



Magnifiers
Pages 484 to 486



Stereo Microscopes
Pages 487 to 490



Measuring Microscopes
Finescopes, Microscope Units and Objective lenses
Pages 491 to 518



Profile Projectors
Pages 519 to 530



Profile Projector Accessories
Pages 531 to 537

Precision Magnifier

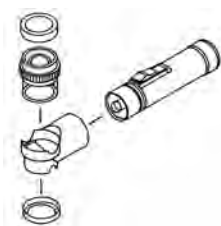
Series 183

Precision Magnifier

- For measuring length, diameters, line thickness, thread pitches, etc.
- Quick replacement of the reticles.
- Easy measurement.



183-101



950757
(optional illuminator)

Pocket Comparators

| No. | Magnification | Field of View (mm) | Dimensions (mm) | Mass (g) |
|---------|---------------|--------------------|-----------------|----------|
| 183-101 | 8X | 24.5 | Ø 37 x 48 | 40 |
| 183-131 | 10X | 24.5 | Ø 37 x 45 | 42 |

Pocket Comparators Set (including magnifier and reticles)

| No. | Set compilation |
|---------|---|
| 183-902 | 183-101, 183-102, 183-106, 183-107, 183-112, 183-113, 183-114 |
| 183-903 | 183-101, 183-102, 183-106, 183-107, 183-109, 183-113, 183-115 |
| 183-904 | 183-101, 183-102 |

Reticles for Pocket Comparators

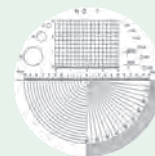
| No. | Description |
|---------|---|
| 183-102 | Diameter 0,1; 0,2; 0,3; 0,4; 0,5; 0,6; 0,7; 1,5; 3 mm Grid 0.3"; 0.4" (Pitch 0.025") Radius 0 – 10 mm (Pitch 0,5 mm) Angle 0 – 90° (Pitch 1°) Scale 0 – 10 mm (Pitch 0,1 mm) |
| 183-103 | Angle 0 – 90° (Reading 0–80° = 5°; 80–90° = 1°) Radius 0 – 10 mm, (Reading 0,1 mm); 0 – 5" (Pitch 0.5") Diameter 0,1–1,0 mm; 0.005"; 0.01"; 0.02"; 0.03"; 0.04"; 0.05"; 1/64"; 1/32"; 3/60"; 1/16" |
| 183-104 | Thickness 0,02 – 0,16 mm (Pitch 0,01 mm) Angle 0 – 90° (Reading 0–10° = 1°; 10–90° = 5°) Radius 0 – 10 mm (Reading 0,5 mm) |
| 183-105 | Diameter 0,1–1,0 mm (Reading 0,1 mm) Scale 0 – 10 mm (Reading 0,1 mm) Grid 5 – 10 mm (Reading 1 mm) |
| 183-106 | Angle 0 – 90° (Pitch 5°) Radius 1/16"; 3/32"; 1/8"; 5/32"; 3/16"; 7/32"; 1/4"; 9/32"; 5/16"; 11/32"; 3/8" Diameter 0.002"; 0.005"; 0.01"; 0.02"; 0.04"; 0.05" Scale 1/4"; 1/8"; 1/16"; 3/16"; 1/32"; 3/32"; 1/64"; 3/64" |
| 183-107 | Angle 0 – 90° (Reading 0–80° = 5°; 80–90° = 1°) Radius 0 – 10 mm (Reading 0–1 mm = 0,1 mm; 1–10 mm = 0,5 mm) Scale 0 – 3/8" |
| 183-108 | Grid 10 mm (Reading 0,5 mm) Diameter 0,1; 0,2; 0,3; 0,4; 0,5; 0,6; 0,7; 0,8; 0,9; 1,0; 1,5; 2,0; 2,5 mm |
| 183-109 | Scale 0 – 20 mm (Reading 0.1 mm) |
| 183-110 | Angle 0 – 180° (Reading 1°) Radius 0 – 10 mm (Reading 0,5 mm) |
| 183-111 | Thread pitches 0,25; 0,3; 0,35; 0,4; 0,45; 0,6; 0,75; 0,9; 10 mm |
| 183-112 | Thread pitches 50"; 32"; 28"; 24"; 20"; 18"; 16"; 14"; 8" |
| 183-113 | Angle 0 – 90° (Reading 1°) Radius 0 – 0.5" (Reading 0 – 0.5" = 0.005") Scale 0 – 10 mm (Reading 0,1 mm) |
| 183-114 | Scale 0 – 0.8" (Reading 0.005") |
| 183-115 | ISO-Thread pitches 0,25; 0,3; 0,35; 0,4; 0,45; 0,5; 0,7; 0,8; 1,0 mm |

Specifications

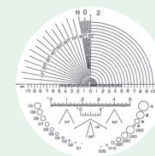
| | |
|-------------------------------|--|
| Measuring plate diameter (mm) | 30 |
| Delivered | Pocket Comparators Set in box (including magnifier and reticles) |

Optional accessories

| No. | Description |
|--------|--|
| 353489 | Battery LR14 |
| 950757 | Magnifier holder with illumination (without battery) |



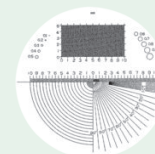
183-102



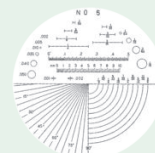
183-103



183-104



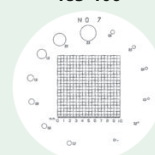
183-105



183-106



183-107



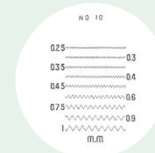
183-108



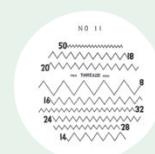
183-109



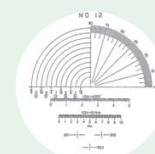
183-110



183-111



183-112



183-113



183-114



183-115

Pocket Magnifiers

Series 183 - Slim model

- Stable design, secure holding.
- Easy handling.



183-201

Magnification 25X

| No. | Field of View | Dimensions | Mass |
|---------|---------------|----------------|------|
| 183-201 | 3,4 mm | ø14,5 x 125 mm | 17g |

Series 183 - Freestanding model



183-202



183-203

Magnification 25X

| No. | Field of View | Dimensions | Mass |
|---------|---------------|----------------|------|
| 183-202 | 3,3 mm | ø31,5 x 115 mm | 90 g |

Magnification 50X

| No. | Field of View | Dimensions | Mass |
|---------|---------------|----------------|------|
| 183-203 | 1,6 mm | ø31,5 x 100 mm | 82 g |

Series 183

- Clear Loupe Magnifiers.
- Transparent draw tube enables clear imaging of the workpiece.

Magnification 7X

| No. | Field of View | Dimensions | Mass |
|---------|---------------|-------------|------|
| 183-301 | 25 mm | ø32 x 43 mm | 17 g |

Magnification 10X

| No. | Field of View | Dimensions | Mass |
|---------|---------------|-------------|------|
| 183-302 | 24 mm | ø32 x 40 mm | 18 g |

Magnification 15X

| No. | Field of View | Dimensions | Mass |
|---------|---------------|-------------|------|
| 183-303 | 10 mm | ø32 x 30 mm | 23 g |

Magnification 8 - 16X zoom

| No. | Field of View | Dimensions | Mass |
|---------|---------------|-------------|-------|
| 183-304 | 10 - 20 mm | ø45 x 70 mm | 149 g |



183-301



183-302



183-303



183-304



Reticle (provided)

Cold-light Illuminator

Cold-light Illuminator and Conductors



011079-1
(Swan neck light
conductor 011080-1 is optional)



011080-1



011336

Cold-Light Illuminator

| No. | Input | Output | Light brightness control | Filter insertion | Dimensions | Mass |
|----------|-------|--------|--------------------------|------------------|--------------------|--------|
| 011079-1 | 50 VA | 35W | Stepless | Lateral | 168 x 120 x 268 mm | 1.3 kg |

Swan neck light Conductor

| No. | Arm length | Arm diameter |
|----------|------------|--------------|
| 011080-1 | 550 mm | 4 mm |

Flexible light Conductor

| No. | Arm length | Arm diameter |
|---------|------------|--------------|
| 011336* | 1200 mm | 7 mm |

Consumable spares

| No. | Description |
|--------|---------------------------|
| 011315 | Lamp 8V, 30W for 011079-1 |

MSM-400 Stereo Microscope

Series 377 - MSM-412L, MSM-465L, MSM-Z414L and MSM-Z475TL

Stereo microscope with illumination

- Bright, sharp images with real depth are recreated with high resolution and excellent colour fidelity, thus minimizing eye fatigue while increasing inspection efficiency and productivity.
- Easy change of magnification either by Turret or Zoom lens.
- Using the horizontal focusing wheels mounted on both sides of the unit, you can quickly bring the object into focus regardless of whether you're right or left handed.
- The trinocular tube of the MSM-Z475TL allows easy attachment of a digital camera to save captured images of the object.

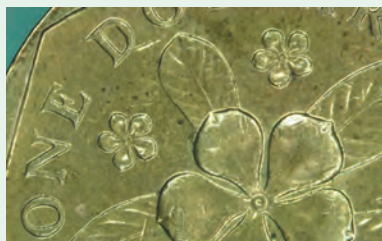
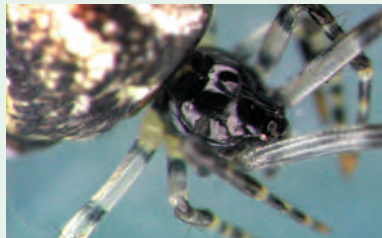
Specifications

Dimensions 151 x 285 x 343 mm

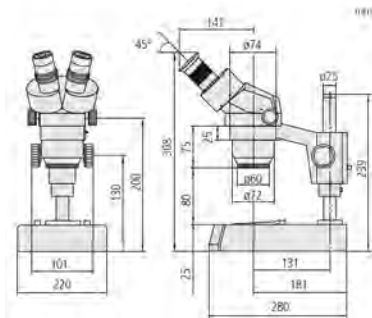
Additional Specifications

Transmitted illumination **Light source for 377-926, 377-946, 377-966, 377-986** : Halogen bulb (12V, 10W) with colour filter

Surface illumination **Light source for 377-926, 377-946, 377-966, 377-986** : Halogen bulb (12V, 15W)



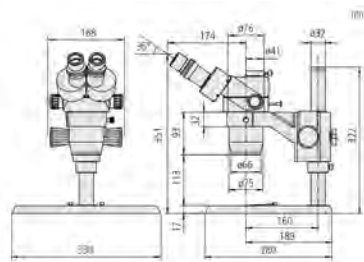
377-946



377-946



377-966



377-986

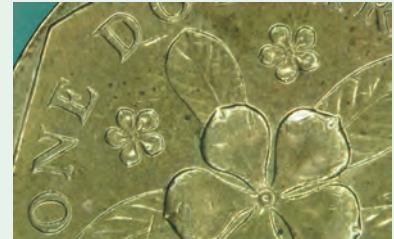
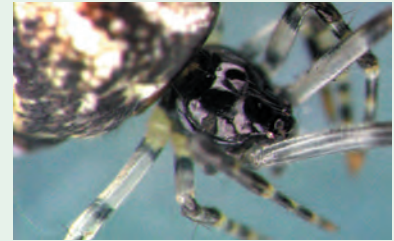
| Model | MSM-412L | MSM-Z414L | MSM-Z475TL | MSM-465L |
|--------------------------------------|--|--|---|---|
| No. | 377-926D* 377-926E | 377-946D 377-946E | 377-986D | 377-966D* 377-966E |
| Total magnification | 10X, 20X | 10X to 40X | 7.5X to 50X | 6X, 12X, 25X, 50X |
| Optical tube | Binocular | Binocular | Trinocular | Binocular |
| Interpupillary distance (adjustable) | 54 - 76 mm | 54 - 76 mm | 52 - 79 mm | 54 - 76 mm |
| Eyepiece (optional) | WF5X/22, WF10X/20 (standard), WF15X/13, WF20X/10 | WF5X/22, WF10X/20 (standard), WF15X/13, WF20X/10 | WF10X/23 (standard), WF5X/23, WF6,25X/23, WF15X/17, WF20X/13, WF32X/8 | WF6,25X/23, WF10X/23 (standard), WF15X/17,6, WF20X/13,4, WF32X/10 |
| Objective lens | 1X, 2X Turret, two stage | 1X to 4X (zoom factor 4) | 0.75X to 5X (zoom) | 1.2X, 2.5X, 5X Turret, four stage |
| Auxiliary objective (optional) | - | 0.5X, 0.75X, 1.5X | 0.5X, 0.63X, 1.5X, 2X | 0.6X, 1.2X, 2.5X, 5X |
| Total magnification of objective | 2.5X to 60X | 2.5X to 120X | 1.87X to 320X | 3.75X to 320X |
| Working distance of objective | 95 mm | 80 mm | 113 mm | 89 mm |
| Height adjustment range | 44 mm | 44 mm | 50 mm | 50 mm |
| Max. workpiece height | 93 mm | 95 mm | 130 mm | 95 mm |
| Mass (kg) | 4.7 | 5.1 | 6.9 | 6.3 |

UK only for all ref. in E, example : 377-926E

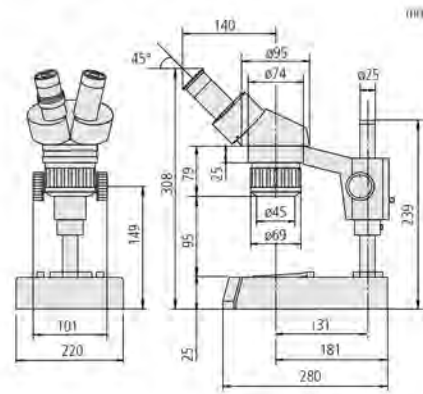
MSM-400 Stereo Microscope

Series 377 - MSM-412 and MSM-465 - Stereo microscope without illumination

- Bright, sharp images with real depth are recreated with high resolution and excellent colour fidelity, thus minimizing eye fatigue while increasing inspection efficiency and productivity.
- Using the horizontal focusing wheels mounted on both sides of the unit, you can quickly bring the object into focus regardless of whether you're right or left handed.



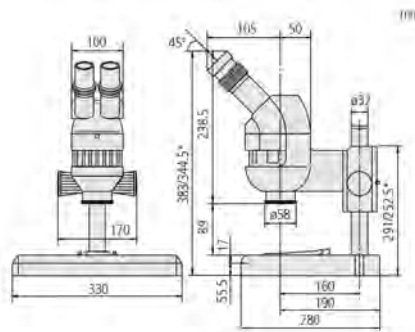
377-925K



377-925K



377-965K



377-965K

| Model | MSM-412 | MSM-465 |
|--------------------------------------|--|---|
| No. | 377-925K | 377-965K |
| Total magnification | 10X, 20X | 6X, 12X, 25X, 50X |
| Optical tube | Binocular | Binocular |
| Interpupillary distance (adjustable) | 54 - 76 mm | 54 - 76 mm |
| Eyepiece (optional) | WF5X/22, WF10X/20 (standard), WF15X/13, WF20X/10 | WF6,25X/23, WF10X/23 (standard), WF15X/17,6, WF20X/13,4, WF32X/10 |
| Objective lens | 1X, 2X Turret, two stage | 1.2X, 2.5X, 5X Turret, four stage |
| Auxiliary objective (optional) | - | 0.6X, 1.2X, 2.5X, 5X |
| Total magnification of objective | 2.5X to 60X | 3.75X to 320X |
| Working distance of objective | 95 mm | 89 mm |
| Height adjustment range | 44 mm | 50 mm |
| Max. workpiece height | 93 mm | 95 mm |
| Mass (kg) | 4.9 | 6.3 |

MSM-400 Stereo Microscope

Series 377 - Accessories

Standard accessories

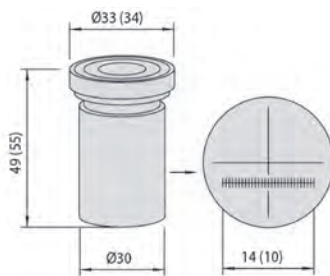
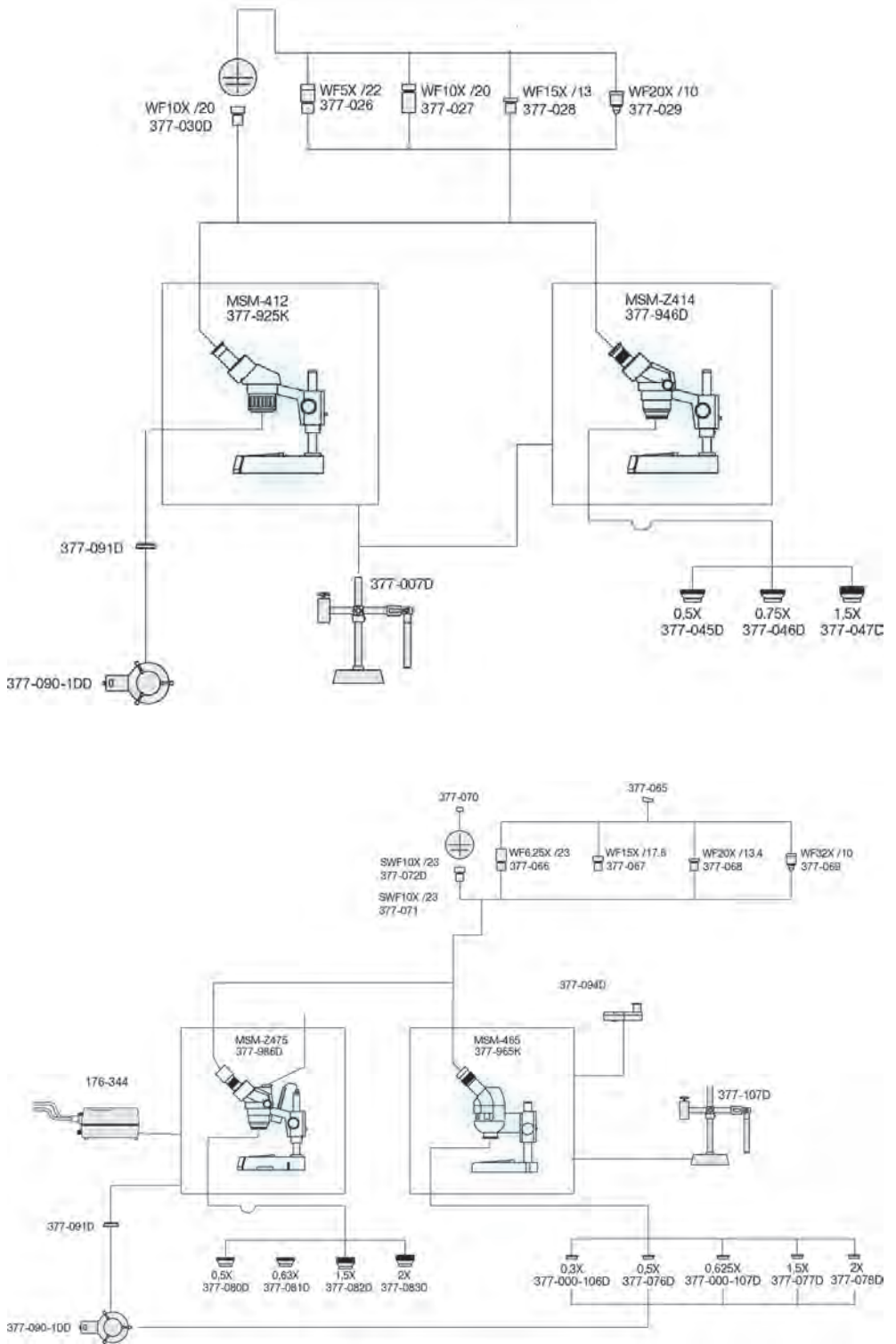
| No. | Description |
|--------|-----------------------------------|
| 011514 | Power supply unit for (MSM-Z414L) |

Optional accessories

| No. | Description |
|-------------------------|---|
| 377-070 | Eye Cap ø35 |
| 377-065 | Eye Cap ø32.5 |
| 176-344CED | Bifurcated fibre illumination |
| 176-344CEE | Bifurcated fibre illumination UK only |
| Adapters | |
| 377-092 | Ring-type unit connecting ring (for MSM-Z414) |
| 377-091D | Ring-type unit connecting ring (for MSM-412) |
| 377-094D | C-Mount Adapter for MSM-465 |
| Lighting | |
| 377-090-1DD | Ring-type fluorescent illumination unit |
| 377-090-1E | Ring-type fluorescent illumination unit UK only |
| Objective lenses | |
| 377-082D | Auxiliary lens systems 1.5X |
| 377-000-106 D | Auxiliary lens systems 0.3X |
| 377-000-107 D | Auxiliary lens systems 0.625X |
| 377-045D | Auxiliary lens systems 0.5X |
| 377-046D | Auxiliary lens systems 0.75X |
| 377-047D | Auxiliary lens systems 1.5X |
| 377-076D | Auxiliary lens systems 0.5X |
| 377-077D | Auxiliary lens systems 1.5X |
| 377-078D | Auxiliary lens systems 2X |
| 377-080D | Auxiliary lens systems 0.5X |
| 377-081D | Auxiliary lens systems 0.63X |
| 377-083D | Auxiliary lens systems 2X |
| Oculars | |
| 377-026 | Eyepiece WF 5X |
| 377-027 | Eyepiece WF 10X |
| 377-028 | Eyepiece WF 15X |
| 377-029 | Eyepiece WF 20X |
| 377-066 | Eyepiece WF 6.25X |
| 377-067 | Eyepiece WF 15X |
| 377-068 | Eyepiece WF 20X |
| 377-069 | Eyepiece WF 32X |
| 377-071 | Eyepiece SWF 10X |
| 377-072D | Eyepiece SWF 10X/23 |
| 377-030D | Eyepiece EF10X/20 |
| Stands | |
| 377-007D | Stand for stereomicroscope |
| 377-107D | Mount (MSM-465) |

Consumable spares

| No. | Description |
|--------|--------------------|
| 011534 | Cleaner for optics |



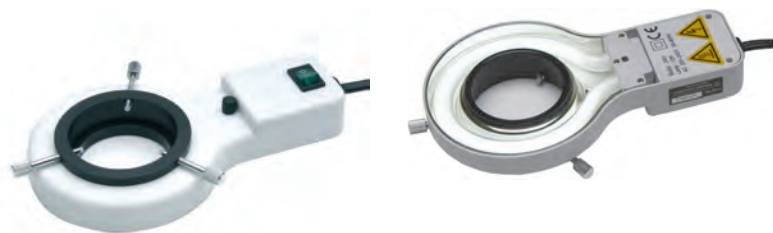
377-030D - 377-072D
() dimensions apply to 377-072D



Accessories for Stereo Microscope

Ring Light

- The ring light provides additional, intensive, fluorescent illumination. This type of light source prevents colour errors in the image caused by the colour characteristics of the illumination. The ring-shaped positioning of the light source around the objective ensures even illumination of the subject without interfering shadows.



377-090-1DD

| No. | Description |
|-------------|---|
| 377-085D | Ring type LED illumination unit |
| 377-090-1DD | Ring-type fluorescent illumination unit |
| 377-090-1E* | Ring-type fluorescent illumination unit (UK only) |

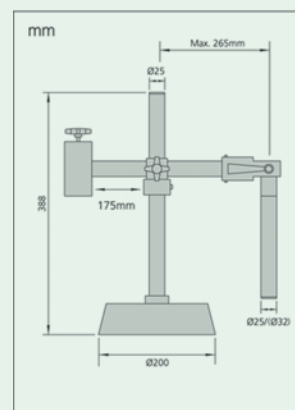
Universal mounting support

- For greater convenience when observing large objects that cannot be installed on a standard support.
- The adjustable arm provides for several observation angles.
- Maximum height of object: approx. 225/205mm (MSM-Z414, MSM-465).
- Optimum weight distribution guarantees excellent stability of the instrument.

| No. | Applicable Microscope |
|-----------|-----------------------|
| 377-007D* | MSM-412 and MSM-Z414 |
| 377-107D* | MSM-465 |

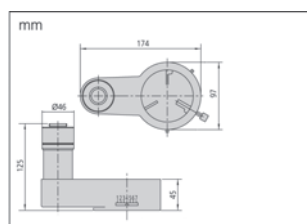
Optional accessories

| No. | Description |
|----------|---|
| 377-092 | Ring-type unit connecting ring (for MSM-Z414) |
| 377-091D | Ring-type unit connecting ring (for MSM-412) |



CCD Camera Adaptor

- 1/2" CCD camera support (camera with load transfer device).
- Switching between binocular and video observation modes.
- Digital diaphragm opening/closing control.
- Under certain observation conditions, visible artifacts may appear in the field of view.



| No. | Applicable Microscope |
|----------|-----------------------|
| 377-094D | MSM-465 |

TM-500 Measuring Microscope

Series 176

Toolmaker's Microscope

- Suitable for measuring dimensions and angles on small workpieces using optional analogue or digital micrometer heads and the built-in circular scale
- Compact design makes this microscope ideal for use where space is strictly limited.
- A choice of adjustable-intensity transmitted or incident illumination is provided.

