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Measuring Microscope TM Generation B

TM Generation B

With this Toolmaker's Microscope you can measure dimensions and angles on small workpieces thanks to the optional analogue or digital micrometer heads and the built-in circular scale.

Further benefits of the TM Generation B include:

- Toolmakers microscopes well-suited for measuring dimensions and angles of features on small workpieces with the XY stage and rotating eyepiece scale.
- Compact design with recessed grips for better portability. The slim design makes this microscope ideal for use in areas with limited space.
- Powerful adjustable LED light sources for contour and surface illumination provide optimum lighting conditions for workpiece inspection.
- The TM Generation B is available with work stages of 50 x 50 mm or 100 x 50 mm.
- **Please note that the Micrometer Heads or Digital Micrometer Heads are optional and not included.**

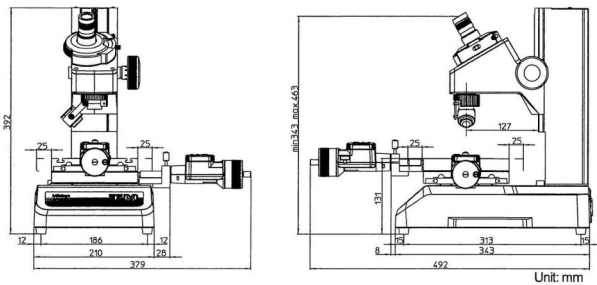


TM-505B fitted with optional digimatic micrometer heads

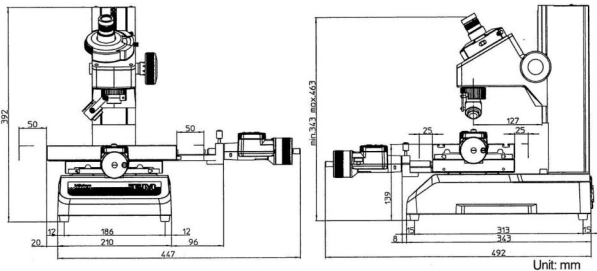


TM-1005B fitted with optional digimatic micrometer heads

| No. | Model | XY stage table top size | Effective area of table | Remarks | XY stage travel range | Max. work-piece height | Mass |
|------------|----------|-------------------------|-------------------------|---|-----------------------|------------------------|-------|
| 176-818-11 | TM-505B | 152 x 152 mm | 96 x 96 mm | TM-505B with optional micrometer heads | 50 x 50 mm | 115 mm | 14 kg |
| 176-819-11 | TM-1005B | 240 x 152 mm | 154 x 96 mm | TM-1005B with optional micrometer heads | 100 x 50 mm | 107 mm | 15 kg |



TM-505B



TM-1005B

Specifications

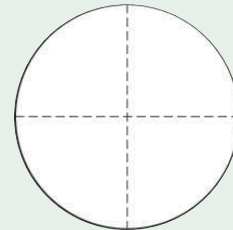
| | |
|--------------------------|--|
| Observation image | Erect |
| Angle reading | Range: 360° Minimum reading: 6' (by vernier) |
| Objective lens | 2X (176-138) Working distance: 67 mm Optional: 5X, 10X |
| Eyepiece | 15X (176-116), View field ø13 mm Optional: 10X, 20X |
| Total magnification | 30X |
| Transmitted illumination | Light source: White LED with green filter Functions: Light intensity adjustable |
| Surface illumination | Light source: White LED Functions: Light intensity adjustable |
| Power supply | 100/240V AC, 50/60Hz |
| Mass | TM-505B: 14 kg TM-1005B: 15 kg |

Standard accessories

| No. | Description |
|---------|---|
| 176-116 | Eyepiece for TM, 15X Eyepiece |
| 176-126 | Reticle for TM, 90° Broken Cross-hair |
| 176-138 | Objective Lens for TM, 2X magnification |



