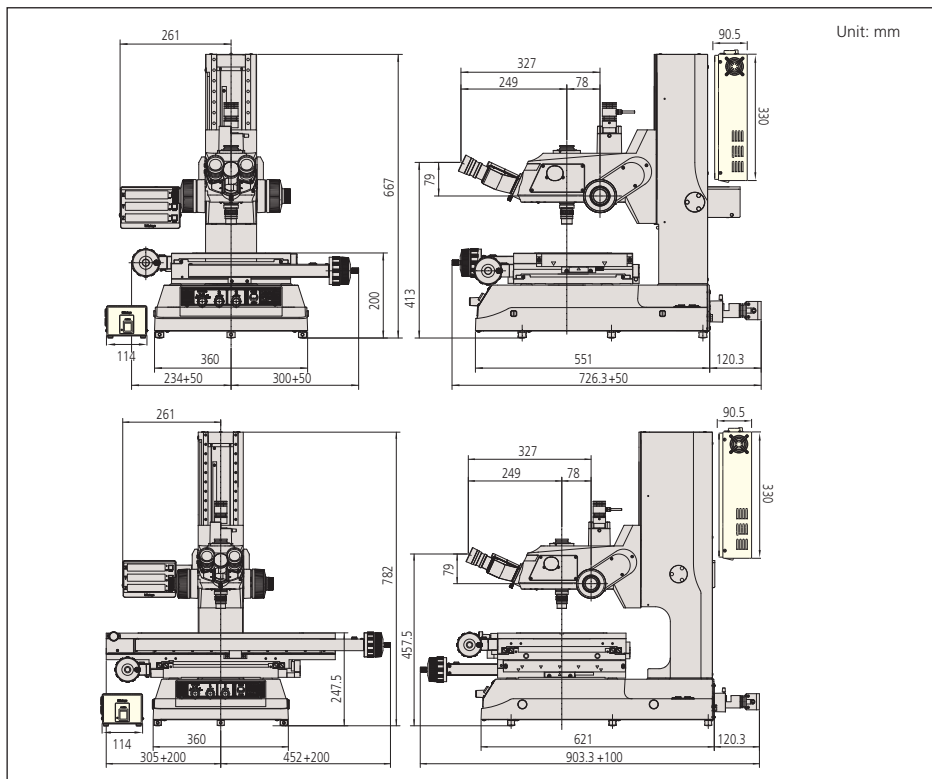
Illumination Unit (must select)

Applicable Illumination Unit	LED	Halogen
Order No.	176-345A	176-347A

Eye Tube Selection (must select)

Monocular with 10X eyepiece	172-392
Binocular with 10X eyepiece	172-393

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)
- 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)
- 176-314-1:** Slide type nosepiece (2-mount, parfocal)
- 176-314-2:** Slide type nosepiece (2-mount, mag. adjusted)
- 12AAA643:** ND2 color filter (transmitted / surface)
- 12AAA644:** ND8 color filter (transmitted / surface)
- 12AAA645:** GIF filter (transmitted / surface)
- 12AAA646:** LB80 color filter (transmitted / surface)
- 375-054:** 0.5X camera adapter (with C-mount adapter)
- 970441:** C-mount adapter
- 513667:** Halogen bulb (24V, 50W)
- 12BAB345:** Halogen bulb (long life type, 24V, 50W)
- 176-308:** Vibration damping stand
- 176-309:** Mounting stand
- 375-056:** Stage micrometer
- 12AAA165:** Lens cleaning kit
- 12AAA846:** Foot switch

Illumination units

- 176-351-6A:** Oblique surface illumination unit
- 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 support*
(max. workpiece dia.: 3.1" / 80mm)
- 176-305:** Rotary stage with fine feed knob for 505C/1010C/2010C models
- 176-306:** Rotary stage with fine feed knob for 2017C/3017C/4020C models

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