Specifications

| | |
|--------------------------|---|
| Observation image | Erect |
| Angle reading | Range : 360° Minimum reading : 6' (by vernier) |
| Objective lens | 2X (176-138) Working distance : 67 mm Optional : 5X, 10X |
| Eyepiece | 15X (176-116), View field ϕ 13 mm Optional : 10X, 20X |
| Total magnification | 30X |
| Transmitted 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 | 220/240V AC, 50/60Hz |
| Mass | TM-505 : 13.5 kg TM-510 : 14.5 kg |
| Max. stage loading | 5 kgf |

Standard accessories

| No. | Description |
|---------|---|
| 176-206 | Adjustment range 50 x 50 mm (TM-505) |
| 176-207 | Adjustment range 100 x 50 mm (TM-510) |
| 176-116 | 15X projection lens set |
| 176-126 | Eyepiece reticle cross hairs (standard accessory) |
| 176-138 | Objective 2X |

Consumable spares

| No. | Description |
|---------|------------------------|
| 383038D | Halogen bulb (24V, 2W) |



Angle reading



TM-505 fitted with optional analogue micrometer heads



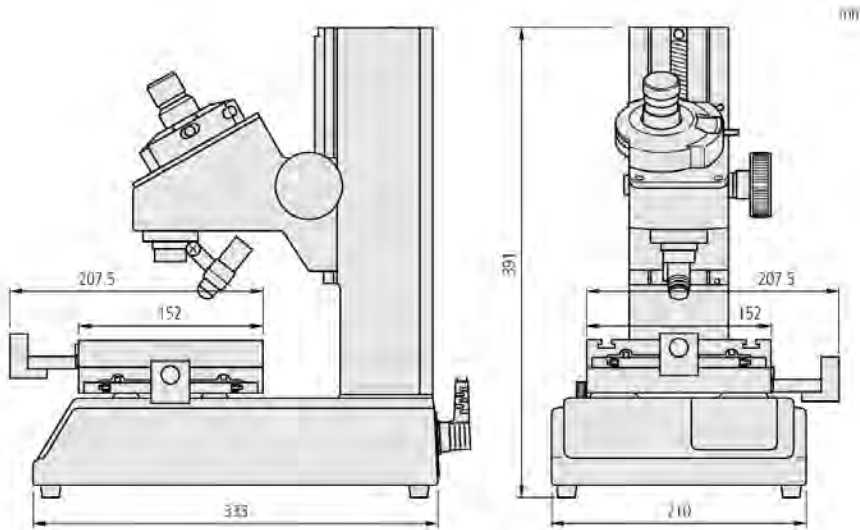
TM-510 fitted with optional analogue micrometer heads

TM-500 Measuring Microscope

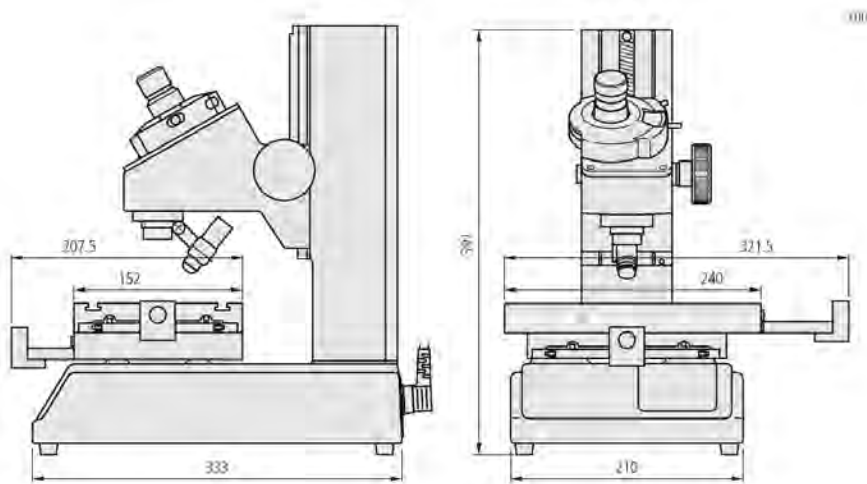
Series 176

Dimensions

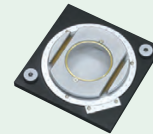
| Model | TM-505 | TM-510 |
|----------------------------|--------------------------|--------------------------|
| No. | 176-811CED 176-811CEE | 176-812CED 176-812CEE |
| Remarks | 176-811CEE UK only | 176-812CEE UK only |
| XY stage travel range (mm) | 50 x 50 mm | 100 x 50 mm |
| XY stage table top size | 152 x 152 mm | 240 x 152 mm |
| Effective area of table | 96 x 96 mm | 154 x 96 mm |
| Max. workpiece height | 115 mm | 107 mm |



TM-505



TM-510



176-106



172-378



176-107



176-105



172-197

TM-500 Measuring Microscope

Series 176

Accessories

Optional accessories

| No. | Description |
|-------------|--|
| 152-390 | Micrometer head for X-axis 50 mm |
| 152-389 | Micrometer head for Y-axis 50 mm |
| 377-085D | Ring-type LED illumination unit |
| 377-090-1DD | Ring-type fluorescent illumination unit |
| 176-344CED | Bifurcated fibre illumination |
| 176-105 | Swivel centre support |
| 176-106 | Rotary table 66 mm |
| 172-197 | Swivel centre support |
| 172-198 | Rotary table 100 mm with fine adjustment |
| 172-196 | Rotary table 100 mm |
| 959149 | Signal cable 1 m with data switch |
| 959150 | Signal cable 2 m with data switch |
| 172-378 | V-block with clamp (Max. workpiece $\varnothing 25$ mm) |
| 12AAE044 | Ring-type unit connecting ring (for TM-500) |
| 176-107 | Holder with clamp |
| 164-163 | Digital micrometer head 50 mm |
| 176-115 | 10X eyepiece (view field $\varnothing 13$ mm) |
| 176-116 | 15X projection lens set |
| 176-117 | 20X eyepiece (view field $\varnothing 10$ mm) |
| 176-137 | Objective 10X (W.D : 14 mm, N.A. : 0.14) |
| 176-139 | Objective 5X (W.D : 33 mm, N.A. : 0.10) |
| 176-203 | Twin-bulb reflected illumination unit |
| 176-204 | Dial indicator attachment for Z-axis measurement |
| 176-366CED | Fibre-optic ring light |
| 611635-031 | Steel Individual Metric Gauge Block 25 mm Grade 1 |
| 06ADV380C | Signal cable 2 m USB |
| 02AZD790C | Signal cable for U-Wave with data switch |
| 611675-031 | Steel Individual Metric Gauge Block 50 mm Grade 1 |
| 990561 | Workpiece clip (2pcs./set) |

176-106 : for stage 50 x 50 mm
172-1796 and 172-198 : for stage 100 x 50 mm

Optional accessories for Inch

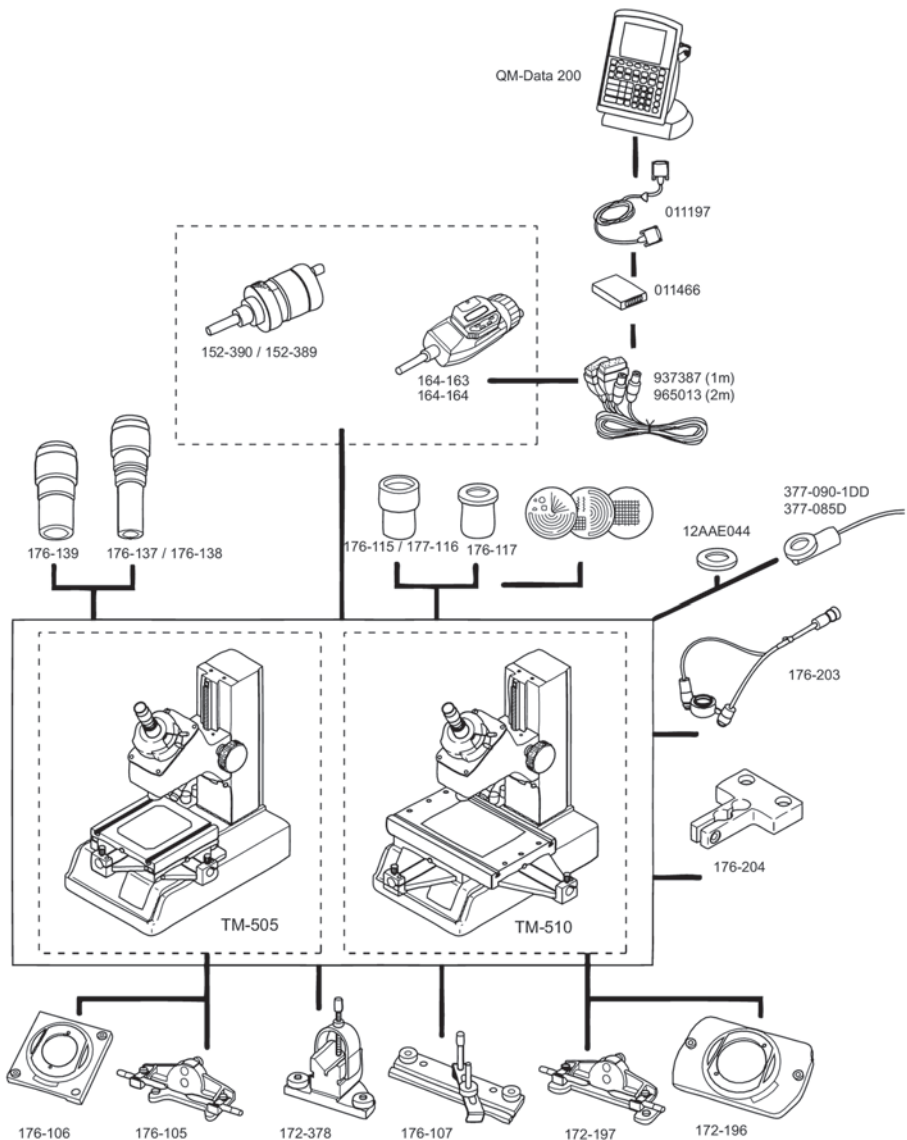
| No. | Description |
|------------|---|
| 377-090-1E | Ring-type fluorescent illumination unit UK only |
| 176-344CEE | Bifurcated fibre illumination UK only |
| 152-392 | Micrometer head for Y-axis 2" |
| 152-391 | Micrometer head for X-axis 2" |
| 164-164 | Digimatic micrometer head 50 mm/2" |

Objective lenses and Eyepieces

| No. | Objective lens | Eyepiece 10X (176-115) | Eyepiece 15X (176-116) | Eyepiece 20X (176-117) |
|---------|-------------------|------------------------|------------------------|------------------------|
| 176-137 | 10X | 100X (1,3 mm) | 150X (1,3 mm) | 200X (1 mm) |
| 176-138 | 2X ⁽¹⁾ | 20X (6,5 mm) | 30X (6,5 mm) | 40X (5 mm) |
| 176-139 | 5X | 50X (2,6 mm) | 75X (2,6 mm) | 100X (2 mm) |

⁽¹⁾ Standard accessory

The number in brackets is the diameter of the view field

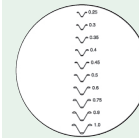


377-090

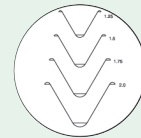
Reticles for Measuring Microscope TM-500

Series 176

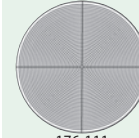
| No. | Designation |
|----------|--|
| 176-109 | Metric screw threads (pitch = 0,25 - 1 mm) |
| 176-110* | Metric screw threads (pitch = 1,25 - 2 mm) |
| 176-111 | Concentric circle (up to $\varnothing 4$ mm, 0,05 mm increment) |
| 176-112 | 20° involute gear teeth (normal rack type) |
| 176-113* | 55° angle |
| 176-114 | 60° angle |
| 176-120* | Whitworth screw threads (60 - 26TPI) |
| 176-121* | Whitworth screw threads (24 - 18TPI) |
| 176-122 | Whitworth screw threads (16 - 11TPI) |
| 176-123 | Unified screw threads (80 - 28TPI) |
| 176-124* | Unified screw threads (24 - 14TPI) |
| 176-125 | Unified screw threads (13 - 10TPI) |
| 176-126 | Cross-hair (standard accessory) |
| 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) |
| 176-135* | Concentric circles (up to $\varnothing 0.2$ " , 0.01" increment) |
| 176-140 | ISO metric screw threads (0,075 - 0,7 mm) |
| 176-141 | ISO metric screw threads (0,75 - 2 mm) |
| 176-142* | ISO unified screw threads (80 - 28TPI) |
| 176-143* | ISO unified screw threads (24 - 14TPI) |
| 176-144* | ISO unified screw threads (13 - 10TPI) |



176-109



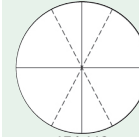
176-110



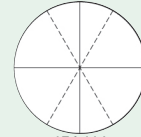
176-111



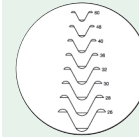
176-112



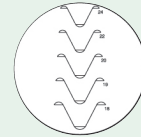
176-113



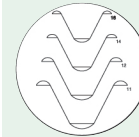
176-114



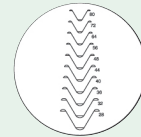
176-120



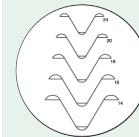
176-121



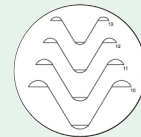
176-122



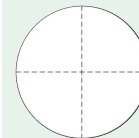
176-123



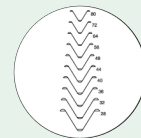
176-124



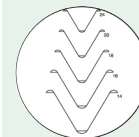
176-125



176-126



176-127



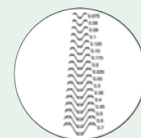
176-128



176-129



176-130



176-140



176-141

MF Measuring Microscope

Series 176

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.

- 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.
- Variable aperture diaphragm (reflected/transmitted) allows observation measurement while suppressing light diffraction.
- Variety of standardised stages in sizes up to 400x200 mm.
- 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.

Specifications

| | |
|--------------------------|---|
| Observation image | Erect image |
| Optical tube | Monocular or binocular tube (depression: 25"), Reticle projection method, with TV mount, Optical path ratio (eyepiece/TV mount: 50/50) |
| Eyeiece | 10X, 15X, 20X |
| Objective lens | Standard: 3X Optional: 1X, 5X, 10X, 20X, 50X, 100X |
| Transmitted illumination | Light source: Halogen bulb (12V, 50W) Optical system: Telecentric illumination with adjustable aperture diaphragm Functions: Light intensity adjustable, non-stepped brightness adjustment |
| Surface illumination | Light source: Halogen bulb (12V, 150W) Optical system: Koehler illumination with adjustable aperture diaphragm No. of axes: 2 (MF-A type) or 3 (MF-B type) Resolution: 0,001 mm/0,0005 mm/0,0001 mm/0.0001"/0.00005"/0.00001" Functions: Zero/Abs, Direction switching, Data output (via RS-232C interface) Light intensity adjustable, non-stepped brightness adjustment Display unit |
| Power supply | 100/110/120/220/240 VAC, 50/60Hz |



Reticle mounts
(standard accessories)



176-392
Optional monocular



176-393
Optional binocular



176-664-10
MF-2017C model



505C
50x50 mm



1010C
100x100 mm



2010B
200x100 mm



3017C
300x170 mm



4020C
400x200 mm



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

MF Measuring Microscope

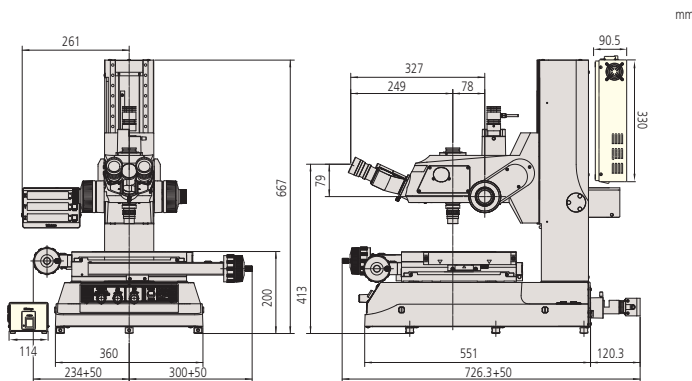
Series 176

Specifications/Dimensions

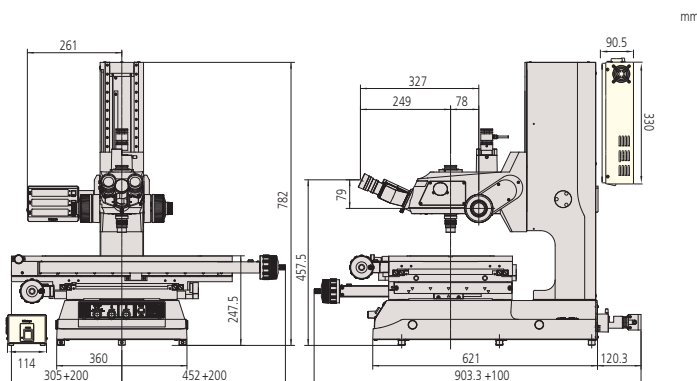
| Model | 0505C | 1010C | 2010C | 2017C | 3017C | 4020C |
|----------------------------|----------------------------|---------------------------|--------------------------|---------------------------|---------------------------|----------------------------|
| No. | 176-661-10* 176-681-10* | 176-662-10 176-682-10* | 176-663-10 176-683-10 | 176-664-10 176-684-10* | 176-665-10* 176-685-10 | 176-666-10* 176-686-10* |
| MF-A (2 axis) | 176-661-10 | 176-662-10 | 176-663-10 | 176-664-10 | 176-665-10 | 176-666-10 |
| MF-B (3 axis) | 176-681-10 | 176-682-10 | 176-683-10 | 176-684-10 | 176-685-10 | 176-686-10 |
| XY stage travel range (mm) | 50 x 50 | 100 x 100 | 200 x 100 | 200 x 170 | 300 x 170 | 400 x 200 |
| Z-axis travel range (mm) | 150 | 150 | 150 | 220 | 220 | 220 |
| XY stage top size (mm) | 280 x 280 | 280 x 280 | 350 x 280 | 410 x 342 | 510 x 342 | 610 x 342 |
| Effective glass size (mm) | 180 x 180 | 180 x 180 | 250 x 150 | 270 x 240 | 370 x 240 | 440 x 240 |
| Swivelling function | - | - | - | ±5° (left) | ±5° (left) | ±3° (left) |
| Max. stage loading | 10 kg | 10 kg | 10 kg | 20 kg | 20 kg | 15 kg |
| Max. workpiece height | 150 mm | 150 mm | 150 mm | 220 mm | 220 mm | 220 mm |
| Mass | 65.5 kg | 65.5 kg | 69.5 kg | 130 kg | 138 kg | 144 kg |

Optional accessories

| No. | Description |
|-------------------|---|
| 12AAA165 | Lens cleaning set |
| 12AAA846 | Foot switch |
| 12BAB345 | Halogen bulb (24V/50W) |
| 176-308 | Vibration damping stand |
| 264-145D | Tabletop type QM-Data 200 |
| 264-145E | Tabletop type QM-Data 200 UK only |
| 375-054 | 0.5X camera adapter (with C-mount adapter) |
| 375-056 | Stage micrometer |
| Eyepieces | |
| 176-313D | Digital protractor eyepiece (10X) |
| 176-313E | Digital protractor eyepiece (10X) UK only |
| 176-392 | Monocular tube with 10X eyepiece |
| 176-393 | Binocular tube with 10X eyepiece set |
| 375-043 | Protractor eyepiece (10X) |
| 378-856-5 | 10X eyepiece set (ø24 mm) |
| 378-857-5 | 15X eyepiece set |
| 378-858-5 | 20X eyepiece set (ø12 mm) |
| Filters | |
| 12AAA643 | ND2 colour filter |
| 12AAA644 | ND8 colour filter |
| 12AAA645 | GIF filter (transmitted / surface) |
| 12AAA646 | LB80 colour filter (transmitted / surface) |
| Mounts | |
| 176-314-1 | Slide type nosepiece (2-mount / parfocal) factory-fit option |
| 176-314-2 | Slide type nosepiece (2-mount / mag. adjusted) factory-fit option |
| 970441 | C-mount adapter |
| Objectives | |
| 375-034-1 | 5X objective (WD : 61 mm, NA : 0.13) |
| 375-036-2 | 1X objective (WD : 61 mm, NA : 0.03) |
| 375-037-1 | 3X objective (WD : 77 mm, NA : 0.09) |
| 375-039 | 10x objective / CF |
| 375-051 | 20X objective (WD : 20 mm, NA : 0.42) |
| 375-052 | 50X objective (WD : 13 mm, NA : 0.55) |
| 375-053 | 100X objective (WD : 6 mm, NA : 0.7) |