176-116



176-126



176-138



Refer to the TM microscopes brochure

Measuring Microscope TM Generation B

TM Generation B

Optional accessories

| No. | Description |
|----------|--|
| 176-115 | Eyepiece for TM 10X |
| 176-117 | Eyepiece for TM 20X |
| 176-111 | Reticle for TM, Concentric Circles (4 mm, P=0,05 mm) |
| 176-114 | Reticle for TM, 60° Angle |
| 176-204 | Dial Indicator Attachment, for TM |
| 63AAA001 | Ringlight LED, Illumination unit |
| 63AAA455 | M2 – Geometric Measuring Software for TM Microscope, Digimatic interface |
| 63AAA795 | ASUS AiO PC for M2 system, Intel Celeron N4500/8GB/256GB SSD M.2/ W11Pro/ 15.6" FHD Touch Screen |
| 63AAA353 | HDMI USB camera set for TM microscopes |

| Cables | |
|-----------|---|
| 959150 | Digimatic Cable, Straight, Data Button, 2 m |
| 959149 | Digimatic Cable, Straight, Data Button, 1 m |
| 06AFM380C | USB Input Tool Direct (Digimatic to USB), 2m Cable, Digimatic/Digimatic 2, Straight, with Data Button |
| 02AZD790C | Connection Cable C for U-WAVE, Straight, with Data Button |

| Gauge blocks | |
|--------------|--|
| 611675-031 | Gauge Block, Metric, Inspection Cert., ISO, Grade 1, Steel, 50mm |
| 611635-031 | Gauge Block, Metric, Inspection Cert., ISO, Grade 1, Steel, 25mm |

| Indispensable optional accessories * | |
|--------------------------------------|--|
| 152-389 | Micrometer Head XY-Stage, Thimble 49mm, 0-25mm, Y-Axis |
| 152-390 | Micrometer Head XY-Stage, Thimble 49mm, 0-25mm, X-Axis |
| 164-163 | Digital Micrometer Head, 0-50mm, 0,001mm, 18mm Stem |

| Lenses | |
|---------|---------------------------|
| 176-137 | Objective Lens for TM 10X |
| 176-139 | Objective Lens for TM 5X |

| Materials | |
|-----------|--|
| 176-107 | Fixture/clamping material, Holder with clamp |
| 172-378 | V-BLOCK, with clamp |
| 172-604 | Swivel center support, Fixture/clamping material |

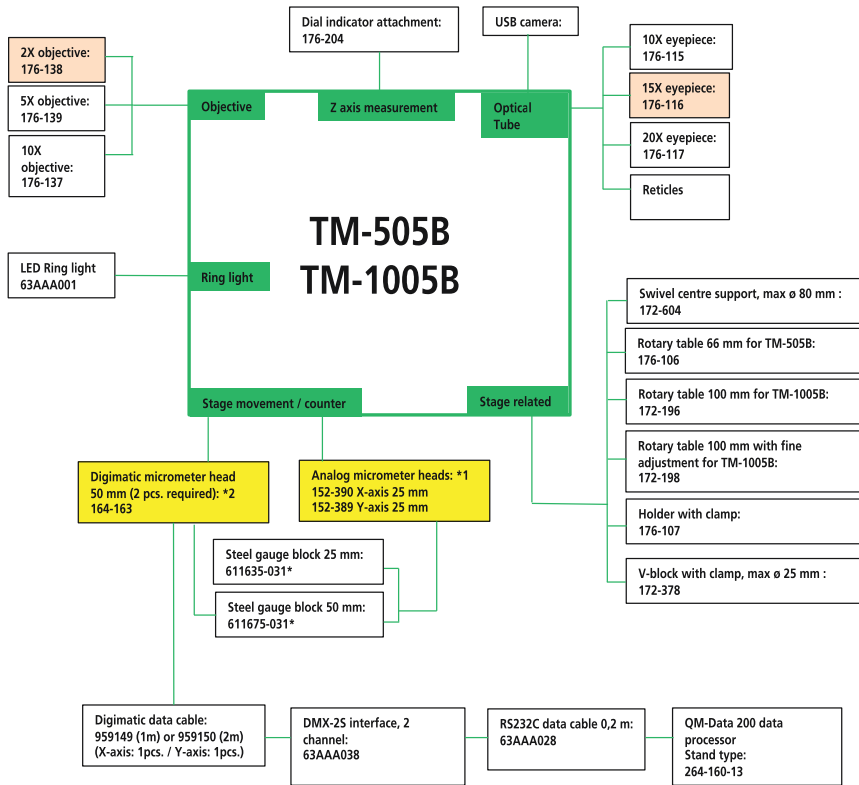
| Rotary tables | |
|---------------|---|
| 176-106 | Rotary table |
| 172-196 | Rotary table, 100 mm for TM-1005B |
| 172-198 | Rotary table, 100 mm with fine feed knob for TM-1005B |

HDMI USB camera set for TM microscopes (63AAA353) - Set includes:
 63AAA059 - HDMI16MDPX camera, including HDMI cable, mouse and simple calculation and reporting software on SD card
 63AAA060 - 0.37X C-mount to Eyepiece adapter for TM microscopes
 63AAA155 - Mechanical adapter for mounting the HDMI camera on the ocular tube

Digital camera for TM microscopes
 Mounting the HDMI16MDPX digital camera into the ocular tube transforms the TM microscope into a digital microscope.
 1. HDMI16MDPX, 6 megapixel colour camera with direct HDMI output to a monitor, no PC necessary
 2. Integrated SD card for saving images and pre-installed software for performing basic in-screen measurements
 3. Intuitive operation of the software with standard supplied USB mouse
 *At least one of the options is necessary for operation.