1010C



4020C



Focus pilot FP-05
Focus assisting system



QM-Data 200



Vision Unit
PC-based vision measuring system

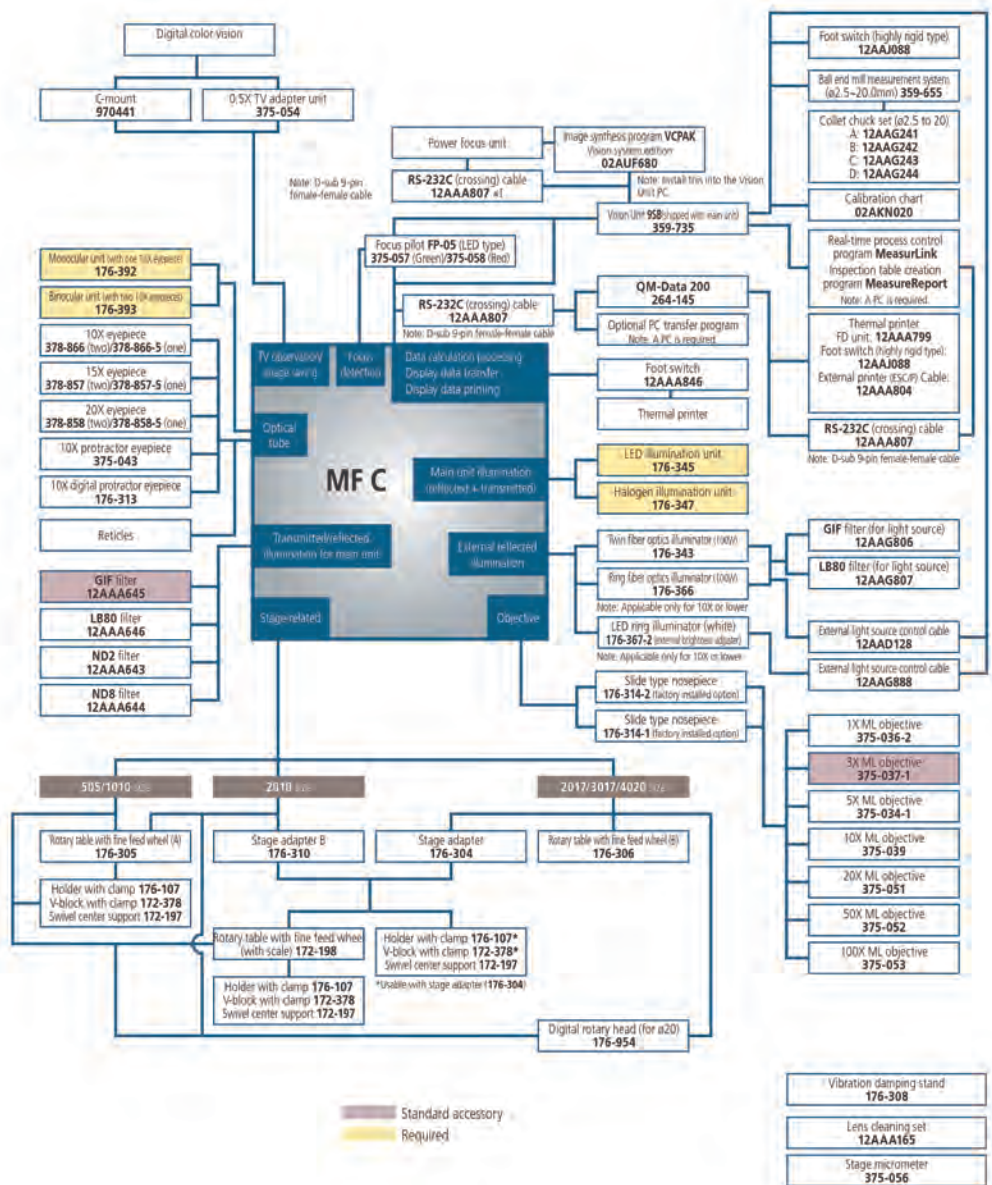
MF Measuring Microscope

Series 176

Accessories/Diagram system

Optional accessories

| No. | Description |
|------------------|--|
| 172-197 | Swivel centre support |
| 172-198 | Rotary table 100 mm with fine adjustment |
| 176-305 | Rotary table with fine feed wheel ø183 mm |
| 176-306 | Rotary table with fine feed wheel ø240 mm |
| 172-378 | V-block with clamp (Max. workpiece ø25 mm) |
| 12AAG806 | GIF filter |
| 12AAG807 | LB80 filter |
| 176-107 | Holder with clamp |
| 12AAA807D | Cable RS-232C D-SUB 9/D-SUB 9 (2m) |
| Eyepieces | |
| 378-856 | 10X eyepiece (two) |
| 378-856-5 | 10X eyepiece set (ø24 mm) |
| Lighting | |
| 176-343D | Twin fibre-optic illuminator |
| 176-345D | LED illumination unit |
| 176-345E | LED illumination unit UK only |
| 176-347D | Halogen illumination unit |
| 176-347E | Halogen illumination unit UK only |
| 176-351-6 | Oblique surface illumination unit |
| 176-366CED | Fibre-optic ring light |
| 176-367-2D | LED ring illuminator |
| 176-367-2E | LED ring illuminator UK only |
| Reticles | |
| 12AAG838 | Cross-hair reticle (7 µm width) |
| 12AAG846 | Reticle 10x10 mm section |
| 12AAG847 | Reticle metric screw thread (P=0,25-1,0) |
| 12AAG848 | Reticle metric screw thread (P=1,25-2,0) |
| 12AAG849 | Reticle involute gear tooth (14.5°) |
| 12AAG850 | Reticle involute gear tooth (20°), module =0.1-1.0 |
| 12AAG851 | Reticle unified screw thread (80-28TPI) |
| 12AAG852 | Reticle unified screw thread (24-14TPI) |
| 12AAG853 | Reticle unified screw thread (13-10TPI) |
| 12AAG836 | Cross-hair reticle (5 µm width) |
| 12AAG873 | Cross-hair reticle (3 µm width) |
| 12AAG840 | Broken cross-hair reticle and 60° angle |
| 12AAG841 | Zeiss type chart reticle |
| 12AAG842 | Reticle 20 mm scale |
| 12AAG843 | Reticle concentric circle (ø1,2 - ø18 mm) |
| 12AAG844 | Reticle 10 mm scale |
| 12AAG845 | Reticle 5 mm scale |
| 12AAG839 | Broken cross-hair and 45° angle |
| 12AAG854 | Concentric circle (Ø0.01" - Ø0.2") |



MF-U Measuring Microscope

Series 176

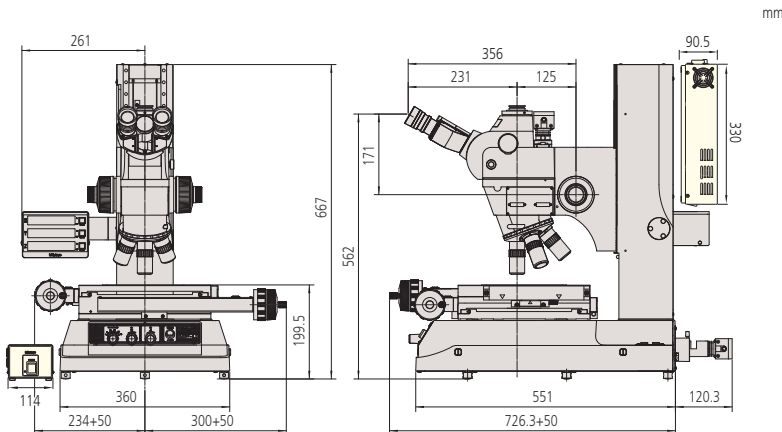
High-power Multi-function

- A measuring microscope that provides detailed 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).
- 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.
- Illumination unit (reflected/transmitted) optional 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 400 × 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.
- Low-noise design.



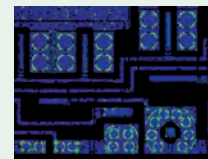
MF-UB 3017C

(turret, objectives and illumination are optional)

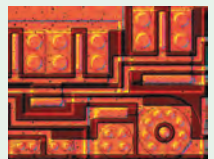


Specifications

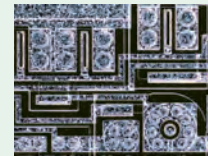
| | |
|-----------------------------------|---|
| Observation image | Erect image |
| Measuring accuracy (at 20°C) | XY-axis : (2,2+0,02L) μm L : Measuring length (mm) when not loaded, JIS B7153 |
| Indication accuracy (at 20°C) | Z-axis : (5+0,04L) μm L : Measuring length (mm) |
| Floating function | X and Y axes with Quick-release mechanism |
| Focusing method | Manual (coarse focusing : 10 mm/rev., fine focusing : 0,1 mm/rev.) |
| Optical tube | Siedentoph type (pupil distance adjustment : 51 - 76 mm), 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 lens (optional) | M / BD Plan Apo objective from 1X to 100X |
| Transmitted illumination optional | Light source : Halogen bulb (12V, 50W) Optical system : Telecentric illumination with adjustable aperture diaphragms Functions : Light intensity adjustable, Non-stepped brightness adjustment |
| Surface illumination optional | Light source : Optional halogen illumination unit (fiber-optic cold light illumination) Optical system : Koehler illumination with adjustable aperture diaphragms Functions : Light intensity adjustable, Non-stepped brightness adjustment |
| Display unit resolution | 0.001mm / 0.0005mm / 0.0001mm / 0.0001" / 0.00005" / 0.00001" No. of axis : 2 axes or 3 axes Functions : Zero-setting, Direction switching, Data output (via RS-232C interface) |
| Power supply | 220/240V AC, 50/60Hz |



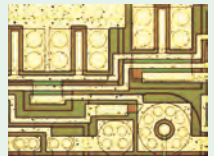
Polarized light



Differential interference contrast



Dark field



Bright field

MF-U Measuring Microscope

Series 176 - High-power Multi-function

Optional accessories

| No. | Description |
|------------------|--|
| 176-305 | Rotary table with fine feed wheel ø183 mm |
| 176-306 | Rotary table with fine feed wheel ø240 mm |
| 172-378 | V-block with clamp (Max. workpiece ø25 mm) |
| 12AAA165 | Lens cleaning set |
| 12AAA846 | Foot switch |
| 375-054 | 0.5X camera adapter (with C-mount adapter) |
| 375-056 | Stage micrometer |
| 970441 | C-mount adapter |
| Bulbs | |
| 12BAB345 | Halogen bulb (24V/50W) |
| 12BAD602 | High intensity bulb (24V/100W) |
| 517181 | Halogen bulb (24V, 100W) |
| Eyepieces | |
| 378-857 | 15X eyepiece |
| 378-858 | 20X eyepiece |
| Filters | |
| 12AAA643 | ND2 colour filter |
| 12AAA644 | ND8 colour filter |
| 12AAA645 | GIF filter (transmitted / surface) |
| 12AAA646 | LB80 colour filter (transmitted / surface) |
| 12AAG806 | GIF filter |
| 12AAG807 | LB80 filter |
| Lighting | |
| 176-315D | Halogen illumination unit (12V, 100W) |
| 176-315E | Halogen illumination unit (12V, 100W) UK only |
| 176-316D | Halogen illumination unit (12V, 150W) |
| 176-316E | Halogen illumination unit (12V, 150W) UK only |
| 176-343D | Twin fibre-optic illuminator |
| 176-346D | LED illumination unit |
| 176-346E | LED illumination unit UK only |
| 176-348D | Halogen illumination unit |
| 176-348E | Halogen illumination unit UK only |
| Reticles | |
| 12AAG876 | Cross-hair reticle (3 µm width) |
| 12AAG877 | Cross-hair reticle (5 µm width) |
| 12AAG878 | Cross-hair reticle (7 µm width) |
| 12AAG879 | Cross-hair and 45° angle |
| 12AAG880 | Broken cross-hair and 60° angle |
| 12AAG881 | Zeiss type chart |
| Stands | |
| 172-197 | Swivel centre support |
| 176-107 | Holder with clamp |
| 176-308 | Vibration damping stand |
| Turrets | |
| 176-211 | Manual turret BF/DF 4 mount |
| 378-018 | Manual turret BF |
| 378-116D | Power turret BF 5 mounts |
| 378-210 | Power turret BF/DF |

Optional accessories

| No. | Description |
|------------------|---|
| DIC Units | |
| 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 |

Model 505C

XY stage travel range : 50 x 50 mm
Z-axis travel range : 150 mm
XY stage top size : 280 x 280 mm
Effective glass size : 180 x 180 mm
Max. stage loading : 10 kgf
Max. workpiece height : 150 mm
Mass : 65.5 kg

| Model | MF-UA | MF-UC | MF-UB | MF-UD |
|--------------------|-----------------------|---------------------------|--------------------------|---------------------------|
| No. | 176-667-10* | 176-673-10* | 176-687-10* | 176-693-10* |
| Observation type | Bright Field (BF) | Bright/Dark Field (BF/DF) | Bright Field (BF) | Bright/Dark Field (BF/DF) |
| Measurement system | X and Y axis (2 axes) | X and Y axis (2 axes) | X, Y and Z-axis (3 axes) | X, Y and Z-axis (3 axes) |



Model 505C

Model 1010C

XY stage travel range : 100 x 100 mm
Z-axis travel range : 150 mm
XY stage top size : 280 x 280 mm
Effective glass size : 180 x 180 mm
Max. stage loading : 10 kgf
Max. workpiece height : 150 mm
Mass : 65.5 kg

| Model | MF-UA | MF-UC | MF-UB | MF-UD |
|--------------------|---------------------|---------------------------|--------------------------|---------------------------|
| No. | 176-668-10 | 176-674-10* | 176-688-10* | 176-694-10 |
| Observation type | Bright Field (BF) | Bright/Dark Field (BF/DF) | Bright Field (BF) | Bright/Dark Field (BF/DF) |
| Measurement system | X and axis (2 axes) | X and Y axis (2 axes) | X, Y and Z axis (3 axes) | X, Y and Z axis (3 axes) |



Model 1010C

Model 2010C

XY stage travel range : 200 x 100 mm
Z-axis travel range : 150 mm
XY stage top size : 350 x 280 mm
Effective glass size : 250 x 150 mm
Max. stage loading : 10 kgf
Max. workpiece height : 150 mm
Mass : 69.5 kg

| Model | MF-UA | MF-UC | MF-UB | MF-UD |
|--------------------|-----------------------|---------------------------|--------------------------|---------------------------|
| No. | 176-669-10* | 176-675-10* | 176-689-10* | 176-695-10 |
| Observation type | Bright Field (BF) | Bright/Dark Field (BF/DF) | Bright Field (BF) | Bright/Dark Field (BF/DF) |
| Measurement system | X and Y axis (2 axes) | X and Y axis (2 axes) | X, Y and Z axis (3 axes) | X, Y and Z axis (3 axes) |



Model 2010C

Series 176

Model 2017C

XY stage travel range : 200 x 170 mm
Z-axis travel range : 220 mm
XY stage top size : 410 x 342 mm
Effective glass size : 270 x 240 mm
Swivelling function (left) : ±5°
Max. stage loading : 20 kgf
Max. workpiece height : 220 mm
Mass : 130 kg

MF-U Measuring Microscope

| Model | MF-UA | MF-UC | MF-UB | MF-UD |
|--------------------|-----------------------|---------------------------|--------------------------|---------------------------|
| No. | 176-670-10* | 176-676-10* | 176-690-10* | 176-696-10* |
| Observation type | Bright Field (BF) | Bright/Dark Field (BF/DF) | Bright Field (BF) | Bright/Dark Field (BF/DF) |
| Measurement system | X and Y axis (2 axes) | X and Y axis (2 axes) | X, Y and Z axis (3 axes) | X, Y and Z axis (3 axes) |

Model 3017C

XY stage travel range : 300 x 170 mm
 Z-axis travel range : 220 mm
 XY stage top size : 510 x 342 mm
 Effective glass size : 370 x 240 mm
 Swivelling function (left) : $\pm 5^\circ$
 Max. stage loading : 20 kgf
 Max. workpiece height : 220 mm
 Mass : 138 kg

| Model | MF-UA | MF-UC | MF-UB | MF-UD |
|--------------------|-----------------------|---------------------------|--------------------------|---------------------------|
| No. | 176-671-10* | 176-677-10* | 176-691-10* | 176-697-10* |
| Observation type | Bright Field (BF) | Bright/Dark Field (BF/DF) | Bright Field (BF) | Bright/Dark Field (BF/DF) |
| Measurement system | X and Y axis (2 axes) | X and Y axis (2axes) | X, Y and Z axis (3 axes) | X, Y and Z axis (3 axes) |

Model 4020C

XY stage travel range : 400 x 200 mm
 Z-axis travel range : 220 mm
 XY stage top size : 610 x 342 mm
 Effective glass size : 440 x 240 mm
 Swivelling function (left) : $\pm 3^\circ$
 Max. stage loading : 15 kgf
 Max. workpiece height : 220 mm
 Mass : 144 kg

| Model | MF-UA | MF-UC | MF-UB | MF-UD |
|--------------------|-----------------------|---------------------------|--------------------------|---------------------------|
| No. | 176-672-10* | 176-678-10* | 176-692-10* | 176-698-10* |
| Observation type | Bright Field (BF) | Bright/Dark Field (BF/DF) | Bright Field (BF) | Bright/Dark Field (BF/DF) |
| Measurement system | X and Y axis (2 axes) | X and Y axis (2 axes) | X, Y and Z axis (3 axes) | X, Y and Z axis (3 axes) |



Model 2017C



Model 3017C



Model 4020C

Accessories for Measuring Microscope

Series 176 - 378 - 375

Focus Pilot FP-05 /FP-05U

- By installing this system on the camera mount of an MF series measuring microscope and projecting the focusing chart onto the workpiece surface, the focal point can be detected with high accuracy and high repeatability.
- The brightness of the image can be adjusted.
- A wide view field observation on the monitor is made possible with the use of a CCD camera (C-mount adapter is included).
- Four chart patterns are available. The pattern should be selected that works best with the type of workpiece surface texture.



Focus Pilot

Magnification : 0.5X, Accuracy : 0.1% (within 2/3 area from the centre of view field)

Camera adapter : C-mount (provided)

Applicable CCD camera : Up to 2/3-inch

Mass : 1.8 kg

| No. | Applicable microscopes | Light source | Remarks |
|-----------|------------------------|--------------|---------|
| 375-057D* | MF-C | Green LED | |
| 375-057E* | MF-C | Green LED | UK only |
| 375-058D* | MF-C | Red LED | |
| 375-058E* | MF-C | Red LED | UK only |
| 375-067D* | MF-U C | Green LED | |
| 375-067E* | MF-U C | Green LED | UK only |
| 375-068D* | MF-U C | Red LED | |
| 375-068E* | MF-U C | Red LED | UK only |

Power Turrets

Power supply : 240V AC, 50/60 Hz

Dimensions : Turret : 164 x 65 x 137 mm

Control Box : 108 x 72 x 193 mm

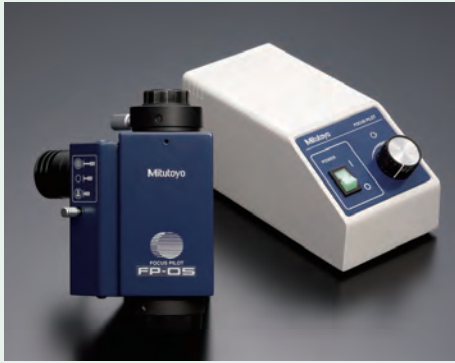
| No. | Applicable microscopes | Observation type | No. of objective mounts | Remarks |
|-----------|------------------------|-------------------|-------------------------|---------|
| 176-210D | MF-UC | Bright Dark Field | 4 | |
| 176-210E* | MF-UC | Bright Dark Field | 4 | UK only |
| 378-016D | MF-UC | Bright Field | 4 | |
| 378-016E* | MF-UC | Bright Field | 4 | UK only |
| 378-116D | MF-UC | Bright Field | 5 | |
| 378-116E* | MF-UC | Bright Field | 5 | UK only |

Manual Turrets

| No. | Applicable microscopes | Observation type | No. of objective mounts |
|---------|------------------------|-------------------|-------------------------|
| 176-211 | MF-UC | Bright Dark Field | 4 |
| 378-018 | MF-UC | Bright Field | 4 |

Stage Micrometer

| No. | Range | Graduations | Accuracy (at 20°C) | Dimensions | Mass |
|----------|-------|-------------|---------------------------------------|------------|------|
| 375-056* | 1 mm | 0,01 mm | (1+L) μm L : Measuring length (mm) | 76 x 26 mm | 16 g |



Focus Pilot is factory set option



Manual and Power Turrets



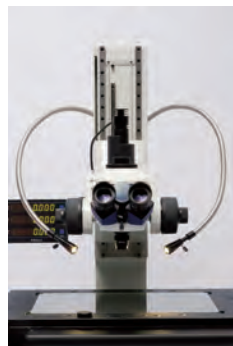
Stage Micrometer

Accessories for Measuring Microscope

Series 176



LED Ring Light
(for FS Objective lenses)



Dual Swan-neck Light-pipe

LED Ring Light (for FS Objective lenses)

| No. | Applicable microscopes | Light source |
|--------------------|---|---|
| 176 Led Ring Light | MF-UC models with 1X, 3X, 5X objective lens | Supplied from microscope (surface illumination) |

Dual Swan-neck Light-pipe illuminator

Applicable microscopes : MF, MF-U models

Length of fibre cable : 700 mm

Light source : Halogen bulb (12V, 100W) (517181 : halogen bulb)

Dimensions : Light unit 235 x 76 x 120 mm

| No. | Remarks |
|-----------|---------|
| 176-343D* | |
| 176-343E* | UK only |

Fibre-optic Ring Light

Applicable microscopes : MF models

Length of fibre cable : 1000 mm

Light source : Halogen bulb (12V, 100W) (517181 : halogen bulb)

Dimensions : Light unit 235 x 76 x 120 mm

| No. | Remarks |
|-------------|---------|
| 176-366CED* | - |

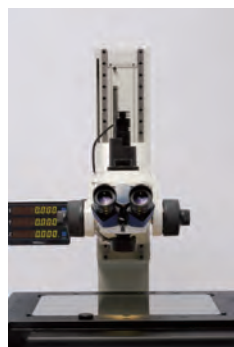
LED Ring Illuminator

Applicable microscopes : MF models with 1X, 3X, 5X, 10X objective

Light source : White LED

Length of LED cable : 1500 mm

| No. | Remarks |
|-------------|---------|
| 176-367-2D | - |
| 176-367-2E* | UK only |



Fibre-optic Ring Light



LED Ring Illuminator



LED Ring Light



Dual Swan-neck Light-pipe



Fibre-optic Ring Light

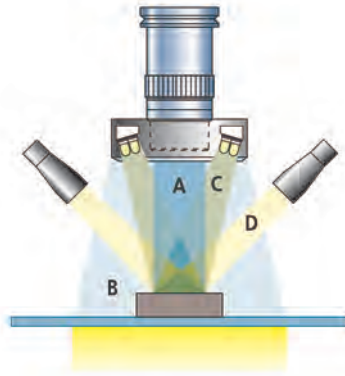


LED Ring Illuminator

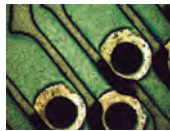
Accessories for Measuring Microscope

Accessories for Measuring Microscope

Illumination



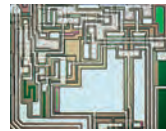
- (A) : Vertical surface illumination (Halogen)
- (B) : Fibre-optic Ring illumination
- (C) : LED Ring illumination
- (D) : Dual Swan-neck Light Pipe illumination



(A) PCB



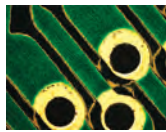
HDD suspension



IC structure



(B) Flexible PCB



PCB



Electrical parts



(C) HDD suspension



PCB



Black plastic molded parts



(D) IC package



Garnet



PCB

Vision Unit

Series 359

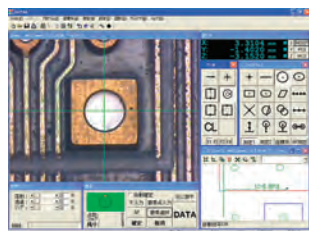
Vision System Retrofit for Microscopes

- Automatic edge-detection tools and various macro icons allow measurement in one easy step.
- Graphics and measurement navigation functions facilitate operation.
- Image data input/storage function.
- Measurement results are output to MSEXCEL®. This lets the user generate an inspection table on the same computer.
- 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 in height measurements. (Patent pending)
- A series of measuring operations can be performed using just one screen display.
- The auto-brightness control function faithfully reproduces the type and degree of illumination used. (This function is limited to the MF/MF-U series.)



The PC system, QSPAK VUE software and microscope are optional.

| No. | Description |
|----------|-------------|
| 359-797* | For MF C |
| 359-799* | For MF-UC |



QSPAK VUE Measurement Window

Specifications

| | |
|-----------------|---|
| Projected image | Inverted |
| Camera unit | Image sensor : 1/2" color CMOS camera Resolution : 0,0001 mm Dimensions : 100 x 58 x 89 mm (W x D x H) Mass : 0,4 kg |
| Adapter unit | Operating software : QSPAK VUE (optional) Dimensions : 45 x 123 mm Magnification : 0.5X Mass : 0,3 kg |
| Magnification | 21X - 210X on 19" monitor |

QSPAK VUE, optional software

- For observation/comparison of form
- Template matching function
- Manual pattern matching function

For simple measurement

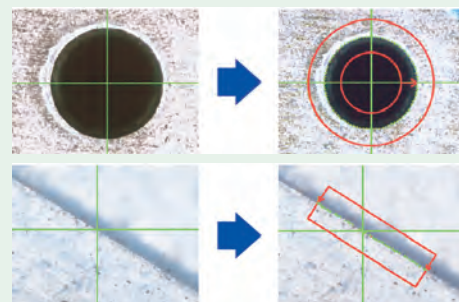
- One-click edge detection tool function
- Smart tool function
- User macro function

Functions for repeated measurement/auto-measurement

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

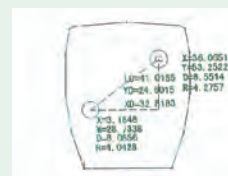
Standard accessories

| No. | Description |
|----------|-------------|
| 12AAJ088 | Footswitch |



One-click Edge Detection

Just 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 calculations.

Hyper MF/MF-U Measuring Microscope

Series 176

- The world highest XY measuring accuracy of $(0,9+3L/1000) \mu\text{m}$.
L = measured length in XY plane, stage unloaded.
- Selectable LAF (Laser Auto Focus) function.
- High operability and repeatability.
- Three-axis motorized control.
- Power-drive auto focus unit is a standard feature.
- Easy positioning via joystick control.