Refer to the TM microscopes brochure



- Standard accessory
- Necessary option either chose *1 or *2

* Necessary gauge blocks for extending stage travel range:

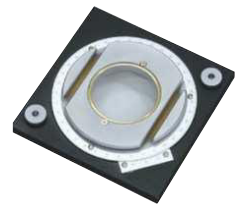
| Stage travel range | TM with analog micrometer heads 0-25 mm | TM with digimatic micrometer heads 0-50 mm |
|--------------------|---|--|
| Range 25-50 mm | X-axis:611635-031 Y-axis:611635-031 | |
| Range 25-75 mm | X-axis:611675-031 | |
| Range 50-100 mm | | X-axis:611675-031 |



63AAA353 HDMI USB camera set



Rotating eyepiece with angle reading



176-106 Rotary table



152-389



152-390



164-163

Accessories for Measuring Microscope TM Generation B

Objectives and Eyepieces for TM



176-137



176-138



176-139

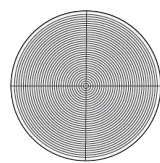
Objective Lenses and Eyepieces

| No. | Objective Magnification | Numerical aperture | Working distance [mm] | Total Magnification with Eyepiece 10X (176-115) | Total Magnification with Eyepiece 15X (176-116) | Total Magnification with Eyepiece 20X (176-117) | Mass [g] |
|---------|-------------------------|--------------------|-----------------------|---|---|---|----------|
| 176-138 | 2X ⁽¹⁾ | 0.07 | 67 | 20X (6,5 mm) | 30X (6,5 mm) | 40X (5 mm) | 140 |
| 176-139 | 5X | 0.1 | 33 | 50X (2,6 mm) | 75X (2,6 mm) | 100X (2 mm) | 85 |
| 176-137 | 10X | 0.14 | 14 | 100X (1,3 mm) | 150X (1,3 mm) | 200X (1 mm) | 100 |

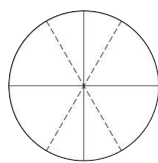
⁽¹⁾ Standard accessory

The number in brackets is the diameter of the field of view

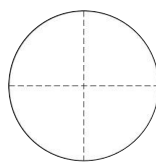
Reticles for TM



176-111



176-114



176-126

Reticles

| No. | Remarks |
|---------|---|
| 176-111 | Concentric circle (up to ø 4 mm, 0,05 mm increment) |
| 176-114 | 60° angle |
| 176-126 | Cross-hair (standard accessory) |

Ring Light for TM



LED Ring Light for TM including controller

| No. | Remarks |
|----------|---|
| 63AAA001 | LED illumination light can emphasize the contrast of projected workpiece images, providing stereoscopic and sharp observation. Projected image can be observed with high colour reproducibility, which is never realized by the existing halogen-type surface illumination. |



Refer to the TM microscopes brochure

Measuring Microscope MF Generation D (Manual, 2- or 3-axis)

Specifications

| | |
|-------------------------------|--|
| Observation image | Erect |
| Optical tube | Monocular or binocular tube (depression: 25") Reticle projection method, with TV mount Optical path ratio (eyepiece/TV mount: 50/50) |
| Eyepiece | 10X, 15X, 20X |
| Indication accuracy (at 20°C) | XY-axis: (2,2+0,02L) μm Z-axis: (5+0,04L) μm L: Measuring length (mm) when not loaded, JIS B 7153 |
| Floating function | X and Y axes with Quick-release mechanism |
| Power supply | 100/110/120/220/240 VAC, 50/60Hz |
| Objective lens | ML-series objectives Standard: 3X Optional: 1X, 5X, 10X, 20X, 50X, 100X |

Standard accessories

| No. | Description |
|-----------|-------------------------|
| 375-037-1 | ML Objective Lens 3x |
| 12AAA645 | Illumination Filter GIF |