Specifications

| | |
|--------------------------|--|
| Observation image | Erect |
| Optical tube | Reticle projection method, with TV mount, Optical path ratio (eyepiece/TV mount : 50/50) Hyper MF : Monocular or binocular tube (optional depression : 25°) Hyper MF-U : Siedentoph type (pupil distance adjustment : 51 - 76 mm), 1X tube lens, Binocular tube (depression : 25°) |
| Eye-piece | Hyper MF : Optional 10X, 15X, 20X Objective : 3X (375-037-1), W.D. : 77 mm Optional : 1X, 5X, 10X, 20X, 50X, 100X Hyper MF-U : 10X (field No. : 24 mm), Optional : 15X, 20X |
| Turret (optional) | Hyper MF-U : Power Objective (optional) : M / BD Plan Apo objective from 1X to 100X |
| Transmitted illumination | Light source : Halogen bulb (12V, 100W) Hyper MF : (fiber-optic cold light illumination) Optical system : Telecentric illumination with adjustable aperture diaphragms Functions : Light intensity adjustable, 100 steps brightness adjustment |
| Surface illumination | Light source : Halogen bulb (12V, 50W) Optical system : Koehler illumination with adjustable aperture diaphragms Functions : Light intensity adjustable, 100 steps brightness adjustment |
| Data output | Via RS-232C interface |
| Power supply | 220/240V AC, 50/60 Hz |
| Optional Accessories | See MF accessories for Hyper MF models See MF-U accessories for Hyper MF-U models |



Control panel for fast traverse and three-axis positioning



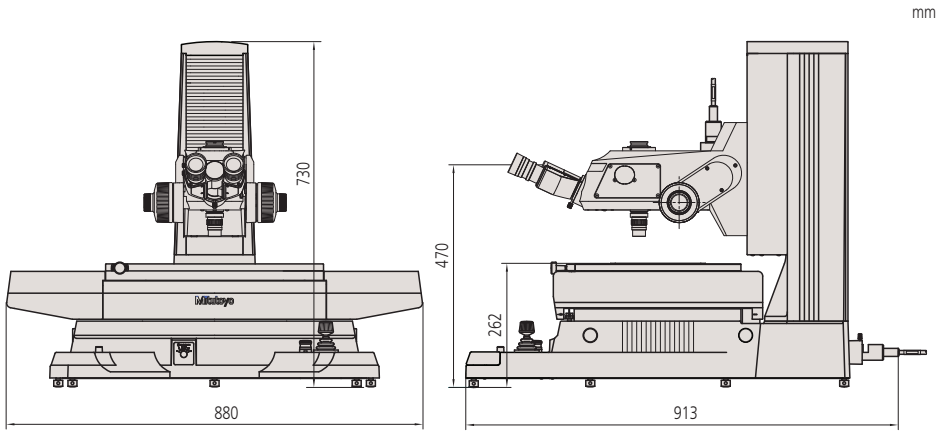
Hyper MF-U
with optional turret and objective lenses

XY stage travel range : 250 x 150 mm
Measuring unit : Linear encoder
Resolution : 0,01 μm
XY stage top size : 300 x 200 mm
Swiveling function : $\pm 3^\circ$
Max. stage loading : 30 kgf
Max. workpiece height : 150 mm

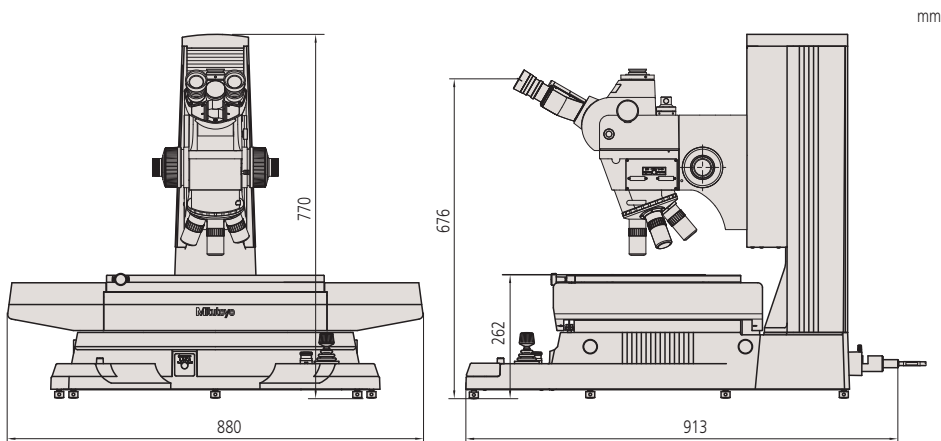
| Model | Hyper MF-B2515B | Hyper MF-UB2515B | Hyper MF-UD2515B | Hyper MF-UE2515B | Hyper MF-UF2515B |
|---------------------------|------------------------|------------------------|---|------------------------|---|
| No. | 176-430D* 176-430E* | 176-431D* 176-431E* | 176-432D* 176-432E* | 176-433D* 176-433E* | 176-434D* 176-434E* |
| Observation type | Bright Field | Bright Field | Bright Field or Bright Field/Dark Field | Bright Field | Bright Field or Bright Field/Dark Field |
| Laser auto focus function | - | - | - | Available | Available |
| Remarks | 176-430E UK only | 176-431E UK only | 176-432E UK only | 176-433E UK only | 176-434E UK only |

Hyper MF/MF-U Measuring Microscope

Series 176



Hyper MF-B2515B



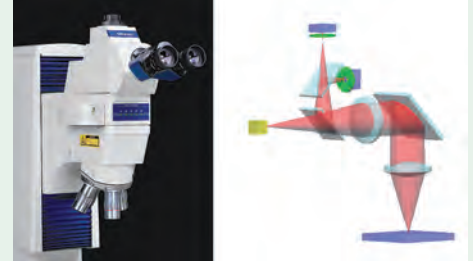
Hyper MF-UB2515B

Specifications

Optional Accessories See MF accessories for Hyper MF models
See MF-U accessories for Hyper MF-U models

Optional accessories

| No. | Description |
|----------|---|
| 264-149D | Data processing unit QM-Data 200 for Hyper MF/MFU |
| 264-149E | Data processing unit QM-Data 200 for Hyper MF/MFU UK only |
| 359-7775 | Vision Unit 7C for Hyper MF/MF-U |



Laser Auto Focus Optical Tube



QM-Data 200
2-D data processing unit



Vision Unit
PC-based vision measuring system

FS-300 Inspection Microscope

Series 378

High Power Inspection Microscope

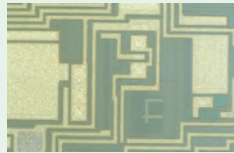
The FS-300 is designed for inspecting microcomponents such as IC chips and video head parts. The optical system features ultra-long working distance objectives, widefield eyepieces, and independent correction for lateral chromatic aberration.

FEATURES

- A complete FS-300 system can be composed of a variety of components for meeting diverse applications.
- Available with or without a transmitted light illuminator.
- Ultra-long working distance objectives provide easy manipulation of workpieces.
- Easy switching between bright-field illumination and dark-field illumination.
- Optional accessories widen the range of applications.

Specifications

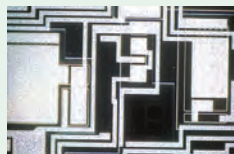
| | |
|--------------|---|
| Main unit | Reflected illumination : Köhler illumination with aperture diaphragm (centering mechanism) and field stop 12V/100W halogen lamp (continuously variable brightness adjustment) with filter mounting (2-slot), with BF/DF switching slide (378-321, 378-323, 378-325, 378-327 only) Transmitted illumination : 12V/100W fibre-optic illumination (continuously variable brightness, adjustment) with aperture diaphragm (378-323, 378-324, 378-326, 378-327 only) |
| Power turret | Inward type with 4 lens mounts |
| Workstage | Travel stroke : 356 x 306 mm with X/Y axis fine feed knobs, and coarse travel handle |
| Optical tube | Type : Trinocular Siedentopf (erect image) Field number : 24 Intermediate image mag. : 1 Optical pass ratio and Pupil distance : 50/50, adjustment range : 51 - 76 mm |
| Dimensions | Main unit : 360 x 803 x 568,5 mm Workstage : 700 x 400 mm |
| Power supply | 100/240V AC, 50/60Hz |
| Mass | Approx. 50 kg including workstage |



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.



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



Dark field 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.



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



FS-300 with optional accessories

| No. | Main unit observation system | Optical tube depression angle | Eyepiece Field of view | Applicable objective (optional) | Power consumption (approx.) |
|-----------|------------------------------|-------------------------------|------------------------|---------------------------------------|-----------------------------|
| 378-320D* | Bright field | Fixed 20° | 10X/ø30 | M Plan Apo, M Plan Apo SL, G Plan Apo | 150W |
| 378-321D* | Bright/Dark field | Fixed 20° | 10X/ø30 | BD Plan Apo, BD Plan Apo SL | 150W |
| 378-322D* | Bright field | Fixed 20° | 10X/ø30 | M Plan Apo, M Plan Apo SL, G Plan Apo | 300W |
| 378-323D* | Bright/Dark field | Fixed 20° | 10X/ø30 | BD Plan Apo, BD Plan Apo SL | 300W |
| 378-324D* | Bright field | Adjustable 0° to 20° | 10X/ø24 | M Plan Apo, M Plan Apo SL, G Plan Apo | 150W |
| 378-325D* | Bright/Dark field | Adjustable 0° to 20° | 10X/ø24 | BD Plan Apo, BD Plan Apo SL | 150W |
| 378-326D* | Bright field | Adjustable 0° to 20° | 10X/ø24 | M Plan Apo, M Plan Apo SL, G Plan Apo | 300W |
| 378-327D* | Bright/Dark field | Adjustable 0° to 20° | 10X/ø24 | BD Plan Apo, BD Plan Apo SL | 300W |

FS70 Microscope Unit

Series 378 - Microscope Unit for Semiconductor Inspection

The optical system originally developed for the best-selling FS60 models was further enhanced for the FS70 models. It is ideal as the microscope unit of a prober station for semiconductors. (All models CE marked.)



Specifications

| | |
|----------------------------|---|
| Focus adjustment | Method : With concentric coarse and fine focusing wheels (right and left) Range : 50 mm travel range, 0,1 mm/rev. for fine adjustment, 3,8 mm/rev. for coarse adjustment |
| Trinocular tube Image | Erect image |
| Interpupillary distance | Siedentopf type, adjustment range : 51-76mm |
| Field number | 24 |
| Tilt angle | 0° - 20° (only - TH, - THS models) |
| Illumination system | Reflective illumination for bright field (Koehler illumination, with aperture diaphragm) |
| Light source | 12 V / 100 W fibre-optic, non-stopped adjustment, light guide length 1.5m, power consumption 150W |
| Objectives lens (optional) | M Plan Apo, M Plan Apo SL, G Plan Apo |

FS-70

- 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, Mitutoyo assumes no responsibility whatever for the performance and/or safety of the laser system used with Mitutoyo microscopes. A careful examination is recommended when selecting a laser-emission unit.

- Bright field, Differential Interference Contrast (DIC) and polarized observations are standard with the FS70Z. The FS70L and FS70L4 do not support the DIC method.

- By employing an inward-leaning turret, the long working distance objectives provide excellent operability.

| Model | FS70 | FS70-TH | FS70Z | FS70Z-TH |
|-----------------------------------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| No. | 378-184-1 | 378-184-3* | 378-185-1* | 378-185-3* |
| Model short base | FS70-S | FS70-THS | FS70Z-S | FS70Z-THS |
| Order No. short base model | 378-184-2 | 378-184-4 | 378-185-2 | 378-185-4 |
| Optical pass ratio | 50/50 | 100/0 or 0/100 | 50/50 | 100/0 or 0/100 |
| Tube lens | 1X | 1X | 1X, 2X zoom | 1X, 2X zoom |
| Camera mount | C-mount (using optional adapter B) | C-mount (using optional adapter B) | C-mount (using optional adapter B) | C-mount (using optional adapter B) |
| Loading (*1) | 14.5 kg | 13.6 kg | 14.1 kg | 13.2 kg |
| Mass (main unit) | 6.1 kg | 7.1 kg | 6.6 kg | 7.5 kg |

(*1) Loading on optical tube excluding weight of objective lenses and eyepieces.

| Model | FS70L | FS70L-TH | FS70L4 | FS70L4-TH |
|---|-------------------------------|-------------------------------|---|---|
| No. | 378-186-1* | 378-186-3* | 378-187-1* | 378-187-3* |
| Model short base | FS70L-S | FS70L-THS | FS70L4-S | FS70L4-THS |
| Order No. short base model | 378-186-2 | 378-186-4 | 378-187-2 | 378-187-4 |
| Optical pass ratio | 100/0 or 0/100 | 100/0 or 0/100 | 100/0 or 0/100 | 100/0 or 0/100 |
| Protective filter | Built-in laser beam filter | Built-in laser beam filter | Built-in laser beam filter | Built-in laser beam filter |
| Tube lens | 1X | 1X | 1X | 1X |
| Applicable laser | 1064/532/355 nm | 1064/532/355 nm | 532/266 nm | 532/266 nm |
| Camera mount | Use a laser with TV port. | Use a laser with TV port. | C-mount receptacle (with green filter switch) | C-mount receptacle (with green filter switch) |
| Objective, optional (for laser-cutting) | M/LCD Plan NIR M/LCD Plan NUV | M/LCD Plan NIR M/LCD Plan NUV | M Plan UV | M Plan UV |
| Loading (*1) | 14.2 kg | 13.5 kg | 13.9 kg | 13.1 kg |
| Mass (main unit) | 6.4 kg | 7.2 kg | 6.7 kg | 7.5 kg |

(*1) Loading on optical tube excluding weight of objective lenses and eyepieces.

VM-ZOOM40 Assembly Type Microscope Unit

Series 378

The VM-ZOOM40 has dramatically improved operability and the quality of visual images by combining the main unit, which has a high-magnification zooming system, with a newly developed high resolution, long working distance objective. If the VM-ZOOM40 is used with an analysis probe and various other laser repair equipment, it will greatly aid in development, manufacturing, and inspection of semiconductors and LCD panels.



Specifications

| | |
|------------------------|---|
| Total magnification | 100X - 4,000X (when using 1/2-inch CCD camera and 14-inch monitor) |
| Magnification tube | 0.25X - 10X (Zoom ratio 1:40) |
| Objective lens | M Plan Apo HR 10X |
| Field of view | <ul style="list-style-type: none"> • 1/2 inch CCD camera (optional) : 2,56 x 1,92mm - 0,064 x 0,048mm • Binocular : ø 3,2mm - ø 0,08mm • Koehler system (with aperture stop) |
| Reflected illumination | <ul style="list-style-type: none"> • Fibre-optic illuminator (378-088) is required for the manual zoom type. |
| Light source | Halogen bulb (21V, 150W) |
| Power supply | 20 Lux (min.) on the screen |
| Mass g | Main unit : Approx. 7kg Binocular unit : 1kg Remote controller unit : Approx. 7kg |

VM-ZOOM40

Features

- High-ratio 40X zoom with excellent operability.
- High-resolution objective (10X) supplied as standard.
- Various optional bright-field objectives attachable.
- The slide type lens mount allows quick change between the monitoring and laser-beam cutting objectives.
- Various wavelength (near infrared, visible, near ultraviolet, ultraviolet) lasers supported.
- C-mount attached as standard.
- Manual or power type systems are selectable according to the purpose.

Selection Guide to System Configuration

(Depends on each system configuration)

| No. | Manual zoom function | Power zoom function | Single objective mount | Double-single mount | Binocular unit | YAG laser (1064/532/355nm) mount | YAG laser (532/266nm) mount |
|-----------|----------------------|---------------------|------------------------|---------------------|----------------|----------------------------------|-----------------------------|
| 378-171D* | Yes | | Yes | | | | |
| 378-172D* | Yes | | | Yes | Yes | | |
| 378-173D* | Yes | | | Yes | | Yes | |
| 378-174D* | Yes | | | Yes | Yes | Yes | |
| 378-175D* | | Yes | Yes | | | | |
| 378-176D* | | Yes | | Yes | Yes | | |
| 378-177D* | | Yes | | Yes | | Yes | |
| 378-178D* | | Yes | | Yes | Yes | Yes | |
| 378-181D* | | Yes | | Yes | | | Yes |
| 378-182D* | | Yes | | Yes | Yes | | Yes |

Remarks :

- Power-zoom function : Fiber-optic illumination controller is also provided
- Double-objective mount : The objective can be switched via sliding mechanism
- Binocular unit : 10X eyepieces (378-856) are provided
- For UK, change suffix D to E, example 378-171E

VMU Video Microscope Unit

Series 378

The VMU is a compact, lightweight, and easy-to-install microscope unit for CCD camera monitoring in semiconductor fabrication facilities.

- The optical system features ultralong working distance objectives and correction for the wide range of radiation wavelengths in use.
- Fibre-optic reflected illumination keeps the workpiece free from thermal expansion. The fibre-optic illuminator is required for the light source.
- Also available with a laser mount or turret (objective mount).



VMU-V
378-505

VMU-H
378-506



VMU-LB
378-507

VMU-L4B
378-508

Selection Guide to System Configuration (Depends on each system configuration)

| No. | Applicable Wavelength | Vertical CCD camera mount | Horizontal CCD camera mount | YAG laser mount | Fibre optic illumination unit | Mass |
|----------|--|---------------------------|-----------------------------|-----------------|-------------------------------|--------|
| 378-505 | Near-infrared and visible radiation | Yes | | | | 570 g |
| 378-506 | Near-infrared and visible radiation | | Yes | | | 590 g |
| 378-507 | Near-infrared, visible, near-ultraviolet radiation | Yes | | Yes | Yes | 1270 g |
| 378-508* | Near infrared, visible, near ultraviolet and ultraviolet radiation | Yes | | Yes | Yes | 1300 g |

Specifications

| | |
|--|--|
| Magnification of tube | 1X |
| Reflected illumination | - Telecentric system with aperture stop system - Fibre-optic illuminator (optional) is required |
| Light source | Halogen bulb (21V, 150W) (optional) |
| Objective lenses for bright field observation (Optional accessory) | M Plan Apo, M Plan Apo SL, G Plan Apo |
| Objective lenses for laser cutting (Optional accessory) | M plan Apo NIR, LCD Plan Apo NIR, M Plan Apo NUV and LCD Plan Apo NUV |
| Objective lenses for laser machining (Optional accessory) | M Plan UV (for 378-508 only) |

Eyepieces

Series 378

- Extra-wide field of view type.
- Optional reticles are available.
- Applicable microscope models: MF-C, MF-UC, Hyper MF, Hyper MF-U, FS-300, FS70, VM-Zoom40.



Optional accessories

| No. | Description |
|--------|--|
| 516576 | Reticle broken cross-hair 90°, 60° |
| 516577 | Reticle concentric circle D1,2 mm |
| 516578 | 20 mm scale (Min. reading: 0,1 mm) with cross hair reticle |
| 516848 | Reticle cross-hair |
| 516849 | 10 mm scale (Min. reading : 0,1 mm) |
| 516850 | 5 mm scale (Min. reading : 0,05 mm) |

Two-piece sets

*1 : For FS-300 only : Reticles not applicable for this eyepiece

| No. | Magnification | Field number | Correction range | Eye point | Mass |
|---------|---------------|--------------|------------------|-----------|-------|
| 378-851 | 10X *1 | 30 | -8D to +4D | High | 250 g |
| 378-856 | 10X | 24 | -10D to +5D | High | 85 g |
| 378-857 | 15X | 16 | -8D to +5D | Normal | 40 g |
| 378-858 | 20X | 12 | -8D to +5D | Normal | 55 g |

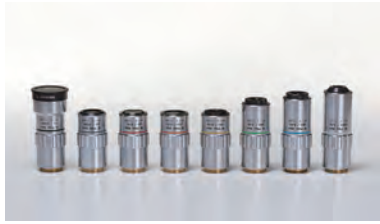
Individual

| No. | Magnification | Field number | Correction range | Eye point | Mass |
|-----------|---------------|--------------|------------------|-----------|------|
| 378-856-5 | 10X | 24 | -10D to +5D | High | 85 g |
| 378-857-5 | 15X | 16 | -8D to +5D | Normal | 40 g |
| 378-858-5 | 20X | 12 | -8D to +5D | Normal | 55 g |

Objective lenses M Plan

Series 378

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.



M Plan Apo and M Plan Apo SL
Objectives for bright field observation



BD Plan Apo and BD Plan Apo SL
Objectives for bright/dark field observation



Near-ultraviolet wavelength corrected M Plan Apo NUV objectives



Ultraviolet wavelength corrected M Plan UV objectives

Specifications

Features - The long working distance type objectives provide excellent clearance between the lens surface and the workpiece surface in focus, making it possible to observe workpieces which are usually hard-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 the near-infrared, near-ultraviolet and ultraviolet regions of the spectrum, or various thicknesses of LCD screen glass.

- The mounting screw threads of objectives are designed to conform to JIS B-7141-1988.



Near-infrared wavelength corrected M Plan Apo NIR objectives

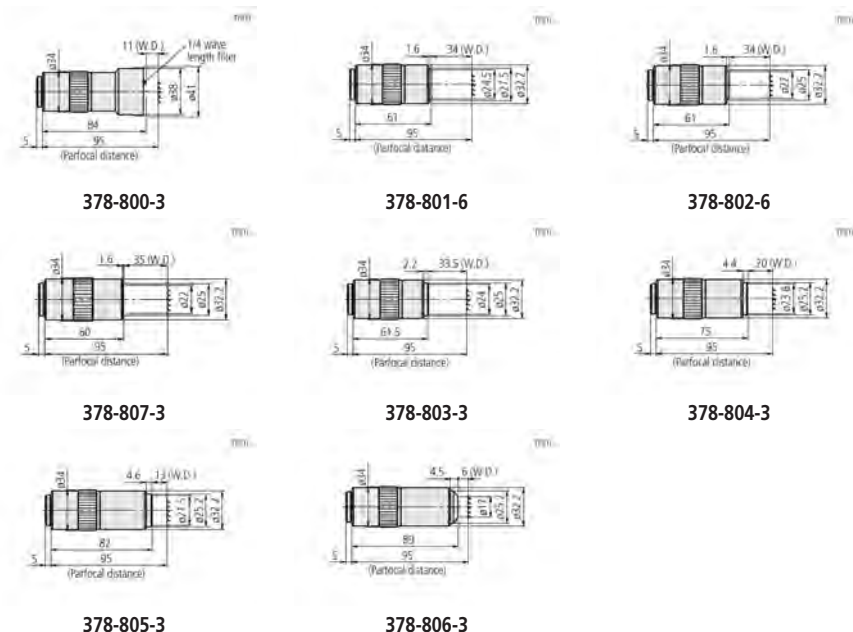
M Plan Apo and M Plan Apo SL

Series 378

Specifications

Abbreviations in product table

Mag. : Magnification
 N.A. : Numerical aperture
 W.D. : Working distance
 f : Focal distance
 R : Resolving power
 D.F. : Focal depth
 View field 1 : Field of view when
 using $\phi 24$ mm eyepiece
 View field 2 : Field of view when
 using 1/2" CCD camera



M Plan Apo for Bright Field Observation

Compatible with microscope types VMU / VM-ZOOM40 / FS-70 / FS-300 / MF-U / Hyper MF-U

Note : Polarizing unit (378-074) is required when using 1X objective.