Optional reticles for 3X eyepiece

Optional accessories

| No. | Description |
|---------------------------------------|--|
| 1. Oculars including eyepiece* | |
| 176-392 | Monocular Tube, for MF |
| 176-394 | Binocular Tube, for MF |
| 375-043 | Protractor Eyepiece 10X, for MF |
| 176-313-11 | Digital Protractor Eyepiece, for MF |
| 2. Illumination units* | |
| 176-449 | LED illumination unit MF, Transmitted/Reflected illumination set |
| 176-451 | Halogen illumination unit MF, Transmitted/Reflected illumination set |
| 63AAA770 | M3 Soft-and hardware for MF-A/B Microscope, Metlogix M3 software, camera, interface box, 2x LED lighting modules |

*Note: At least one of the options is necessary for operation for 1. Oculars including eyepiece, 2. Illumination units.
In case of 63AAA770 illumination unit is included.

Manual MF-A/B Models

MF Generation D: Manual models

This versatile measuring microscope, whether you use it to boost the performance with Mitutoyo's vision unit, for data management on a PC or other applications, offers you further improved measuring efficiency.

The MF offers you the following benefits:

- Measuring accuracy that is one of the highest in its class.
- Proven high-NA objectives from the ML optical series (long working distance type).
- Integration of metallurgical and measurement microscope functions enabling you to make high-resolution observations and high-accuracy measurements.
- Illumination unit (reflected/transmitted) gives you the option of a high-intensity LED or halogen bulb.
- The variable aperture diaphragm (reflected/ transmitted) allows observation measurement while suppressing light diffraction.
- Variety of standardized stages in sizes up to 400 x 200 mm.
- Quick-release mechanism enabling you to move the stage quickly when measuring large or numerous workpieces.
- High-magnification eyepiece observation up to 2000X.
- A good choice of optional accessories, including a Vision Unit, various digital cameras or data management on a PC, promises a wide field of application and excellent measuring



MF-B2010D

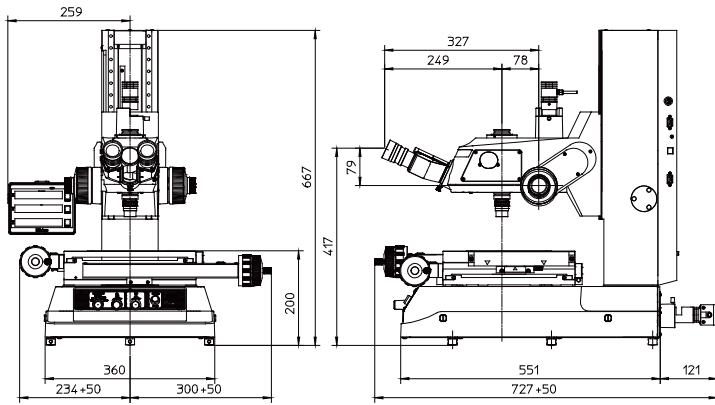
MF-A (2 axis)

| No. | Model | XY stage travel range | Z-axis travel range | XY stage top size | Stage glass size [[mm]] | Max. stage loading | Max. work-piece height | Z-axis motor | Mass |
|------------|-----------|-----------------------|---------------------|-------------------|-------------------------|--------------------|------------------------|--------------|--------|
| 176-961-13 | MF-A1010D | 100 x 100 mm | 150 mm | 280 x 280 mm | 180 x 180 mm | 10 kg | 150 mm | No | 67 kg |
| 176-962-13 | MF-A2010D | 200 x 100 mm | 150 mm | 350 x 280 mm | 250 x 150 mm | 10 kg | 150 mm | No | 71 kg |
| 176-963-13 | MF-A2017D | 200 x 170 mm | 220 mm | 410 x 342 mm | 270 x 240 mm | 20 kg | 220 mm | No | 148 kg |
| 176-964-13 | MF-A3017D | 300 x 170 mm | 220 mm | 510 x 342 mm | 370 x 240 mm | 20 kg | 220 mm | No | 156 kg |
| 176-965-13 | MF-A4020D | 400 x 200 mm | 220 mm | 610 x 342 mm | 440 x 240 mm | 15 kg | 220 mm | No | 162 kg |