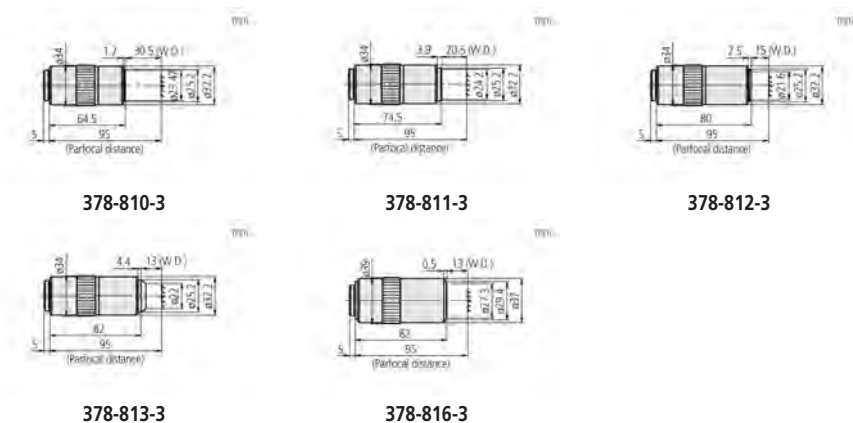
| No. | Mag. | N.A. | W.D. | f | R | D.F. | View field 1 | View field 2 | Mass g |
|------------|------|-------|---------|----------|--------------|--------------|----------------|--------------|--------|
| 378-800-3 | 1X | 0.025 | 11.0 mm | 200 mm | 11.0 μ m | 440 μ m | $\phi 24$ mm | 4.8x6.4 mm | 300 g |
| 378-801-6 | 2X | 0.055 | 34.0 mm | 100 mm | 5.0 μ m | 91 μ m | $\phi 12$ mm | 2.4x3.2 mm | 220 g |
| 378-802-6 | 5X | 0.14 | 34.0 mm | 40 mm | 2.0 μ m | 14.0 μ m | $\phi 4.8$ mm | 0.96x1.28 mm | 240 g |
| 378-807-3* | 7.5X | 0.21 | 35.0 mm | 26.67 mm | 1.3 μ m | 6.2 μ m | $\phi 3.6$ mm | 0.64x0.85 mm | 240 g |
| 378-803-3 | 10X | 0.28 | 33.5 mm | 20 mm | 1.0 μ m | 3.5 μ m | $\phi 2.4$ mm | 0.48x0.64 mm | 230 g |
| 378-804-3 | 20X | 0.42 | 20.0 mm | 10 mm | 0.7 μ m | 1.6 μ m | $\phi 1.2$ mm | 0.24x0.32 mm | 270 g |
| 378-805-3 | 50X | 0.55 | 13.0 mm | 4 mm | 0.5 μ m | 0.9 μ m | $\phi 0.48$ mm | 0.10x0.13 mm | 290 g |
| 378-806-3 | 100X | 0.70 | 6.0 mm | 2 mm | 0.4 μ m | 0.6 μ m | $\phi 0.24$ mm | 0.05x0.06 mm | 320 g |

M Plan Apo SL for Bright Field Observation

Compatible with microscope types VMU / VM-ZOOM40 / FS-70 / FS-300 / MF-U / Hyper MF-U

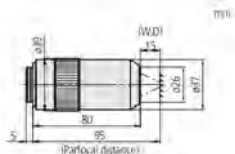
Note : These objectives offer extra-long working distance.

| No. | Mag. | N.A. | W.D. | f | R | D.F. | View field 1 | View field 2 | Mass g |
|-----------|------|------|---------|--------|-------------|-------------|----------------|---------------|--------|
| 378-810-3 | 20X | 0.28 | 30.5 mm | 10 mm | 1.0 μ m | 3.5 μ m | $\phi 1.2$ mm | 0.24x0.32 mm | 240 g |
| 378-811-3 | 50X | 0.42 | 20.5 mm | 4 mm | 0.7 μ m | 1.6 μ m | $\phi 0.48$ mm | 0.10x0.13 mm | 280 g |
| 378-812-3 | 80X | 0.50 | 15.0 mm | 2.5 mm | 0.6 μ m | 1.1 μ m | $\phi 0.3$ mm | 0.06x0.08 mm | 280 g |
| 378-813-3 | 100X | 0.55 | 13.0 mm | 2 mm | 0.5 μ m | 0.9 μ m | $\phi 0.24$ mm | 0.05x0.06 mm | 290 g |
| 378-816-3 | 200X | 0.62 | 13.0 mm | 1 mm | 0.4 μ m | 0.7 μ m | $\phi 0.12$ mm | 0.025x0.03 mm | 490 g |

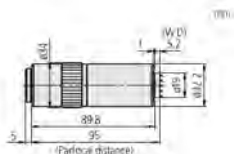


M Plan Apo HR and G Plan Apo

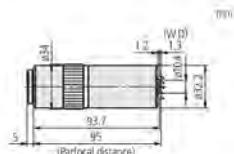
Series 378



378-788-4



378-814-4



378-815-4

M Plan Apo HR for Bright Field Observation

Compatible with microscope types VMU / VM-ZOOM40 / FS-70 / FS-300 / MF-U / Hyper MF-U

Note : These objectives offer extra-high resolving power.

| No. | Mag. | N.A. | W.D. | f | R | D.F. | View field 1 | View field 2 | Mass g |
|-----------|------|------|--------|-------|--------|---------|--------------|--------------|--------|
| 378-788-4 | 10X | 0.42 | 15 mm | 20 mm | 0.7 μm | 1.6 μm | ø2.4 mm | 0.48x0.64 mm | 460 g |
| 378-814-4 | 50X | 0.75 | 5.2 mm | 4 mm | 0.4 μm | 0.49 μm | ø0.48 mm | 0.10x0.13 mm | 400 g |
| 378-815-4 | 100X | 0.90 | 1.3 mm | 2 mm | 0.3 μm | 0.34 μm | ø0.24 mm | 0.05x0.06 mm | 410 g |

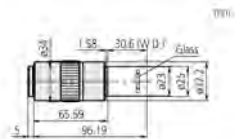
Glass Thickness Corrected

G Plan Apo for Bright Field Observation

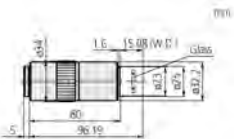
Compatible with microscope types VMU / VM-ZOOM40 / FS-70 / FS-300 / MF-U / Hyper MF-U

Note : The G Plan Apo Series are designed for observing a workpiece through glass (thickness : 3,5 mm).

| No. | Mag. | N.A. | W.D. | f | R | D.F. | View field 1 | View field 2 | Mass g |
|-----------|------|------|----------|-------|--------|--------|--------------|--------------|--------|
| 378-847 | 20X | 0.28 | 29.42 mm | 10 mm | 1.0 μm | 3.5 μm | ø1.2 mm | 0.24x0.32 mm | 270 g |
| 378-848-3 | 50X | 0.50 | 13.89 mm | 4 mm | 0.6 μm | 1.1 μm | ø0.48 mm | 0.10x0.13 mm | 320 g |



378-847



378-848-3

Specifications

Abbreviations in product table

Mag. : Magnification
 N.A. : Numerical aperture
 W.D. : Working distance
 f : Focal distance
 R : Resolving power
 D.F. : Focal depth
 View field 1 : Field of view when using ø24 mm eyepiece
 View field 2 : Field of view when using 1/2" CCD camera

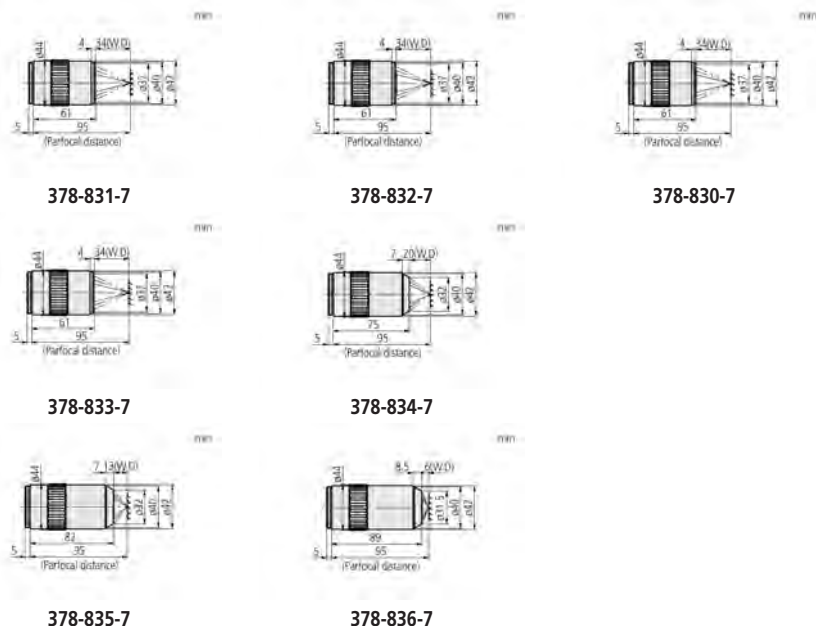
BD Plan Apo and BD Plan Apo SL

Series 378

Specifications

Abbreviations in product table

Mag. : Magnification
 N.A. : Numerical aperture
 W.D. : Working distance
 f : Focal distance
 R : Resolving power
 D.F. : Focal depth
 View field 1 : Field of view when
 using $\phi 24$ mm eyepiece
 View field 2 : Field of view when
 using 1/2" CCD camera



BD Plan Apo for Bright/Dark Field Observation

Compatible with microscope types FS-300 / MF-U / Hyper MF-U

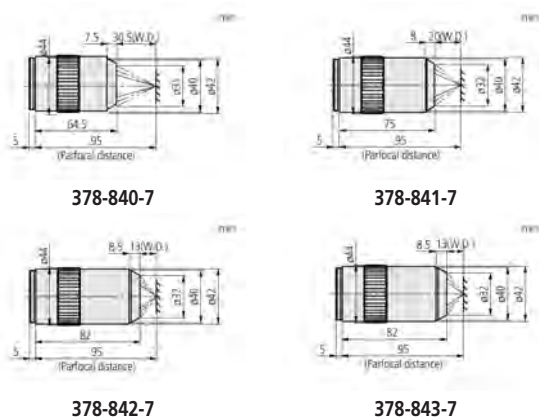
| No. | Mag. | N.A. | W.D. | f | R | D.F. | View field 1 | View field 2 | Mass g |
|------------|------|-------|-------|----------|-------------|--------------|----------------|--------------|--------|
| 378-831-7* | 2X | 0.055 | 34 mm | 100 mm | 5.0 μ m | 91.0 μ m | $\phi 12$ mm | 2.4x3.2 mm | 340 g |
| 378-832-7* | 5X | 0.14 | 34 mm | 40 mm | 2.0 μ m | 14.0 μ m | $\phi 4.8$ mm | 0.96x1.28 mm | 350 g |
| 378-830-7* | 7.5X | 0.21 | 34 mm | 26.67 mm | 1.3 μ m | 6.2 μ m | $\phi 3.6$ mm | 0.64x0.85 mm | 350 g |
| 378-833-7* | 10X | 0.28 | 34 mm | 20 mm | 1.0 μ m | 3.5 μ m | $\phi 2.4$ mm | 0.48x0.64 mm | 350 g |
| 378-834-7* | 20X | 0.42 | 20 mm | 10 mm | 0.7 μ m | 1.6 μ m | $\phi 1.2$ mm | 0.24x0.32 mm | 400 g |
| 378-835-7 | 50X | 0.55 | 13 mm | 4 mm | 0.5 μ m | 0.9 μ m | $\phi 0.48$ mm | 0.10x0.13 mm | 440 g |
| 378-836-7* | 100X | 0.70 | 6 mm | 2 mm | 0.4 μ m | 0.6 μ m | $\phi 0.24$ mm | 0.05x0.06 mm | 460 g |

BD Plan Apo SL for Bright/Dark Field Observation

Compatible with microscope types FS-300 / MF-U / Hyper MF-U

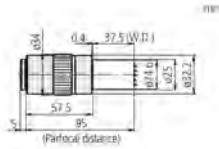
Note : These objectives offer extra-long working distance.

| No. | Mag. | N.A. | W.D. | f | R | D.F. | View field 1 | View field 2 | Mass g |
|------------|------|------|---------|--------|-------------|-------------|----------------|--------------|--------|
| 378-840-7* | 20X | 0.28 | 30.5 mm | 10 mm | 1.0 μ m | 3.5 μ m | $\phi 1.2$ mm | 0.24x0.32 mm | 350 g |
| 378-841-7* | 50X | 0.42 | 20.0 mm | 4 mm | 0.7 μ m | 1.6 μ m | $\phi 0.48$ mm | 0.10x0.13 mm | 410 g |
| 378-842-7* | 80X | 0.50 | 13.0 mm | 2.5 mm | 0.6 μ m | 1.1 μ m | $\phi 0.3$ mm | 0.06x0.08 mm | 430 g |
| 378-843-7* | 100X | 0.55 | 13.0 mm | 2 mm | 0.5 μ m | 0.9 μ m | $\phi 0.24$ mm | 0.05x0.06 mm | 440 g |

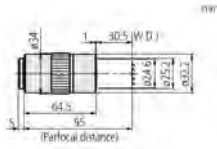


M Plan Apo NIR and BD Plan Apo HR

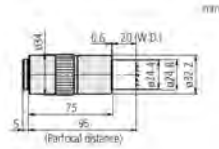
Series 378



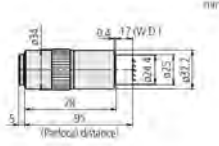
378-822-5



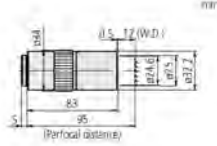
378-823-5



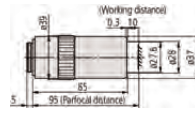
378-824-5



378-825-5



378-826-5



378-863-5

378-864-5

Near-infrared wavelength Corrected

M Plan Apo NIR for Bright Field Observation

Compatible with microscope types VMU / VMZOOM-40 / FS-70 / FS-300

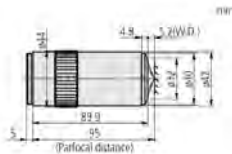
| No. | Mag. | N.A. | W.D. | f | R | D.F. | View field 1 | View field 2 | Mass g |
|-----------|------|------|---------|-------|--------------|--------------|----------------|--------------|--------|
| 378-822-5 | 5X | 0.14 | 37.5 mm | 40 mm | 2.0 μ m | 14.0 μ m | ϕ 4.8 mm | 0.96x1.28 mm | 220 g |
| 378-823-5 | 10X | 0.26 | 30.5 mm | 20 mm | 1.1 μ m | 4.1 μ m | ϕ 2.4 mm | 0.48x0.64 mm | 250 g |
| 378-824-5 | 20X | 0.40 | 20.0 mm | 10 mm | 0.7 μ m | 1.7 μ m | ϕ 1.2 mm | 0.24x0.32 mm | 300 g |
| 378-825-5 | 50X | 0.42 | 17.0 mm | 4 mm | 0.7 μ m | 1.6 μ m | ϕ 0.48 mm | 0.10x0.13 mm | 315 g |
| 378-863-5 | 50X | 0.65 | 10 mm | 4 mm | 0.42 μ m | 0.65 μ m | ϕ 0.48 mm | 0.10x0.13 mm | 450 g |
| 378-826-5 | 100X | 0.50 | 12.0 mm | 2 mm | 0.6 μ m | 1.1 μ m | ϕ 0.24 mm | 0.05x0.06 mm | 335 g |
| 378-864-5 | 100X | 0.70 | 10 mm | 2 mm | 0.39 μ m | 0.56 μ m | ϕ 0.24 mm | 0.05x0.06 mm | 450 g |

BD Plan Apo HR for Bright/Dark Field Observation

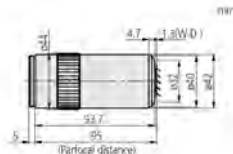
Compatible with microscope types FS-300 / MF-U / Hyper MF-U

Note : These objectives offer extra-high resolving power.

| No. | Mag. | N.A. | W.D. | f | R | D.F. | View field 1 | View field 2 | Mass g |
|------------|------|------|--------|------|-------------|--------------|----------------|--------------|--------|
| 378-845-7* | 50X | 0.75 | 5.2 mm | 4 mm | 0.4 μ m | 0.49 μ m | ϕ 0.48 mm | 0.10x0.13 mm | 530 g |
| 378-846-7* | 100X | 0.90 | 1.3 mm | 2 mm | 0.3 μ m | 0.34 μ m | ϕ 0.24 mm | 0.05x0.06 mm | 545 g |



378-845-7



378-846-7

Specifications

Abbreviations in product table

Mag. : Magnification
 N.A. : Numerical aperture
 W.D. : Working distance
 f : Focal distance
 R : Resolving power
 D.F. : Focal depth
 View field 1 : Field of view when using ϕ 24 mm eyepiece
 View field 2 : Field of view when using 1/2" CCD camera

M Plan Apo NIR

Note :
 These objectives are designed so that the image of a workpiece remains focused within the focal depth even when the wavelength used is changed from within the visible range up to the near-infrared (480 to 1800 nm).
 Therefore the M Plan NIR Series are suitable for laser repair. However, when the wavelength used exceeds 1100 nm, the focussing position may deviate slightly from that in the visible range due to changes in glass dispersion and refractive index.

LCD Plan Apo NIR and M Plan Apo NUV

Series 378

Specifications

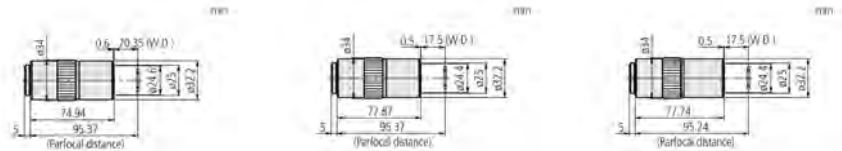
Abbreviations in product table

Mag. : Magnification
 Mag./glass thickness : thickness
 N.A. : Numerical aperture
 W.D. : Working distance
 f : Focal distance
 R : Resolving power
 D.F. : Focal depth
 View field 1 : Field of view when using $\phi 24$ mm eyepiece
 View field 2 : Field of view when using 1/2" CCD camera

M Plan Apo NUV

Note :

These objectives are designed so that the image of a workpiece remains focused within the focal depth even when the wavelength used is changed from within the visible range down to the near-ultraviolet (620 to 355 nm). Therefore The M Plan NUV Series are suitable for laser repair using a short wavelength laser beam.



378-827-5

378-828-5

378-829-5

Near-infrared wavelength and LCD Glass Thickness Corrected LCD Plan Apo NIR for Bright Field Observation

Compatible with microscope types VMU / VM-ZOOM40 / FS-70 / FS-300

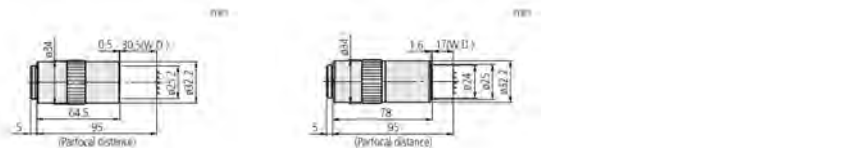
Note : W.D. is just measured in air, not through an LCD glass

| No. | Mag./glass thickness (mm) | N.A. | W.D. | f | R | D.F. | View field 1 | View field 2 | Mass g |
|------------|---------------------------|------|----------|--------|-------------|-------------|----------------|--------------|--------|
| 378-827-5* | 20X/t1.1 | 0.40 | 19.98 mm | 10 mm | 0.7 μ m | 1.7 μ m | $\phi 1.2$ mm | 0.24x0.32 mm | 305 g |
| 378-828-5 | 50X/t1.1 | 0.42 | 17.13 mm | 3.9 mm | 0.7 μ m | 1.6 μ m | $\phi 0.48$ mm | 0.10x0.13 mm | 320 g |
| 378-829-5* | 50X/t0.7 | 0.42 | 17.26 mm | 3.9 mm | 0.7 μ m | 1.6 μ m | $\phi 0.48$ mm | 0.10x0.13 mm | 320 g |
| 378-752-5 | 100X/t1.1 | 0.50 | 12.13 mm | 2 mm | 0.6 μ m | 1.1 μ m | $\phi 0.24$ mm | 0.05x0.06 mm | 335 g |
| 378-754-5* | 100X/t0.7 | 0.50 | 11.76 mm | 2 mm | 0.6 μ m | 1.1 μ m | $\phi 0.24$ mm | 0.05x0.06 mm | 335 g |

Near-ultraviolet wavelength Corrected M Plan Apo NUV for Bright Field Observation

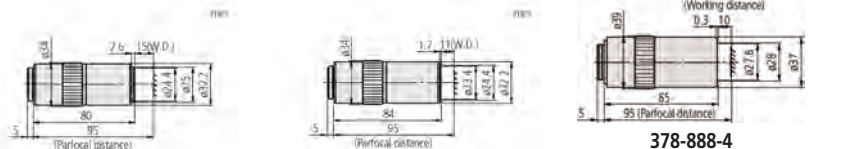
Compatible with microscope types VMU / VM-ZOOM40 / FS-70

| No. | Mag. | N.A. | W.D. | f | R | D.F. | View field 1 | View field 2 | Mass g |
|------------|------|------|----------|-------|--------------|--------------|----------------|--------------|--------|
| 378-809-5* | 10X | 0.28 | 30.5 mm | 20 mm | 1 μ m | 3.5 μ m | $\phi 2.4$ mm | 0.48x0.64 mm | 255 g |
| 378-817-4 | 20X | 0.40 | 17.0 mm | 10 mm | 0.7 μ m | 1.7 μ m | $\phi 1.2$ mm | 0.24x0.32 mm | 340 g |
| 378-818-4 | 50X | 0.42 | 15.0 mm | 4 mm | 0.7 μ m | 1.6 μ m | $\phi 0.48$ mm | 0.10x0.13 mm | 350 g |
| 378-888-4* | 50X | 0.65 | 10.00 mm | 4 mm | 0.42 μ m | 0.65 μ m | $\phi 0.48$ mm | 0.10x0.13 mm | 500 g |
| 378-819-4 | 100X | 0.50 | 11.0 mm | 2 mm | 0.6 μ m | 1.1 μ m | $\phi 0.24$ mm | 0.05x0.06 mm | 380 g |



378-809-5

378-817-4



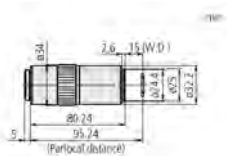
378-818-4

378-819-4

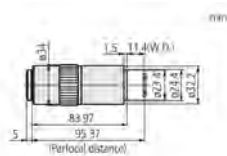
378-888-4

LCD Plan Apo NUV and M Plan UV

Series 378



378-820-4



378-751-4

Near-ultraviolet wavelength and LCD Glass Thickness Corrected LCD Plan Apo NUV for Bright Field Observation

Compatible with microscope types VMU / VM-ZOOM40 / FS-70

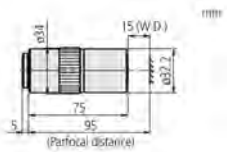
Note : For 378-820-4, W.D. is just measured in air, not through an LCD glass

| No. | Mag./glass thickness (mm) | N.A. | W.D. | f | R | D.F. | View field 1 | View field 2 | Mass g |
|------------|---------------------------|------|----------|------|--------|--------|--------------|--------------|--------|
| 378-753-4* | 50X/t1,1 | 0.42 | 14.53 mm | 4 mm | 0.7 μm | 1.6 μm | ø0.48 mm | 0.10x0.13 mm | 310 g |
| 378-820-4 | 50X/t0,7 | 0.42 | 14.76 mm | 4 mm | 0.7 μm | 1.6 μm | ø0.48 mm | 0.10x0.13 mm | 310 g |
| 378-751-4* | 100X/t1,1 | 0.50 | 11.03 mm | 2 mm | 0.6 μm | 1.1 μm | ø0.24 mm | 0.05x0.06 mm | 380 g |

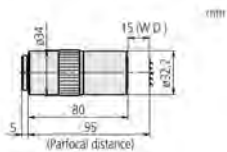
Ultraviolet wavelength Corrected M Plan UV for Bright Field Observation

Compatible with microscope types VMU / VM-ZOOM40 / FS-70

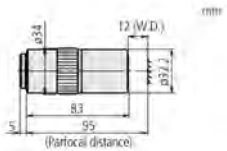
| No. | Mag. | N.A. | W.D. | f | R | D.F. | View field 1 | View field 2 | Mass g |
|------------|------|------|---------|--------|--------|--------|--------------|--------------|--------|
| 378-844-5* | 10X | 0.25 | 20 mm | 20 mm | 1.1 μm | 4.4 μm | ø2.4 mm | 0.48x0.64 mm | 310 g |
| 378-837-5* | 20X | 0.36 | 15.0 mm | 10 mm | 0.8 μm | 2.1 μm | ø1.2 mm | 0.24x0.32 mm | 330 g |
| 378-838-5 | 50X | 0.40 | 12.0 mm | 4 mm | 0.7 μm | 1.7 μm | ø0.48 mm | 0.10x0.13 mm | 400 g |
| 378-839-5* | 80X | 0.55 | 10.0 mm | 2.5 mm | 0.5 μm | 0.9 μm | ø0.3 mm | 0.06x0.08 mm | 380 g |



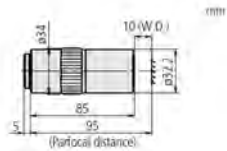
378-844-5



378-837-5



378-838-5



378-839-5

Specifications

Abbreviations in product table

Mag. : Magnification
Mag./glass thickness : Magnification/Thickness
N.A. : Numerical aperture
W.D. : Working distance
f : Focal distance
R : Resolving power
D.F. : Focal depth
View field 1 : Field of view when using ø24 mm eyepiece
View field 2 : Field of view when using 1/2" CCD camera

M Plan UV

Note :

These ultraviolet corrected objectives are designed so that the image of a workpiece remains focused within the focal depth even when the wavelength used is changed from within the visible range down to the ultraviolet (550 to 266 nm). Therefore the M Plan UV Series are suitable for laser repair using a short wavelength laser beam.