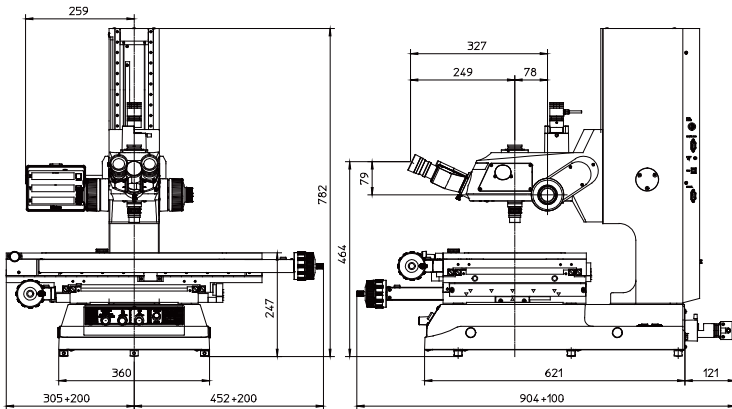
Measuring Microscope MF Generation D (Manual, 2- or 3-axis)

MF-B (3 axis)

| No. | Model | XY stage travel range | Z-axis travel range | XY stage top size | Stage glass size [[mm]] | Max. stage loading | Max. work-piece height | Z-axis motor | Mass |
|------------|-----------|-----------------------|---------------------|-------------------|-------------------------|--------------------|------------------------|--------------|--------|
| 176-966-13 | MF-B1010D | 100 x 100 mm | 150 mm | 280 x 280 mm | 180 x 180 mm | 10 kg | 150 mm | No | 67 kg |
| 176-967-13 | MF-B2010D | 200 x 100 mm | 150 mm | 350 x 280 mm | 250 x 150 mm | 10 kg | 150 mm | No | 71 kg |
| 176-968-13 | MF-B2017D | 200 x 170 mm | 220 mm | 410 x 342 mm | 270 x 240 mm | 20 kg | 220 mm | No | 148 kg |
| 176-969-13 | MF-B3017D | 300 x 170 mm | 220 mm | 510 x 342 mm | 370 x 240 mm | 20 kg | 220 mm | No | 156 kg |
| 176-970-13 | MF-B4020D | 400 x 200 mm | 220 mm | 610 x 342 mm | 440 x 240 mm | 15 kg | 220 mm | No | 162 kg |



1010D



4020D



176-392
Monocular



176-394
Binocular



176-313-11
Digital protractor eyepiece



375-043
Protractor eyepiece



176-449
LED illumination unit for MF-Gen D



176-451
Halogen illumination unit for MF-Gen D



Refer to the MF / MF-U microscopes brochure

Measuring Microscope MF Generation D (Z-axis Motor Drive)

Motor-Driven Z-axis MF-J Models

MF Generation D: Models with motorized Z-axis movement

The MF Generation D version with a motorized Z-axis. This feature renders fast and accurate Auto Focus possible when used in combination with the optional Vision Unit. The MF with motorized Z-axis is available in 3 stage sizes and incorporates all the functionality of the manual MF Generation D.

The MF Generation D with motorized Z-axis offers the following benefits:

- Auto Focus function when using the optional Vision Unit.
- A measuring accuracy that is one of the highest in its class.
- Proven high-NA objectives (long working distance type).
- Integration of metallurgical and measurement microscope functions enabling you to make high-resolution observations and high-accuracy measurements.
- Illumination unit (reflected/transmitted) offers the option of a high-intensity LED or halogen bulb.
- The variable aperture diaphragm (reflected/ transmitted) allows observation measurement while suppressing light diffraction.
- Variety of 3 standardized stages in sizes up to 400 x 200 mm.
- Quick-release mechanism enabling you to move the stage quickly when measuring large or numerous workpieces.
- High-magnification eyepiece observation up to 2000X.
- A large lineup of optional accessories, including a Vision Unit, various digital cameras and data management for a PC, grants a wide field of applications and excellent measuring efficiency.

Specifications

| | |
|-------------------------------|---|
| Observation image | Erect |
| Optical tube | Monocular or binocular tube (depression: 25"), Reticle projection method, with TV mount, Optical path ratio (eyepiece/TV mount: 50/50) |
| Eyepiece | 10X, 15X, 20X |
| Indication accuracy (at 20°C) | XY-axis: (2,2+0,02L) μm Z-axis: (5+0,04L) μm L: Measuring length (mm) when not loaded, JIS B 7153 |
| Floating function | X and Y axes with Quick-release mechanism |
| Power supply | 100/110/120/220/240 VAC, 50/60Hz |
| Objective lens | ML-series objectives Standard: 3X Optional: 1X, 5X, 10X, 20X, 50X, 100X |
| Remote Box | - Speed adjustment - Coarse/Fine Speed switching - Jog shuttle - Emergency stop switch - AF button - Counter reset button - Data output button - Power switch - Limit setting (Z-axis) Remote Box |

Standard accessories

| No. | Description |
|-----------|-------------------------|
| 375-037-1 | ML Objective Lens 3x |
| 12AAA645 | Illumination Filter GIF |

Optional reticles for 3X eyepiece

Optional accessories

| No. | Description |
|---------------------------------------|--|
| 1. Oculars including eyepiece* | |
| 176-392 | Monocular Tube, for MF |
| 176-394 | Binocular Tube, for MF |
| 375-043 | Protractor Eyepiece 10X, for MF |
| 176-313-11 | Digital Protractor Eyepiece, for MF |
| 2. Illumination units* | |
| 176-449 | LED illumination unit MF, Transmitted/Reflected illumination set |
| 176-451 | Halogen illumination unit MF, Transmitted/Reflected illumination set |

*Note: At least one of the options is necessary for operation for 1. Oculars including eyepiece, 2. Illumination units.



MF-J2017D

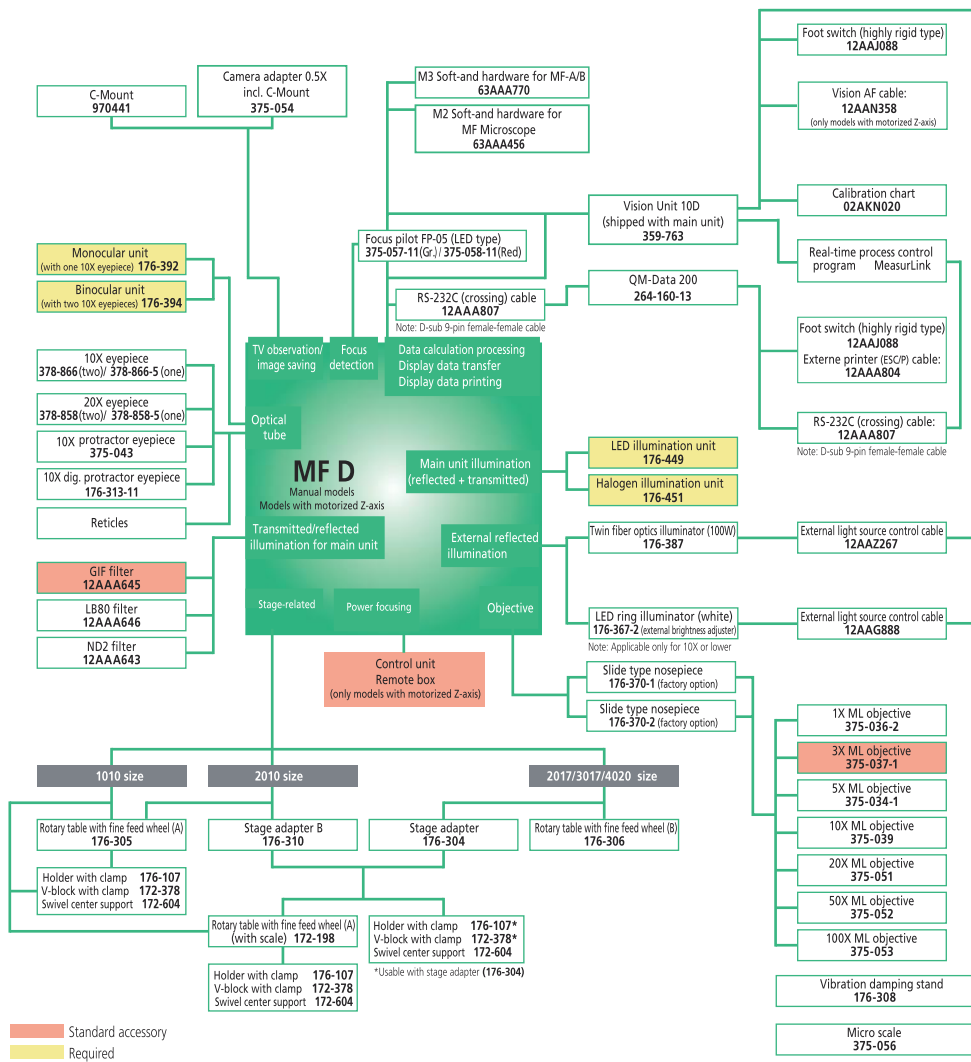
| No. | Model | XY stage travel range | Z-axis travel range | XY stage top size | Max. stage loading | Stage glass size [[mm]] | Max. work-piece height | Z-axis motor | Mass |
|------------|-----------|-----------------------|---------------------|-------------------|--------------------|-------------------------|------------------------|--------------|--------|
| 176-891-13 | MF-J2017D | 200 x 170 mm | 220 mm | 410 x 342 mm | 20 kg | 270 x 240 mm | 220 mm | Yes | 150 kg |
| 176-892-13 | MF-J3017D | 300 x 170 mm | 220 mm | 510 x 342 mm | 20 kg | 370 x 240 mm | 220 mm | Yes | 158 kg |
| 176-893-13 | MF-J4020D | 400 x 200 mm | 220 mm | 610 x 342 mm | 15 kg | 440 x 240 mm | 220 mm | Yes | 164 kg |