PJ-A3000 Measuring Projector

Series 302

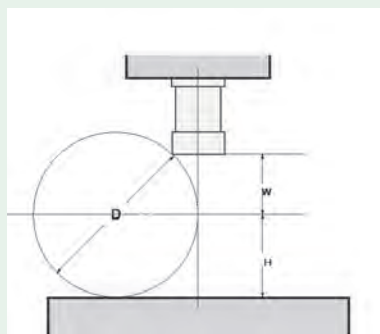
- The PJ-A3000 Series profile projectors are medium-size models that feature excellent versatility and easy operation.
- Easy-to-read digital XY counter is located near the projection screen to minimize eye movement.
- Digital readout protractor screen facilitates angle measurement.

Specifications

| | |
|------------------------|---|
| Projected image | Inverted |
| Projector screen | Effective diameter : 315 mm/12.4" Screen material : Fine-ground glass Screen rotation : $\pm 360^\circ$, fine feed and clamp Angle display : Digital counter (LED) Resolution : 1' or 0.01° (switchable) Range : $\pm 370^\circ$ ABS/INC mode switching, Zero Set Reference lines : Cross-hairs |
| Projection lens | 10X (990948) Optional : 20X, 50X, 100X |
| Magnification accuracy | Contour illumination : $\pm 0.1\%$ or better Surface illumination : $\pm 0.15\%$ or better |
| 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 |
| Focusing | Manual |
| Resolution | 0,001 mm or 0,001 mm/0.0001" (0,001 mm/0.00005" : digital head) |
| Power supply | 220 - 240V AC, 50/60Hz |



302-701D



D : Max. workpiece diameter
W : Working distance
H : Max. workpiece height

| | 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 | -50 models* | 123.5 | 123.5 | 123.5 |
| | -100 models | 91 | 91 | 91 |
| | -150 models | 103.5 | 103.5 | 103.5 |
| | 200 models | 92.5 | 92.5 | 92.5 |
| D | -50 models* | 224 (198) | 87 (61) | 27 |
| | -100 models | 182 | 87 (61) | 27 |
| | -150 models | 207 (198) | 87 (61) | 27 |
| | 200 models | 185 | 87 (61) | 27 |

() When using surface illumination
* Including 302-700D



302-704 - 302-714
302-708 - 302-718
302-709 - 302-719



302-702 - 302-712
302-706



302-703 - 302-713
302-707



302-701 - 302-711
302-705



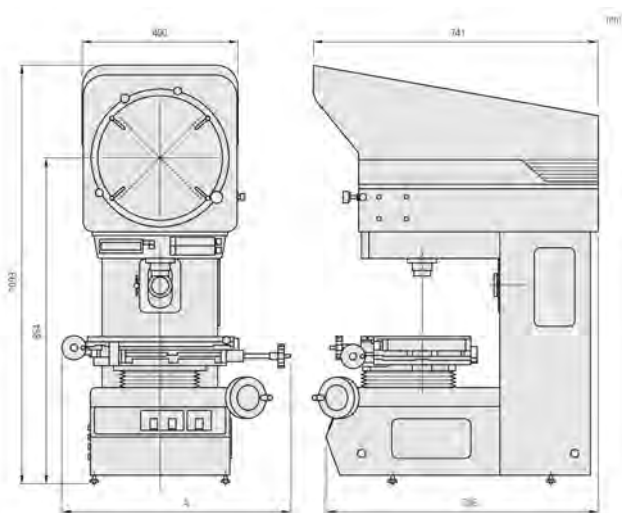
302-700

PJ-A3000 Measuring Projector

Series 302 - Metric model

| Metric | | XY stage 50 x 50 or 100 x 100 mm | | | | |
|------------------------------|----------------|----------------------------------|---------------------|----------------|-------------------|--|
| Model No. | PJ-A3005D-50 | PJ-A3005D-50E | PJ-A3005R-50 | PJ-A3010F-100 | PJ-A3010F-100E | |
| | 302-704D* | 302-708D* | 302-709D* | 302-703D | 302-707D* | |
| XY stage travel range (mm) | 50 x 50 | 50 x 50 | 50 x 50 | 100 x 100 | 100 x 100 | |
| Measurement method | Rotary encoder | Rotary encoder | Analog head | Linear encoder | Linear encoder | |
| Quick-release mechanism | - | - | - | X and Y axes | X and Y axes | |
| XY stage table top size (mm) | 152 x 152 | 152 x 152 | 152 x 152 | 250 x 250 | 250 x 250 | |
| XY stage effective area (mm) | 82 x 82 | 82 x 82 | 82 x 82 | 142 x 142 | 142 x 142 | |
| Stage glass No. | 380405 | 380405 | 380405 | 12BAE041 | 12BAE041 | |
| Swiveling function | - | - | - | - | - | |
| Max stage loading | 10 kg | 10 kg | 10 kg | 10 kg | 10 kg | |
| Remarks | - | w/o angle counter | w/o digital counter | - | w/o angle counter | |
| Mass (kg) | 107 | 107 | 106 | 112 | 112 | |

| Metric | | XY stage 150 x 50 or 200 x 100 mm or fixed | | | | |
|------------------------------|-------------------|--|-------------------|----------------|-------------------|--|
| Model No. | PJ-A3000 | PJ-A3005F-150 | PJ-A3005F-150E | PJ-A3010F-200 | PJ-A3010F-200E | |
| | 302-700D* | 302-702D | 302-706D* | 302-701D | 302-705D* | |
| XY stage travel range (mm) | Fixed | 150 x 50 | 150 x 50 | 200 x 100 | 200 x 100 | |
| Measurement method | - | Linear encoder | Linear encoder | Linear encoder | Linear encoder | |
| Quick-release mechanism | - | X and Y axes | X and Y axes | X and Y axes | X and Y axes | |
| XY stage table top size (mm) | 160 x 145 | 280 x 152 | 280 x 152 | 380 x 250 | 380 x 250 | |
| XY stage effective area (mm) | ø70 | 185 x 84 | 185 x 84 | 266 x 170 | 266 x 170 | |
| Stage glass No. | 200673 | 381349 | 381349 | 382762 | 382762 | |
| Swiveling function | - | - | - | ±3° | ±3° | |
| Max stage loading | 15 kg | 8 kg | 8 kg | 8 kg | 8 kg | |
| Remarks | w/o angle counter | - | w/o angle counter | - | w/o angle counter | |
| Mass (kg) | 109 | 116 | 116 | 140 | 116 | |



- A = 593 mm : 302-701/302-705/302-711
- A = 427 mm : 302-703/302-707/302-713
- A = 455 mm : 302-704/302-708/302-714/302-718
- A = 378 mm : 302-709/302-719
- A = 446 mm : 302-702/302-706/302-712

Standard accessories

| No. | Description |
|---------|--------------------------|
| 172-202 | Projection lens 10X |
| 383876 | Protective hood |
| 512305 | Halogen bulb (24V, 150W) |

Optional accessories

| No. | Description |
|-----------|---|
| 176-105 | Swivel centre support |
| 172-197 | Swivel centre support |
| 176-106 | Rotary table 66 mm |
| 172-198 | Rotary table 100 mm with fine adjustment |
| 172-196 | Rotary table 100 mm |
| 172-378 | V-block with clamp (Max. workpiece ø25 mm) |
| 12AAE671 | Detector mounting plate for ø250 to ø350 mm |
| 176-107 | Holder with clamp |
| 172-116 | Standard scale 50 mm |
| 172-118 | Reading scale 200 mm |
| 172-160-2 | Green filter |
| 172-160-3 | Green filter |
| 172-161 | Reading scale 300 mm |
| 172-203 | Projection lens 20X |
| 172-204 | Projection lens 50X |
| 172-207 | Projection lens 100X |
| 172-229 | Oblique illumination mirror 10X Projection lens |
| 172-230 | Oblique illumination mirror 20X Projection lens |
| 172-269 | Machine stand |
| 264-145D | Tabletop type QM-Data 200 |
| 264-146D | Built-on type QM-Data 200 |
| 332-151 | Optoeye-200 |
| 512305 | Halogen bulb (24V, 150W) |
| 999678D | Fixture mount adapter |

176-106 : for stage 50 x 50 and 150 x 50 mm

172-196 and 172-198 : for stage 100 x 100 and 200 x 100 mm

| METRIC - (INCH/METRIC) | | |
|------------------------|-----------------------|----|
| 302-700D - (302-714E) | 302-701D - (302-711E) | |
| 302-704D - (302-718E) | 302-702D - (302-712E) | |
| 302-708D - (302-716E) | 302-703D - (302-713E) | |
| 302-709D | 302-705D | |
| | 302-706D | |
| | 302-707D | |
| 176-106 | X | - |
| 172-196 | - | X* |
| 172-198 | - | X* |
| 176-105 | X | X* |
| 172-197 | - | X* |
| 176-107 | X | X* |
| 172-378 | X | X* |

* Fixture mount adapter (999678) is required for 302-701D, 302-705D

PJ-A3000 Measuring Projector

Series 302 - Inch/Metric model

Optional accessories

| No. | Description |
|-----------|---|
| 176-105 | Swivel centre support |
| 172-197 | Swivel centre support |
| 176-106 | Rotary table 66 mm |
| 172-198 | Rotary table 100 mm with fine adjustment |
| 172-196 | Rotary table 100 mm |
| 172-378 | V-block with clamp (Max. workpiece ø25 mm) |
| 176-107 | Holder with clamp |
| 172-116 | Standard scale 50 mm |
| 172-118 | Reading scale 200 mm |
| 172-160-2 | Green filter |
| 172-160-3 | Green filter |
| 172-161 | Reading scale 300 mm |
| 172-203 | Projection lens 20X |
| 172-204 | Projection lens 50X |
| 172-207 | Projection lens 100X |
| 172-229 | Oblique illumination mirror 10X Projection lens |
| 172-230 | Oblique illumination mirror 20X Projection lens |
| 172-269 | Machine stand |
| 999678D | Fixture mount adapter |

176-106 : for stage 50 x 50 and 150 x 50 mm
 172-196 and 172-198 : for stage 100 x 100 and 200 x 100 mm
 999678D : for stage 200 x 100 mm

Optional accessories for Inch

| No. | Description |
|----------|-----------------------------------|
| 172-117 | Standard scale (2") |
| 172-119 | Reading scale (8") |
| 172-162 | Reading scale (12") |
| 264-145E | Tabletop type QM-Data 200 UK only |
| 264-146E | Built-on type QM-Data 200 UK only |



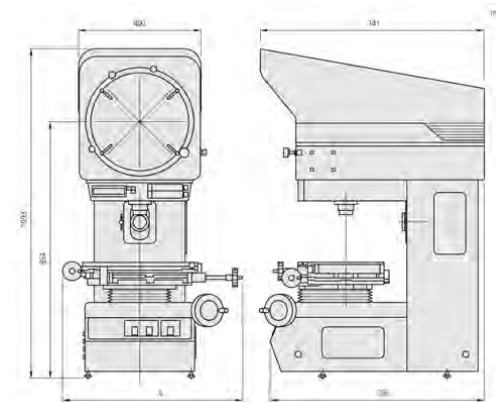
Optoeye-200

Metric/Inch UK only

| Model | PJ-A3005D-50 | PJ-A3005D-50E | PJ-A3005R-50 | PJ-A3010F-100 | PJ-A3005F-150 | PJ-A3010F-200 |
|------------------------------|----------------|-------------------|---------------------|----------------|----------------|----------------|
| No. | 302-714E* | 302-718E* | 302-719E* | 302-713E | 302-712E* | 302-711E |
| XY stage travel range (mm) | 50 x 50 | 50 x 50 | 50 x 50 | 100 x 100 | 150 x 50 | 200 x 100 |
| Measurement method | Rotary encoder | Rotary encoder | Analog head | Linear encoder | Linear encoder | Linear encoder |
| Quick-release mechanism | - | - | - | X and Y axes | X and Y axes | X and Y axes |
| XY stage table top size (mm) | 152 x 152 | 152 x 152 | 152 x 152 | 250 x 250 | 280 x 152 | 380 x 250 |
| XY stage effective area (mm) | 82 x 82 | 82 x 82 | 82 x 82 | 142 x 142 | 185 x 84 | 266 x 170 |
| Stage glass No. | 380405 | 380405 | 380405 | 12BAE041 | 381349 | 382762 |
| Swiveling function | - | - | - | - | - | ±3° |
| Max stage loading | 10 kg | 10 kg | 10 kg | 10 kg | 8 kg | 15 kg |
| Remarks | - | w/o angle counter | w/o digital counter | - | - | - |
| Mass (kg) | 107 | 107 | 106 | 112 | 116 | 140 |

Metric/Inch Europe except UK

| Model | PJ-A3005D-50 | PJ-A3005D-50E | PJ-A3005R-50 | PJ-A3010F-100 | PJ-A3005F-150 | PJ-A3010F-200 |
|------------------------------|----------------|-------------------|---------------------|----------------|----------------|----------------|
| No. | 302-714D* | 302-718D* | 302-719D* | 302-713D* | 302-712D* | 302-711D* |
| XY stage travel range (mm) | 50 x 50 | 50 x 50 | 50 x 50 | 100 x 100 | 150 x 50 | 200 x 100 |
| Measurement method | Rotary encoder | Rotary encoder | Analog head | Linear encoder | Linear encoder | Linear encoder |
| Quick-release mechanism | - | - | - | X and Y axes | X and Y axes | X and Y axes |
| XY stage table top size (mm) | 152 x 152 | 152 x 152 | 152 x 152 | 250 x 250 | 280 x 152 | 380 x 250 |
| XY stage effective area (mm) | 82 x 82 | 82 x 82 | 82 x 82 | 142 x 142 | 185 x 84 | 266 x 170 |
| Stage glass No. | 380405 | 380405 | 380405 | 12BAE041 | 381349 | 382762 |
| Swiveling function | - | - | - | - | - | ±3° |
| Max stage loading | 10 kg | 10 kg | 10 kg | 10 kg | 8 kg | 15 kg |
| Remarks | - | w/o angle counter | w/o digital counter | - | - | - |
| Mass (kg) | 107 | 107 | 106 | 112 | 116 | 140 |



A = 593 mm : 302-701/302-705/302-711 - A = 427 mm : 302-703/302-707/302-713
 A = 455 mm : 302-704/302-708/302-714/302-718 - A = 378 mm : 302-709/302-719
 A = 446 mm : 302-702/302-706/302-712



PJ-H30 Measuring Projector

Series 303

- Incident illumination with variable incident light adjustment.
- By rotating the condenser lens and changing the angle of the half-silvered mirror in the objective, even poorly reflecting surfaces can be represented optimally.
- Improved light intensity of a projected subject thanks to the new optical contour illumination system.
- High measuring accuracy (above JIS standard).
- Measuring stage with rapid single-handed adjustment on both axes for smooth switching between quick positioning and fine adjustment.
- Constant current power supply unit with acceleration control to maximize the service life of the halogen lamp.
- Easily read digital counter with large digit display.
- Built-in precision edge detector (Optoeye) on models PJ-H30 B/D.
- RS-232C output.



303-735D



Vertical / oblique switchable surface illumination



Vertical illumination



Oblique illumination



505B



1010B



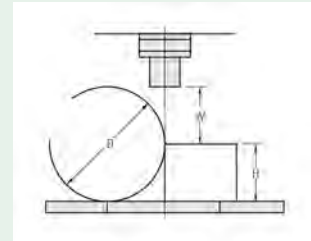
2010B



2017B

Specifications

| | |
|------------------------|---|
| Accuracy | (3+0,02L) μ m L : Max length measurement |
| Projected image | Erect |
| Projector screen | Effective diameter : 306 mm / 12" Screen material : Fine-ground glass Screen rotation : $\pm 360^\circ$, fine adjustment and clamp Angle display : Digital counter (LED) Resolution : 1' or 0.01° (switchable) Range : $\pm 370^\circ$ ABS/INC mode switching, Zero Set Reference lines : Cross-hairs |
| 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 |
| Contour illumination | Light source : Halogen bulb (24V, 150W) Optical system : Telecentric zoom Functions : Continuously variable brightness adjustment, Heat-absorbing filter, Cooling fan |
| Surface illumination | Light source : Halogen bulb (24V, 150W) Optical system : Vertical/Oblique illumination with an adjustable condenser lens Functions : Continuously variable brightness adjustment, Heat-absorbing filter, Cooling fan |
| Power supply | 220V AC, 50/60Hz |
| Resolution | 0,001 mm |



D : Max. workpiece diameter
W : Working distance
H : Max. workpiece height

| | Magnification | | | | |
|------------|---------------|-------------|-------------|-------------|-------------|
| | 5X | 10X | 20X | 50X | 100X |
| View field | $\phi 61.2$ | $\phi 30.6$ | $\phi 15.3$ | $\phi 6.12$ | $\phi 3.06$ |
| H | 105 | 105 | 105 | 105 | 105 |
| W | 66 | 70.5 | 56.5 | 50 | 50 |
| D | 148 | 197 | 137 | 114 | 114 |

Unit: mm



Profile Projector brochure on request

PJ-H30 Measuring Projector

Series 303

- For UK models change suffix from D to E (e.g. 303-711E).

Model 505B - 50 x 50 mm
 XY stage table size : 300 x 240 mm
 XY stage effective area : 180 x 150 mm
 Stage glass No. : 380412
 Swiveling function : $\pm 3^\circ$
 Max stage loading : 10 kgf
 Mass : 176 kg

| Model | PJ-H30E Fixed screen | PJ-H30A | PJ-H30B | PJ-H30D | PJ-H30C |
|---------------|----------------------|-----------|-----------|-------------|-------------|
| No. | 303-701D* | 303-711D* | 303-721D* | 303-731D* | 303-741D* |
| Edge detector | Optional | Optional | Included | Included | Optional |
| Focusing | Manual | Manual | Manual | Power focus | Power focus |

Model 1010B - 100 x 100 mm
 XY stage table size : 300 x 240 mm
 XY stage effective area : 180 x 150 mm
 Stage glass No. : 380412
 Swiveling function : $\pm 3^\circ$
 Max stage loading : 10 kgf
 Mass : 176 kg

| Model | PJ-H30E Fixed screen | PJ-H30A | PJ-H30B | PJ-H30D | PJ-H30C |
|---------------|----------------------|-----------|-----------|-------------|-------------|
| No. | 303-702D* | 303-712D* | 303-722D* | 303-732D* | 303-742D* |
| Edge detector | Optional | Optional | Included | Included | Optional |
| Focusing | Manual | Manual | Manual | Power focus | Power focus |

Model 2010B - 200 x 100 mm
 XY stage table size : 350 x 280 mm
 XY stage effective area : 250 x 150 mm
 Stage glass No. : 382762
 Swiveling function : $\pm 3^\circ$
 Max stage loading : 10 kgf
 Mass : 178 kg

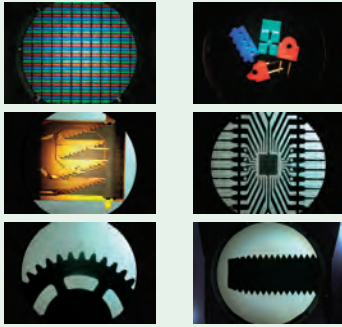
| Model | PJ-H30E Fixed screen | PJ-H30A | PJ-H30B | PJ-H30D | PJ-H30C |
|---------------|----------------------|----------|----------|-------------|-------------|
| No. | 303-703D | 303-713D | 303-723D | 303-733D | 303-743D* |
| Edge detector | Optional | Optional | Included | Included | Optional |
| Focusing | Manual | Manual | Manual | Power focus | Power focus |

Model 2017B - 200 x 170 mm
 XY stage table size : 410 x 342 mm
 XY stage effective area : 270 x 240 mm
 Stage glass No. : 12BAD363
 Swiveling function : $\pm 5^\circ$
 Max stage loading : 20 kgf
 Mass : 205 kg

| Model | PJ-H30E Fixed screen | PJ-H30A | PJ-H30B | PJ-H30D | PJ-H30C |
|---------------|----------------------|-----------|-----------|-------------|-------------|
| No. | 303-704D* | 303-714D* | 303-724D* | 303-734D* | 303-744D* |
| Edge detector | Optional | Optional | Included | Included | Optional |
| Focusing | Manual | Manual | Manual | Power focus | Power focus |

Model 3017B - 300 x 170 mm
 XY stage table size : 510 x 342 mm
 XY stage effective area : 370 x 240 mm
 Stage glass No. : 12BAD330
 Swiveling function : $\pm 5^\circ$
 Max stage loading : 20 kgf
 Mass : 212 kg

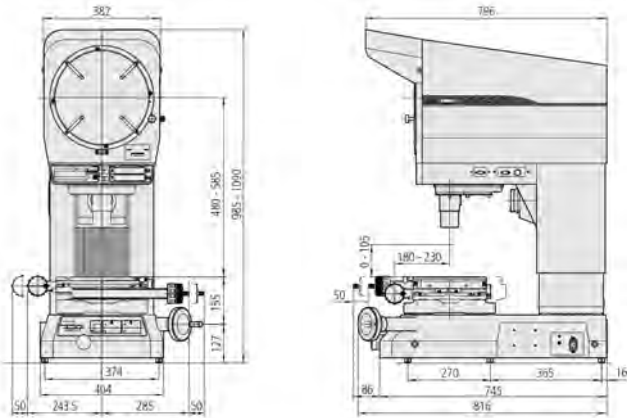
| Model | PJ-H30E Fixed screen | PJ-H30A | PJ-H30B | PJ-H30D | PJ-H30C |
|---------------|----------------------|----------|----------|-------------|-------------|
| No. | 303-705D* | 303-715D | 303-725D | 303-735D* | 303-745D* |
| Edge detector | Optional | Optional | Included | Included | Optional |
| Focusing | Manual | Manual | Manual | Power focus | Power focus |