Refer to the MF / MF-U microscopes brochure

Accessories for Measuring Microscopes MF Series

Accessories for MF Manual and Motorized Z-axis Models



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



QM-Data 200



ML-series objectives



Focus pilot



359-763 Vision Unit 10D

Optional accessories

| No. | Description |
|---|--|
| 1. Eyepieces | |
| 378-866-5 | WF 10X/24 Eyepiece single, Wide field of view eyepiece (1 pcs.) |
| 378-866 | WF 10X/24 Eyepiece pair, Wide field of view eyepiece (2 pcs.) |
| 378-858-5 | WF 20X/12 Eyepiece single, Wide field of view eyepiece (1 pcs.) |
| 378-858 | WF 20X/12 Eyepiece pair, Wide field of view eyepiece (2 pcs.) |
| 2. Lenses | |
| 375-036-2 | ML Objective Lens 1x |
| 375-034-1 | ML Objective Lens 5x |
| 375-039 | ML Objective Lens 10x |
| 375-051 | ML Objective Lens 20x |
| 375-052 | ML Objective Lens 50x |
| 375-053 | ML Objective Lens 100x |
| 3. Oculars including eyepiece: At least one of the options is necessary for operation. | |
| 176-392 | Monocular Tube, for MF |
| 176-394 | Binocular Tube, for MF |
| 176-313-11 | Digital Protractor Eyepiece, for MF |
| 375-043 | Protractor Eyepiece 10X, for MF |
| 4. Objective changer (factory set option) | |
| 176-370-1 | Slide Type Nosepiece, w. Parfocal (for MF factory installed option) |
| 176-370-2 | Slide Type Nosepiece, w. Magnification Guaranteed (for MF factory installed option) |
| 5. Focus pilot | |
| 375-057-11 | Focus pilot FP-05 Green, For MF |
| 375-058-11 | Focus pilot FP-05 Red, For MF |
| 6. Optical filters | |
| 12AAA643 | Illumination Filter ND2 |
| 12AAA646 | Illumination Filter, LB80 |
| 7a. Illumination units: At least one of the options is necessary for operation. | |
| 176-449 | LED illumination unit MF, Transmitted/Reflected illumination set |
| 176-451 | Halogen illumination unit MF, Transmitted/Reflected illumination set |
| 7b. Additional illumination units | |
| 176-387 | Twin fibre LED illumination unit, w/o power cord |
| 176-367-2D | Ringlight LED, Illumination unit |
| 63AAA001 | Ringlight LED, Illumination unit |
| 8. Digital evaluation units | |
| 63AAA770 | M3 Soft-and hardware for MF-A/B Microscope, Metlogix M3 software, camera, interface box, 2x LED lighting modules |
| 63AAA456 | M2 - Soft-and hardware for MF Microscope, Data processing software |
| 264-160-13 | QM-DATA200 (Stand type), 2D Data processor w/o power cord |
| 359-763 | Vision Unit 10D |
| 9. Camera adapters | |
| 970441 | Camera Adaptor, C-Mount |
| 375-054 | Camera Adaptor, 0.5X incl. C-Mount |

1X ML objective 375-036-2
 3X ML objective 375-037-1
 5X ML objective 375-034-1
 10X ML objective 375-039
 20X ML objective 375-051
 50X ML objective 375-052
 100X ML objective 375-053

Vibration damping stand 176-308
 Micro scale 375-056

1010 size
 2010 size
 2017/3017/4020 size

Rotary table with fine feed wheel (A) 176-305
 Stage adapter B 176-310
 Stage adapter 176-304
 Rotary table with fine feed wheel (B) 176-306

Holder with clamp 176-107
 V-block with clamp 172-378
 Swivel center support 172-604

Rotary table with fine feed wheel (A) (with scale) 172-198
 Holder with clamp 176-107*
 V-block with clamp 172-378*
 Swivel center support 172-604*

*Usable with stage adapter (176-304)

Please contact your Mitutoyo representatives for further fixture and camera solutions.