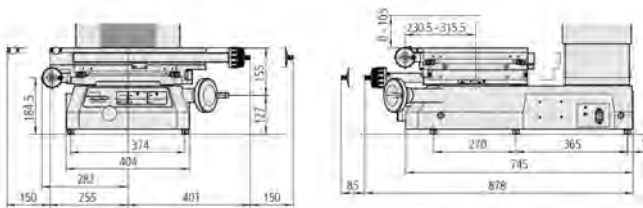
Profile projector brochure on request

PJ-H30 Measuring Projector

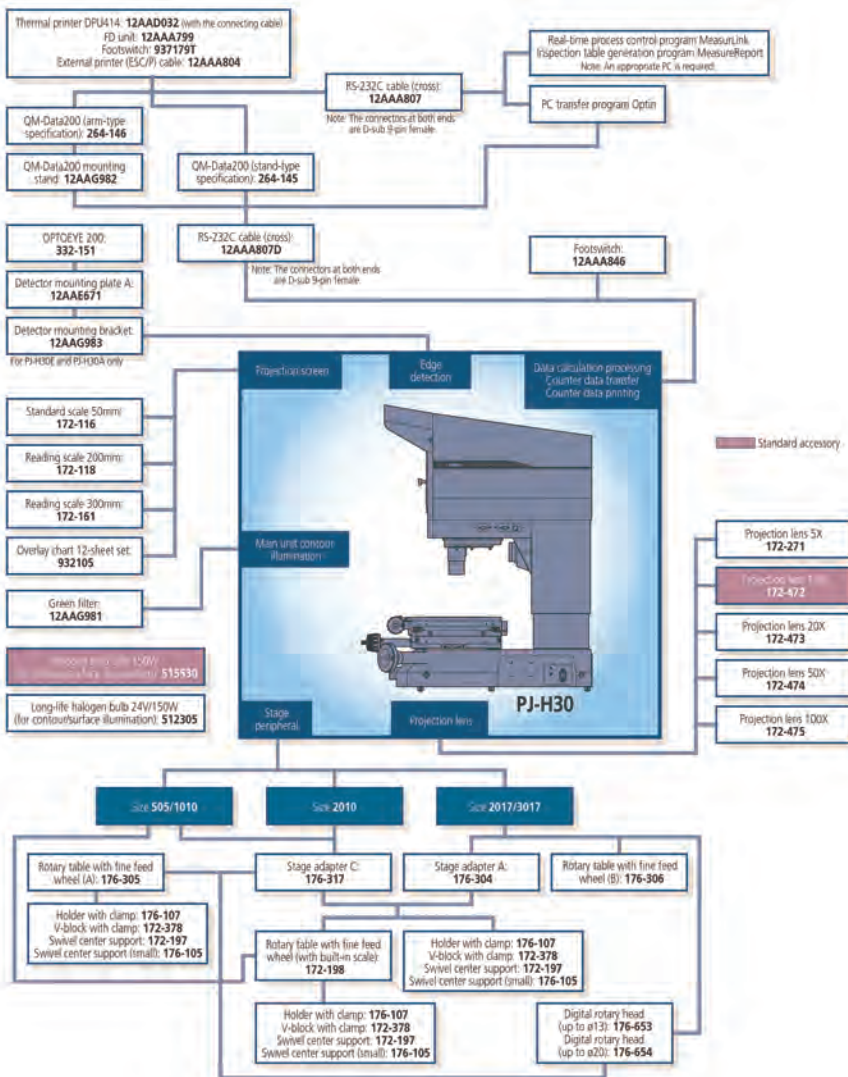
Series 303



1010B model



3017B model



Standard accessories

| No. | Description |
|---------|--------------------------|
| 172-472 | Lens 10X |
| 383876 | Protective hood |
| 512305 | Halogen bulb (24V, 150W) |

Optional accessories

| No. | Description |
|-----------|---|
| 011534 | Cleaner for optics |
| 176-105 | Swivel centre support |
| 172-197 | Swivel centre support |
| 172-198 | Rotary table 100 mm with fine adjustment |
| 176-305 | Rotary table with fine feed wheel ø183 mm |
| 176-306 | Rotary table with fine feed wheel ø240 mm |
| 172-378 | V-block with clamp (Max. workpiece ø25 mm) |
| 12AAE671 | Detector mounting plate for ø250 to ø350 mm |
| 12AAG981 | Green filter |
| 12AAG982 | Mounting stand for QM-Data 200 |
| 12AAG983 | Detector mounting bracket for PJ-H30A/PJ-H30E |
| 172-116 | Standard scale 50 mm |
| 172-118 | Reading scale 200 mm |
| 172-161 | Reading scale 300 mm |
| 172-269 | Machine stand |
| 172-271 | Projection lens 5X |
| 172-473 | Projection lens 20X |
| 172-474 | Projection lens 50X |
| 172-475 | Projection lens 100X |
| 264-145D | Tabletop type QM-Data 200 |
| 264-146D | Built-on type QM-Data 200 |
| 332-151 | Optoeye 200 |
| 12AAA807D | Cable RS-232C D-SUB 9/D-SUB 9 (2m) |

Optional accessories for Inch

| No. | Description |
|----------|-----------------------------------|
| 172-117 | Standard scale (2") |
| 172-119 | Reading scale (8") |
| 172-162 | Reading scale (12") |
| 264-145E | Tabletop type QM-Data 200 UK only |
| 264-146E | Built-on type QM-Data 200 UK only |



264-145D

| Availability | Size of XY stage | | |
|--------------|------------------|---------------------|--------------|
| | 505 1010 | 505 1010 2010 | 2017 3017 |
| 172-198 | X | X** | X*** |
| 176-305 | — | X** | — |
| 176-306 | — | — | X |
| 176-105 | X* | X** | X*** |
| 172-197 | X* | X** | X*** |
| 176-107 | X* | X** | X*** |
| 172-378 | X* | X** | X*** |

* : Need to use with Rotary table (172-198)

** : Fixture mount adapter (176-317) is required

*** : Fixture mount adapter (176-304) is required

PV-5110 Measuring Projector

Series 304

- This measuring projector is a robust stand-alone device.
- The large rotatable screen guarantees good observation and easy measuring.

Specifications

| | |
|------------------------|---|
| Projected image | Inverted |
| Projector screen | Effective diameter : 508 mm/20" Screen material : Fine-ground glass Screen rotation : $\pm 360^\circ$, fine adjustment and clamp Angle reading : Digital counter (LED) Resolution : 1' or 0.01° (switchable) Range : $\pm 370^\circ$ ABS/INC mode switching, Zero Set Reference lines : Cross-hairs |
| Projection lens | 10X (172-402) Optional : 5X, 20X, 50X, 100X |
| Magnification accuracy | Contour illumination : $\pm 0.1\%$ or better Surface illumination : $\pm 0.15\%$ or better |
| 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 |
| Focusing | Manual |
| Resolution | 0,001 mm or 0,001 mm/0.0001" |
| Power supply | 220 - 240V AC, 50/60Hz |
| Mass | 210 kg |



304-909D
Counter is optional



XY stage



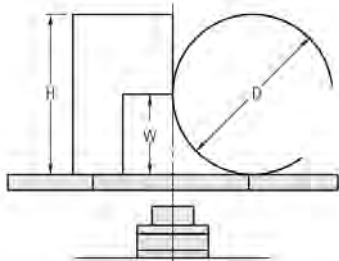
KA Counter



QM-Data 200



332-151



D : Max. workpiece diameter
W : Working distance
H : Max. workpiece height

| | Magnification | | | | |
|------------|---------------|-------------|-------------|--------------|-------------|
| | 5X | 10X | 20X | 50X | 100X |
| View field | $\phi 101.6$ | $\phi 50.8$ | $\phi 25.4$ | $\phi 10.16$ | $\phi 5.08$ |
| H | 125 | 181 | 206 | 87 | 87 |
| W | 60 (27) | 60 | 60 | 32.4 | 22.5 |
| D | 120 | 120 | 120 | 64.8 | 45 |

() When using surface illumination



Profile Projector brochure on request

PH-A14 Measuring Projector

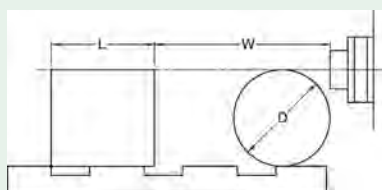
Series 172

Measuring Projector PH-A14

- Horizontal-beam illumination makes the PH-A14 suitable for measuring the larger and heavier workpiece, such as toothed racks, punching tools, etc.
- Generous 203 x 102 mm stage travel and 45 kgf allowable stage loading ensures a wide range of application.

Specifications

| | |
|------------------------|--|
| Projected image | Inverted |
| Projector screen | Effective diameter : 356 mm/14" Screen material : Fine-ground glass Screen rotation : $\pm 360^\circ$, fine adjustment and clamp Angle reading : Vernier, graduation : 1' Resolution : 1' or 0.01° (switchable) Range : $\pm 370^\circ$ Reference lines : Cross-hairs |
| Projection lens | 10X (172-011) Optional : 20X, 50X, 100X |
| Magnification accuracy | Contour illumination : $\pm 0.1\%$ or better Surface illumination : $\pm 0.15\%$ or better |
| Contour illumination | Light source : Halogen bulb (24V, 150W) Optical system : Telecentric Functions : Heat-absorbing filter, Cooling fan |
| Surface illumination | Light source : Halogen bulb (24V, 150W) Optical system : Vertical illumination Functions : Adjustable condenser lens, Heat-absorbing filter, Cooling fan |
| Focusing | Manual |
| Resolution | 0,001 mm or 0,001 mm/0.0001" (using optional KA counter) |
| Power supply | 220 - 240V AC, 50/60Hz |
| Mass | 140 kg |



L : Max. workpiece width
W : Working distance
D : Max. workpiece diameter

| PH-A14 | Magnification | | | |
|------------|---------------|------|------|------|
| | 10X | 20X | 50X | 100X |
| View field | 35.6 | 17.3 | 7.12 | 3.56 |
| L | 235 | 235 | 80 | 109 |
| W | 93 | 40 | 14.6 | 9.5 |
| D | 130 | 116 | 30.4 | 19 |



172-810-10D
With optional evaluation unit QM-Data 200



KA Counter



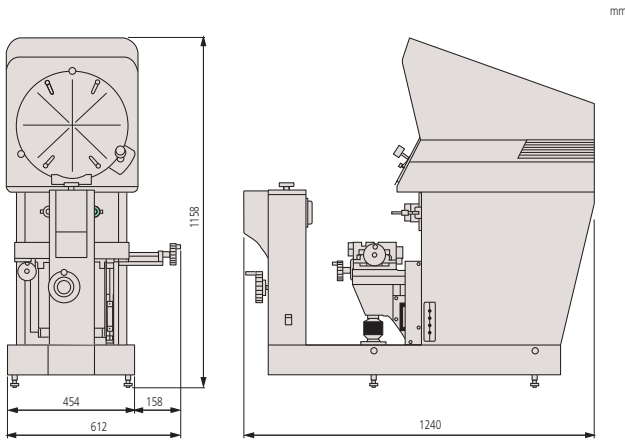
QM-Data200



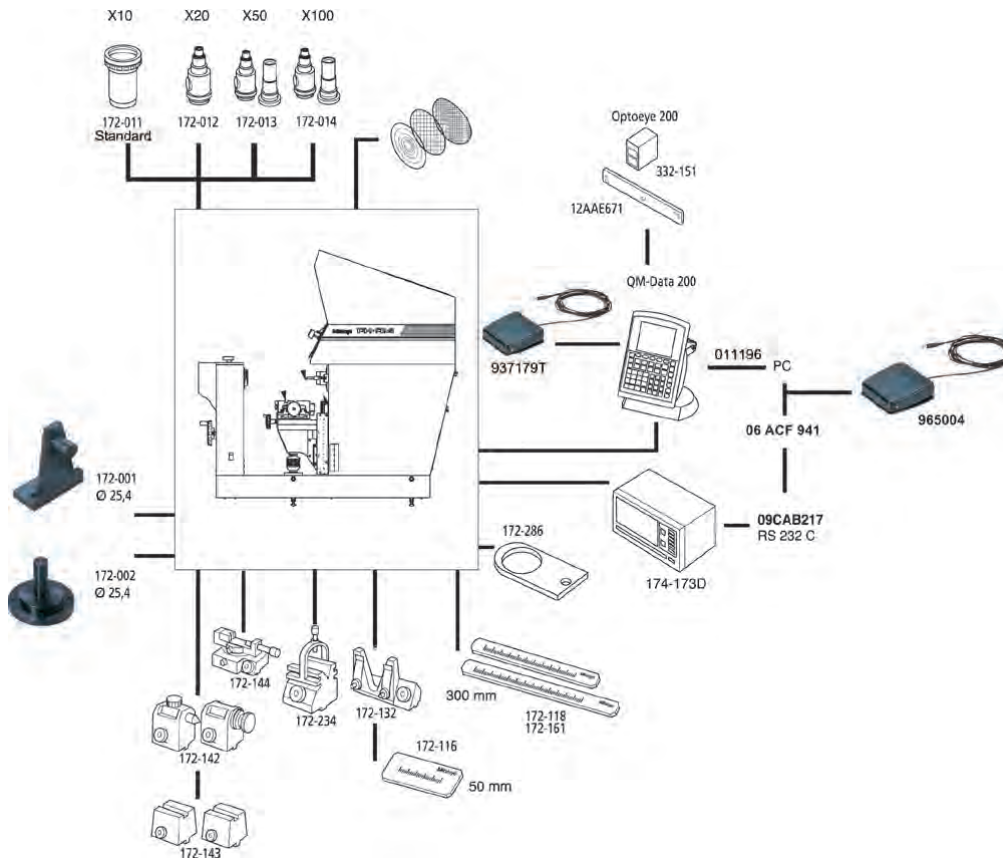
332-151

PH-A14 Measuring Projector

Series 172 - Accessories/Dimensions



| | |
|------------------------------|----------------------------|
| Model | PH-A14 |
| No. | 172-810-10D 172-810-10E |
| Remarks | 172-810-10E UK only |
| XY stage travel range (mm) | 203 x 102 |
| Measurement method | Linear encoder |
| XY stage table top size (mm) | 407 x 153 |
| Max stage loading | 45 kg |



Standard accessories

| No. | Description |
|---------|---------------------------------------|
| 172-011 | Lens 10X for Profile Projector PH-A14 |
| 512305 | Halogen bulb (24V, 150W) |

Optional accessories

| No. | Description |
|----------|---|
| 172-132 | Vertical holder |
| 011534 | Cleaner for optics |
| 172-142 | Centre support |
| 172-143 | Centre support riser |
| 174-173D | KA-Counter 2 Axis |
| 172-144 | Rotary vice (Max. workpiece ø60 mm) |
| 172-234 | V-block with clamp (Max. workpiece ø50 mm) |
| 12AAE671 | Detector mounting plate for ø250 to ø350 mm |
| 172-001 | Support for straight gear |
| 172-002 | Support for flat gear |
| 172-012 | Lens 20X for Profile Projector PH-A14 |
| 172-013 | Lens 50X for Profile Projector PH-A14 |
| 172-014 | Lens 100X for Profile Projector PH-A14 |
| 172-116 | Standard scale 50 mm |
| 172-118 | Reading scale 200 mm |
| 172-161 | Reading scale 300 mm |
| 172-286 | Green filter |
| 264-146D | Built-on type QM-Data 200 |
| 332-151 | Optoeye-200 |
| 58AAA407 | Tray for KA counter |

Optional accessories for Inch

| No. | Description |
|----------|-----------------------------------|
| 174-173E | KA-Counter 2 axis UK only |
| 172-117 | Standard scale (2") |
| 172-119 | Reading scale (8") |
| 172-162 | Reading scale (12") |
| 264-146E | Built-on type QM-Data 200 UK only |

PH-3515F Measuring Projector

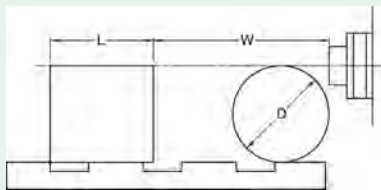
Series 172

Measuring Projector PH-3515F

- Horizontal-beam illumination makes the PH-3515F suitable for measuring the larger and heavier workpiece, such as toothed racks, punching tools, etc.
- Generous 254 x 152 mm stage travel and 45 kgf allowable stage loading ensures a wide range of application.

Specifications

| | |
|------------------------|--|
| Projected image | Inverted |
| Projector screen | Effective diameter : 356 mm/14" Screen material : Fine-ground glass Screen rotation : $\pm 360^\circ$, fine feed and clamp Angle display : Digital counter (LED) Resolution : $1'$ or 0.01° (switchable) Range : $\pm 370^\circ$ ABS/INC mode switching, Zero Set Reference lines : Cross-hairs |
| Projection lens | 10X (172-184) Optional : 5X, 20X, 50X, 100X |
| Magnification accuracy | Contour illumination : $\pm 0.1\%$ or better Surface illumination : $\pm 0.15\%$ or better |
| Contour illumination | Light source : Halogen bulb (24V, 150W) Optical system : Telecentric system Functions : 2-step (High/Low) brightness adjustment, Heat-absorbing filter, Cooling fan |
| Surface illumination | Light source : Halogen bulb (24V, 150W) Optical system : Vertical illumination Functions : Adjustable condenser lens, 2-step (High/Low) brightness adjustment, Heat-absorbing filter, Cooling fan |
| Focusing | Manual |
| Resolution | 0,001 mm or 0,001 mm/0.0001" |
| Power supply | 220 - 240V AC, 50/60Hz |
| Mass | 150 kg |



L : Max. workpiece width
W : Working distance
D : Max. workpiece diameter

| PH-3515F | Magnification | | | | |
|------------|---------------|---------|-------|------|------|
| | 5X | 10X | 20X | 50X | 100X |
| View field | 70.6 | 35.3 | 17.65 | 7.06 | 3.5 |
| L | 175 | 235 | 235 | 80 | 109 |
| W | 160 (64) | 93 (35) | 40 | 14.6 | 9.5 |
| D | 152.4 | 152.4 | 116 | 30.4 | 19 |

() When using surface illumination

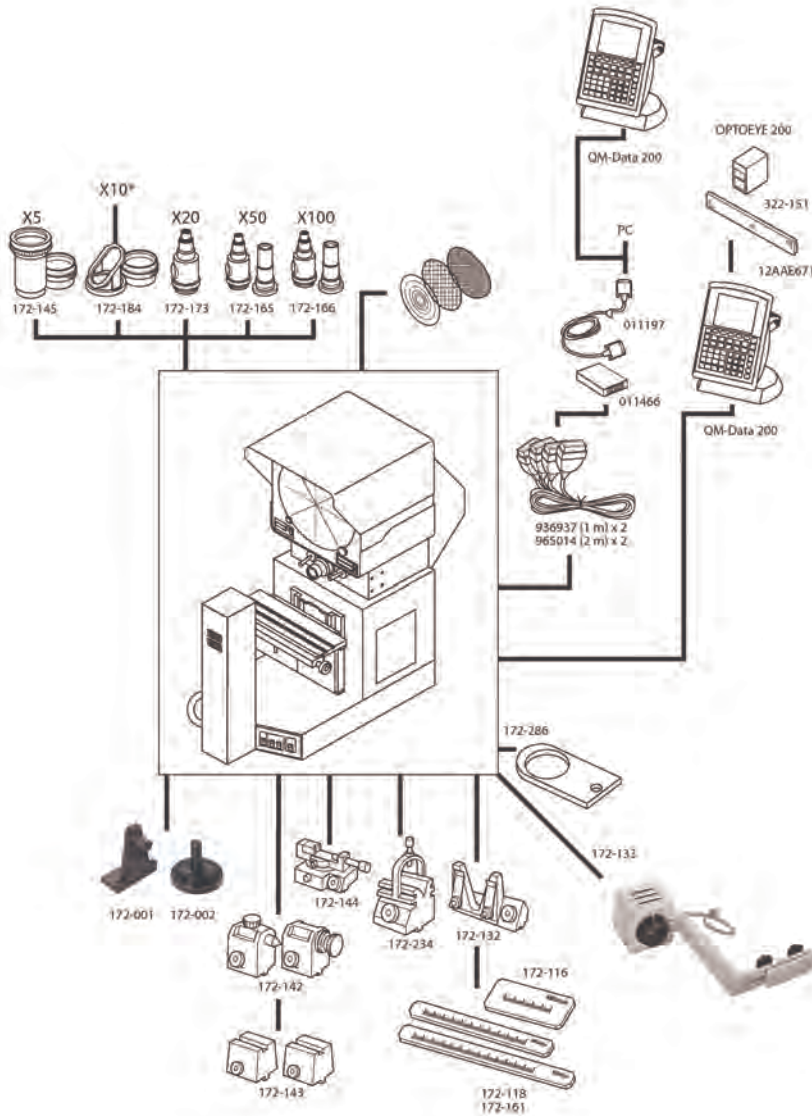
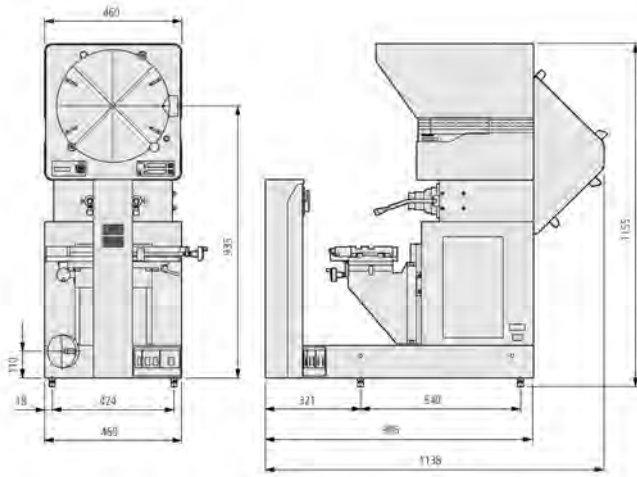


172-858D

| Model | PH-3515F |
|------------------------------|----------------------|
| No. | 172-858D 172-858E |
| Remarks | 172-858E UK only |
| XY stage travel range (mm) | 254 x 152 |
| Measurement method | Linear encoder |
| Quick-release mechanism | X axis |
| XY stage table top size (mm) | 450 x 146 |
| Swiveling function | $\pm 10^\circ$ |
| Max stage loading | 45 kg |

PH-3515F Measuring Projector

Series 172 - Accessories/Dimensions



Standard accessories

| No. | Description |
|----------|--------------------------|
| 12BAA637 | Halogen bulb (24V, 200W) |
| 172-184 | Projection lens 10X |
| 383228 | Protective hood |
| 512305 | Halogen bulb (24V, 150W) |

Optional accessories

| No. | Description |
|----------|---|
| 172-132 | Vertical holder |
| 011534 | Cleaner for optics |
| 172-142 | Centre support |
| 172-143 | Centre support riser |
| 172-144 | Rotary vice (Max. workpiece $\phi 60$ mm) |
| 174-173D | KA-Counter 2 Axis |
| 172-234 | V-block with clamp (Max. workpiece $\phi 50$ mm) |
| 12AAE671 | Detector mounting plate for $\phi 250$ to $\phi 350$ mm |
| 12AAF182 | Digital counter stand |
| 172-116 | Standard scale 50 mm |
| 172-118 | Reading scale 200 mm |
| 172-133 | Vertical surface illumination unit |
| 172-145 | Projection lens 5X with condenser |
| 172-161 | Reading scale 300 mm |
| 172-165 | Projection lens 50X with condenser |
| 172-166 | Projection lens 100X with condenser |
| 172-173 | Projection lens 20X with condenser |
| 172-286 | Green filter |
| 264-146D | Built-on type QM-Data 200 |
| 332-151 | Optoeye-200 |
| 932105 | Overlay chart set (12 sheets) (No. 512066 to 512077) |

Optional accessories for Inch

| No. | Description |
|----------|-----------------------------------|
| 174-173E | KA-Counter 2 axis UK only |
| 172-117 | Standard scale (2") |
| 172-119 | Reading scale (8") |
| 172-162 | Reading scale (12") |
| 264-146E | Built-on type QM-Data 200 UK only |



KA Counter

QM-Data 200

Data Processing Unit QM-Data 200

Series 264

- The Data Processing Unit QM 200 has been especially designed to process measurement data generated by a profile projector or measuring microscope.
- Measuring instructions, measuring values and calculation results for various operations shown on the back-lit LCD are easy to grasp and comprehend.
- Measuring results can also be printed, either by a small and convenient thermal printer (available as special option) or on a ESC/P printer and continuous paper.
- By connecting an optional floppy disk drive newly created part programs, measurement results as well as calculation results may be stored and/or loaded.

Specifications

| | |
|---------------------------------|---|
| Resolution | 0.001/0.0001 mm |
| Screen | Graphic-LCD (320 x 240 dot ; with background lighting) |
| Program functions | Part program creation, execution, editing |
| Statistical processing | Number of data, maximum value, minimum value, mean value, standard deviation, range, histogram |
| Measuring of Geometric Elements | Maximum of 1000 elements, point, line, circle, distance, ellipse, rectangular hole, slotted hole, intersection and intersecting angle and point & angle, plus a number of functions for evaluation, e.g. perpendicularity and parallelism are provided. |
| Display system | Monographic LCD (320 x 240 dots, with LED back light) |
| Measurement result file output | CSV format; MUX-10F format |
| Display language | Japanese/English/German/French/Italian/Spanish/Portuguese/Czech/Slovak/Chinese/Korean |
| Data input | RS-232C, X/Y/Z-axis signal, Footswitch |
| Data output | RS-232C, Printer, Floppy disk drive unit, USB |
| Power supply | 100/240V AC, 50/60 Hz |
| Dimensions | 260 x 242 x 310 mm : Stand-mount type 318 x 153 x 275 mm : Arm-mount type |

Functions

Mitutoyo's AI Function :

The AI function (AI=Artificial Intelligence) renders choosing the element type before measuring obsolete. Point measurements are analysed by the QM-Data and the results for basic elements calculated, thus accelerating the measuring procedure.

Customized Operation :

Macro functions and the creation of part programs speed up single and repetition measurements. Additionally macro commands and part programs as well as frequently used standard operations can be stored as user menus.

Optional accessories

| No. | Description |
|-----------|---|
| 908353-1 | Printer paper for thermal printer |
| 011119 | RS-232C serial cable D-SUB 9/D-SUB 25 |
| 12AAD033 | Thermal printer (with connection cable) |
| 12AAH035 | USB floppy disk drive unit |
| 12AAA807D | Cable RS-232C D-SUB 9/D-SUB 9 (2m) |
| 937179T | Footswitch |
| I-1525612 | Cable for printer (2 m) |



Stand-mount type

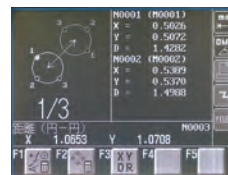


Arm-mount type

| No. | Description | Mass kg |
|-----------|-----------------------------|---------|
| 264-145D | Stand-mount type | 2.9 |
| 264-145E* | Stand-mount type UK only | 2.9 |
| 264-146D | Arm-mount type | 2.8 |
| 264-146E | Arm-mount type UK only | 2.8 |
| 264-149D* | For Hyper MF / MF-U | 2.9 |
| 264-149E* | For Hyper MF / MF-U UK only | 2.9 |



Intuitive panel design



Graphic display

OPTOEYE Edge Sensor

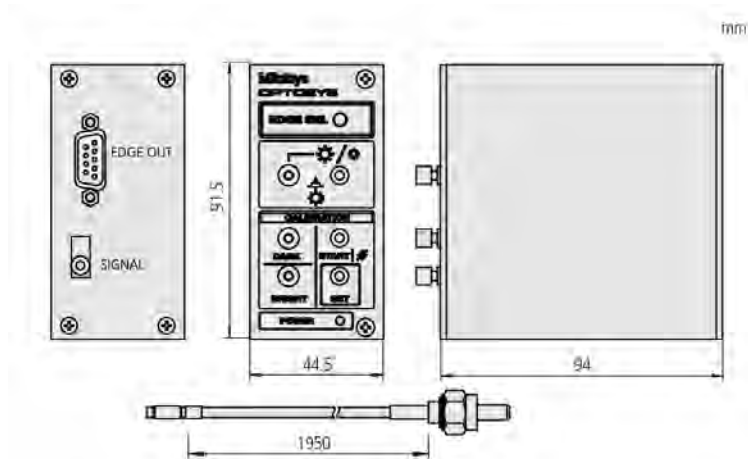
Series 332

- Optoeye 200 reduces the effect of operator skill level on accuracy by automatically detecting edges used in measurement.
- PJ-H30 : The Optoeye edge detector can be used on models PJ-H30A, PJ-H30C and PJ-H30E (requires adapter plate 12AAG983). An edge detector is built into the PJ-H30B/D models.
- PV-5110, PJ-3515F and PJ-A14 : The Optoeye edge detector can be used in conjunction with the QM-Data 200.
- PJ-A3000 : The Optoeye edge detector can be used on models 302-701/302-702/302-703/302-705/302-706/302-707/302-711/302-712/302-713 in conjunction with the QM-Data 200.
- When using the Optoeye all projector scales must be connected to QM-Data 200 directly and built-in counters cannot be used any more (except PJ-H30B and D type)



332-151

| No. | Repeatability |
|---------|--|
| 332-151 | 1 μ m in contour illumination mode |



Specifications

| | |
|-------------------------|--|
| Image detection | Directivity : Direction selection not required |
| Min. diameter | 2 mm on the screen |
| Min. width | 1 mm on the screen |
| Max. moving speed | 1000 mm/s On the table : 4,5 mm/s (10 x objective), On the table : 5,5 mm/s (20 x, 50 x, 100 x objective) |
| Applicable illumination | Type : Surface/Contour illumination Range : 30 to 2000 Lux on the screen Bright-Dark field difference : 20 Lux |
| Function | Automatic detection of feature edges for use in measurement |

Optional accessories

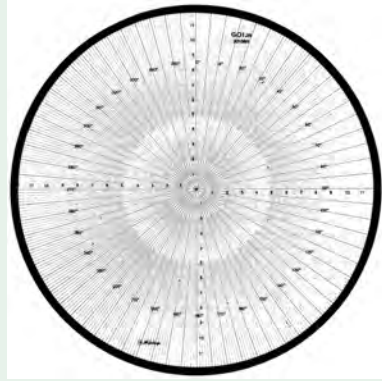
| No. | Description |
|----------|---|
| 12AAE671 | Detector mounting plate for ϕ 250 to ϕ 350 mm |
| 12AAE672 | Detector mounting plate for ϕ 500 to ϕ 600 mm |



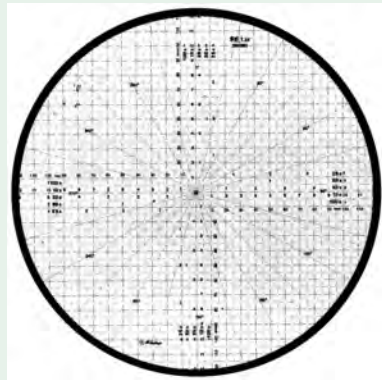
Overlay Chart Set

Specifications

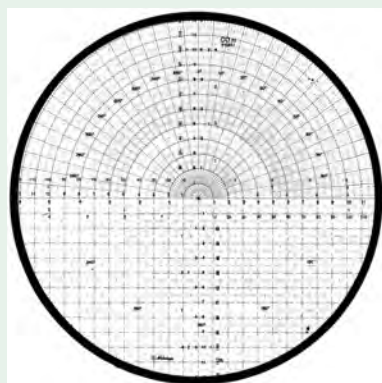
| | |
|----------------|--------------------------|
| Grid divisions | 10X : 0,1 mm / 0.005" |
| | 20X : 0,05 mm / 0.0025" |
| | 50X : 0,02 mm / 0.001" |
| | 100X : 0,01 mm / 0.0005" |



Radius/protractor chart



Grid/protractor chart



Combination chart

Group 1

For profile projectors

- These standard overlay charts increase the range of application and the efficiency of Mitutoyo profile projectors.
- The charts are supplied in the sizes $\varnothing 250, 300, 340, 500$ and 600 mm to suit the screens of Mitutoyo projectors. A large range of scales and profiles is provided that enables workpiece features to be tested quickly and easily. Length, height, parallelism, angle, radius, taper, bore position, diameter, as well as all standardized thread and tooth profiles can be tested.
- All charts are made of a distortion-free special plastics compound and are provided with a protective coating.

Radius/protractor chart

Angle : Divisions at 1° and $30'$ intervals at $7''$ diameter increasing to $15'$ intervals at $11''$ diameter.

Features : Ideal for checking diameters, concentricity of diameters, radii, angles and cams

| No. | Diameter |
|----------|----------|
| 201383* | 250 mm |
| 201387 | 300 mm |
| 201393 | 340 mm |
| 512622 | 500 mm |
| 511844 | 600 mm |
| 999281UK | 10" |
| 999282UK | 12" |
| 999283UK | 14" |
| 999284UK | 20" |
| 999285UK | 24" |

Grid/protractor chart

Angle : 15° increments

Features : Ideal for checking diameters, concentricity of diameters, radii, angles and cams.

| No. | Diameter |
|----------|----------|
| 201380 | 250 mm |
| 201386* | 300 mm |
| 201392 | 340 mm |
| 512621* | 500 mm |
| 511843* | 600 mm |
| 999286UK | 10" |
| 999287UK | 12" |
| 999288UK | 14" |
| 999289UK | 20" |
| 999290UK | 24" |

Combination chart

Angle : Divisions at 10° and $30'$ intervals at $7''$ diameter increasing to $15'$ intervals at $11''$ diameter.

Features : All purpose chart for checking diameters, angles, radii and linear divisions

| No. | Diameter |
|----------|----------|
| 512651* | 250 mm |
| 512652 | 300 mm |
| 512653* | 340 mm |
| 512654 | 500 mm |
| 512655* | 600 mm |
| 999291UK | 10" |
| 999292UK | 12" |
| 999293UK | 14" |
| 999294UK | 20" |
| 999295UK | 24" |

Overlay Chart Set

Group 1

Concentric

Features : Dedicated chart especially designed for checking radii, diameters and concentricity with exceptional clarity.

| No. | Diameter |
|--------|----------|
| 201382 | 250 mm |

Radius chart

Features : Dedicated chart especially designed for checking radii, diameters and concentricity with exceptional clarity.

| No. | Diameter |
|----------|----------|
| 201388 | 300 mm |
| 201394 | 340 mm |
| 512623 | 500 mm |
| 511845* | 600 mm |
| 999296UK | 10" |
| 999297UK | 12" |
| 999298UK | 14" |
| 999299UK | 20" |
| 999300UK | 24" |

Protractor chart

Angle : Divisions at 1° and 30' intervals at 7" diameter increasing to 15' intervals at 11" diameter.

Features : Dedicated chart especially designed for checking angles with exceptional clarity. Suitable for use at any magnification.

| No. | Diameter |
|----------|----------|
| 201381* | 250 mm |
| 201389* | 300 mm |
| 201395 | 340 mm |
| 512624* | 500 mm |
| 511846* | 600 mm |
| 999399UK | 10" |
| 999400UK | 12" |
| 999401UK | 14" |
| 999402UK | 20" |
| 999403UK | 24" |

ISO Metric threads

| No. | Diameter |
|---------|----------|
| 201384* | 250 mm |
| 201390* | 300 mm |
| 201396 | 340 mm |
| 512625* | 500 mm |

Involute gear teeth

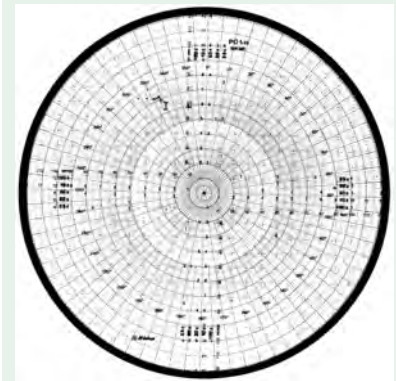
| No. | Diameter |
|---------|----------|
| 201385 | 250 mm |
| 201391* | 300 mm |
| 201397* | 340 mm |
| 512626 | 500 mm |

Specifications

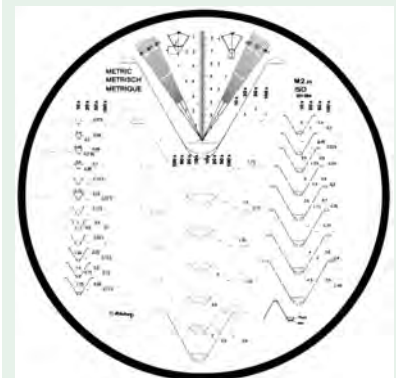
| | |
|----------------|--------------------------|
| Grid divisions | 10X : 0,1 mm / 0.005" |
| | 20X : 0,05 mm / 0.0025" |
| | 50X : 0,02 mm / 0.001" |
| | 100X : 0,01 mm / 0.0005" |



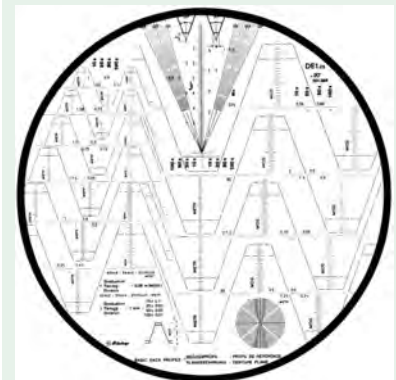
Radius chart



Protractor chart



ISO Metric threads



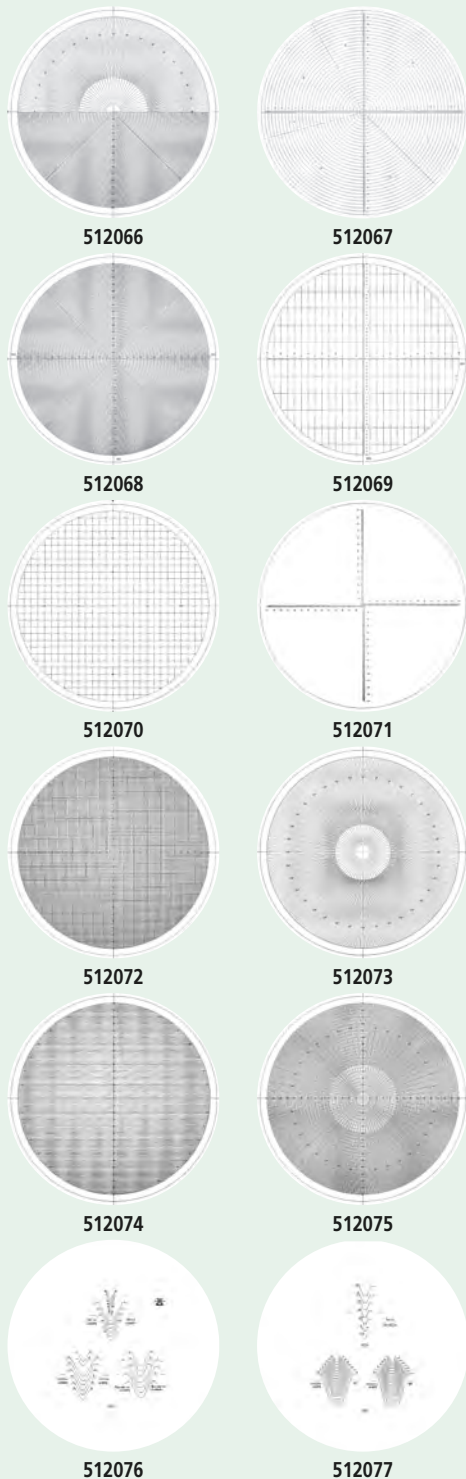
Involute gear teeth

Overlay Chart Set

Group 2 - Makes inspection of projected images an easy process.

Optional accessories

| No. | Description |
|--------|---|
| 932105 | Overlay chart set (12 sheets) (No. 512066 to 512077) |



Metric

| Description | ø 250 mm | ø 300 mm | ø 350 mm | ø 500 mm | ø 600 mm |
|--|----------|----------|----------|----------|----------|
| | No. | No. | No. | No. | No. |
| Concentric circles 1 mm pitch | 999309UK | 512068 | 999310UK | 999311UK | 999312UK |
| Concentric circles at 1 mm pitch with radial index 1° increments | 999337UK | 512075 | 999338UK | 999339UK | 999340UK |
| Crossed lines with 0,5 mm pitch | 999321UK | 512071 | 999322UK | 999323UK | 999324UK |
| Crossed lines with 1 mm graduation and concentric circles 5 mm pitch | 999305UK | 512067* | 999306UK | 999307UK | 999308UK |
| Grid chart (1 mm pitch) | 999325UK | 512072 | 999326UK | 999327UK | 999328UK |
| Grid chart (10 x 10 mm) | 999317UK | 512070* | 999318UK | 999319UK | 999320UK |
| Horizontal for 20X, vertical for 50X with 1 mm graduations | 999313UK | 512069* | 999314UK | 999315UK | 999316UK |
| Horizontal lines 1 mm pitch | 999333UK | 512074* | 999334UK | 999335UK | 999336UK |
| Metric threads 0,075 - 0,225 mm, 100X involute gear teeth : 20° MOD 0.2-1, 14,5° MOD 0.2-1 | 999345UK | 512077* | 999346UK | 999347UK | 999348UK |
| Metric threads 0,2-2 mm, unified threads 28-12 TPI 20X Whitworth threads 20-10 TPI 20X | 999341UK | 512076 | 999342UK | 999343UK | 999344UK |
| Radial index 1° increments | 999329UK | 512073* | 999330UK | 999331UK | 999332UK |
| Radial index 1° increments (upper) concentric circle 1 mm pitch (lower) | 999301UK | 512066 | 999302UK | 999303UK | 999304UK |

Inch

| Description | ø 10" | ø 12" | ø 14" | ø 20" | ø 24" |
|--|----------|----------|----------|----------|----------|
| | No. | No. | No. | No. | No. |
| Concentric circles 0.5" pitch | 999359UK | 999360UK | 999361UK | 999362UK | 999363UK |
| Concentric circles at 0.05" pitch with radial index 1° increments | 999389UK | 999390UK | 999391UK | 999392UK | 999393UK |
| Crossed lines with 0.05" graduation and concentric circles 0.25" pitch | 999354UK | 999355UK | 999356UK | 999357UK | 999358UK |
| Crossed lines with 0.25" pitch | 999374UK | 999375UK | 999376UK | 999377UK | 999378UK |
| Grid chart (0.05" pitch) | 999379UK | 999380UK | 999381UK | 999382UK | 999383UK |
| Grid chart (10 x 0.5") | 999369UK | 999370UK | 999371UK | 999372UK | 999373UK |
| Horizontal for 20X, vertical for 50X with 0.05" graduation | 999364UK | 999365UK | 999366UK | 999367UK | 999368UK |
| Horizontal lines 0.05" pitch | 999384UK | 999385UK | 999386UK | 999387UK | 999388UK |
| Radial index 1° increments (upper) concentric circle 0.05" pitch (lower) | 999349UK | 999350UK | 999351UK | 999352UK | 999353UK |

Workpiece Fixtures

For Profile Projectors and Measuring Microscopes

Vertical Holder

| No. | Mass (kg) |
|---------|-----------|
| 172-132 | 1.3 |

Centre Support

| No. | Max. workpiece height | Mass (kg) |
|---------|-----------------------|-----------|
| 172-142 | 120 mm | 3.3 |

Centre Support Riser

| No. | Max. workpiece height | Mass (kg) |
|---------|-----------------------|-----------|
| 172-143 | 240 mm | 3.3 |

Rotary Vice

| No. | Max. workpiece height | Rotary range | Width of jaws | Angle graduations | Mass (kg) |
|---------|-----------------------|--------------|---------------|-------------------|-----------|
| 172-144 | 60 mm | 360° | 40 mm | 5° | 2.8 |

Swivel Centre Support

| No. | Max workpiece dia. | Max. workpiece length | Swivel range | Mass (kg) |
|---------|------------------------------------|-----------------------|--------------|-----------|
| 176-105 | 70 mm (45 mm) when swiveled 10° | 140 mm | ±10° | 2.4 |
| 172-197 | 80 mm (65 mm) when swiveled 10° | 140 mm | ±10° | 2.5 |

Rotary Tables

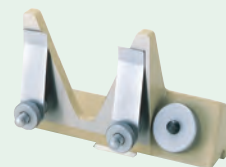
| No. | Effective glass dia. | Angular resolution | Fine feed | Mass (kg) |
|---------|----------------------|--------------------|-----------|-----------|
| 176-106 | 66 mm | 6° | | 1.7 |
| 172-198 | 96 mm | 1° | Available | 2.4 |
| 172-196 | 100 mm | 1° | | 2.5 |
| 176-305 | 182 mm | | Available | 5.5 |
| 176-306 | 238 mm | | Available | 6.5 |

V-Block with Clamp

| No. | Max workpiece dia. | Width of block | Mass (kg) |
|---------|--------------------|----------------|-----------|
| 172-378 | 25 mm | 41 mm | 0.8 |
| 172-234 | 50 mm | 60 mm | 1.24 |

Holder with Clamp

| No. | Max. workpiece height | Mass (kg) |
|---------|-----------------------|-----------|
| 176-107 | 35 mm | 0.42 |



172-132



172-142



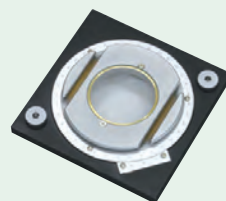
172-143



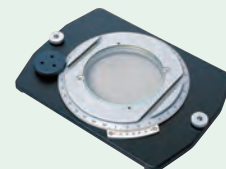
172-144



172-197



176-106



172-198



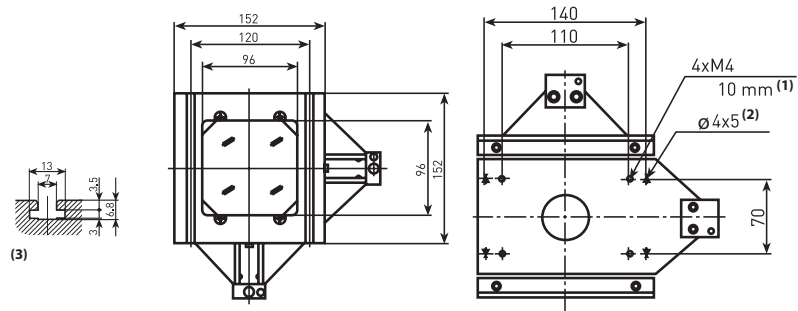
172-234 - 172-378



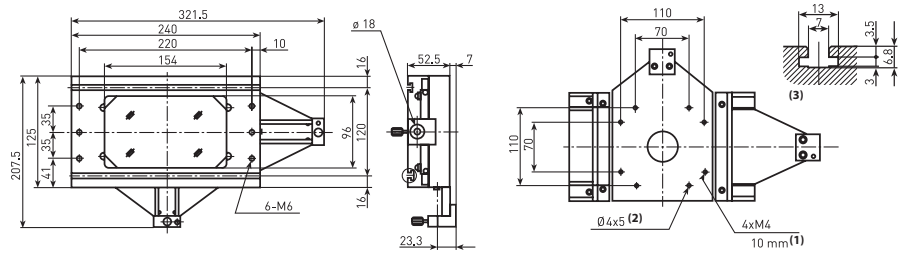
176-107

Measurement table

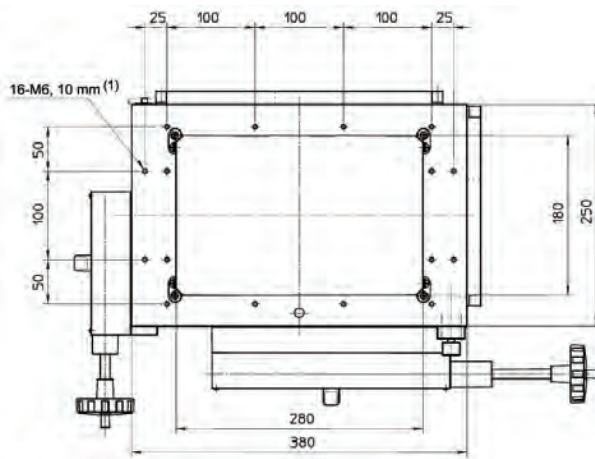
Measurement table dimensions



176-206 for TM-505 (1) depth (2) hole (3) detailed drawing of T slot



176-207 for TM-510 (1) depth (2) hole (3) detailed drawing of T slot



319-225-1 for PJ-A3000 (1) depth

| For Measuring Instrument | TM-505 | TM-510 | PJ-A3010F-200 | PV-5110 |
|-------------------------------------|--------------------------------|--------------------------------|------------------|------------------|
| No. | 176-206 | 176-207* | 319-225-1 | 12AAF177 |
| Adjustment range | 50 x 50 mm | 100 x 50 mm | 200 x 100 mm | 200 x 100 mm |
| Measurement table dimensions | 152 x 152 mm | 240 x 152 mm | 380 x 250 mm | 380 x 250 mm |
| Glass plate dimensions | 96 x 96 mm | 154 x 96 mm | 280 x 180 x 6 mm | 280 x 180 x 6 mm |
| Glass plate order no. | 380405 | 380495 | 382762 | 382762 |
| Measuring methods | Integral micrometer (optional) | Integral micrometer (optional) | Linear encoder | Linear encoder |
| Installation diameter | 18 mm | 18 mm | - | - |
| Table height | 44.5 mm | 52.5 mm | 75 mm | 75 mm |
| Bore pattern for table installation | 100 x 70 mm | 100 x 70 mm | 210 x 140 mm | 210 x 140 mm |
| T-slot distance | 120 mm | 120 mm | - | - |
| Max. stage loading | 5 kg | 5 kg | 8 kg | 5 kg |
| Mass (kg) | 2.72 | 4.17 | 18.5 | 18.5 |