Refer to the MF / MF-U: microscopes brochure
 Refer to the M3 software for the MF microscopes brochure
 Refer to the M2 software for the profile projectors and microscopes brochure

Measuring Microscope MF-U Generation D (Manual, 3-axis)

Specifications

| | |
|-------------------------------|--|
| Observation image | Erect |
| 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) |
| Indication accuracy (at 20°C) | XY-axis: (2,2+0,02L) μm Z-axis: (5+0,04L) μm L: Measuring length (mm) when not loaded, JIS B 7153 |
| Floating function | X and Y axes with Quick-release mechanism |

Standard accessories

| No. | Description |
|----------|---|
| 378-866 | WF 10X/24 Eyepiece pair, Wide field of view eyepiece (2 pcs.) |
| 12AAA645 | Illumination Filter GIF |

Optional accessories

| No. | Description |
|----------------------------------|--|
| 1. Objective lens turret* | |
| 378-018 | Turret for MF-U, Manual (BF), 4 Pos. |
| 378-216-11 | Turret for MF-U, Motorized (BF), 5 Pos. |
| 176-211 | Turret for MF-U, Manual (BD), 4 Pos. |
| 176-212-11 | Turret for MF-U and FS-70, Motorized (BD), 4 Pos. |
| 2. Illumination units* | |
| 176-450 | LED illumination unit MF-U, Transmitted/Reflected illumination set |
| 176-452 | Halogen illumination unit MF-U, Transmitted illumination set |
| 176-316D | Halogen illumination unit MF-U, reflected illumination set 150W |

*Note: At least one of the options is necessary for operation for 1. Objective lens turret, 2. Illumination units.

MF-U Generation D Manual Models

Its infinite corrected optical system allows a wide range of applications (e.g. dark-field-, polarized- and DIC-microscopy) and the use of a turret.

The MF-U offers you the following benefits:

- Measuring accuracy that is one of the highest in its class.
- Proven high-NA objectives from the FS optical system (long working distance type).
- Integration of metallurgical and measurement microscope functions enabling you to make high-resolution observations and high-accuracy measurements.
- Illumination unit (reflected/transmitted) gives you the option of a high-intensity LED or halogen bulb.
- The variable aperture diaphragm (reflected/ transmitted) allows observation measurement while suppressing light diffraction.
- Variety of standardized stages in sizes up to 400 x 200 mm.
- Quick-release mechanism enabling you to move the stage quickly when measuring large or numerous workpieces.
- High-magnification eyepiece observation up to 2000X.
- A good choice of optional accessories, including a Vision Unit, various digital cameras or data management on a PC, promises a wide field of application and excellent measuring efficiency.



MF-UD 2017D

(turret, objectives and illumination are optional)

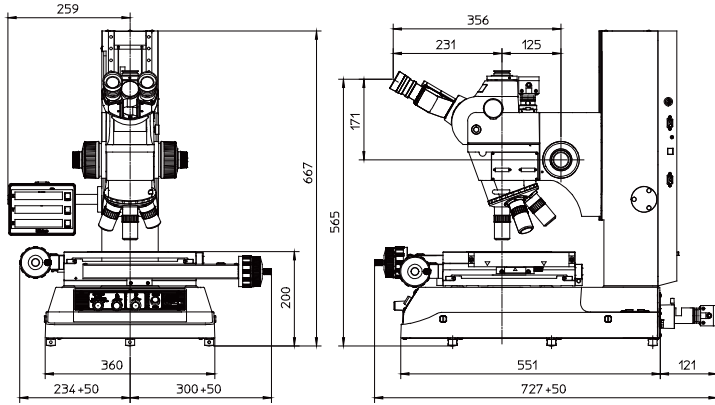
Bright/Dark Field (BF/DF)

| No. | Model | XY stage travel range | Z-axis travel range | XY stage top size | Stage glass size [[mm]] | Max. work-piece height | Swiveling function (left) | Mass [kg] |
|------------|------------|-----------------------|---------------------|-------------------|-------------------------|------------------------|---------------------------|-----------|
| 176-986-13 | MF-UD1010D | 100 x 100 mm | 150 mm | 280 x 280 mm | 180 x 180 mm | 150 mm | | 67 |
| 176-987-13 | MF-UD2010D | 200 x 100 mm | 150 mm | 350 x 280 mm | 250 x 150 mm | 150 mm | | 71 |
| 176-888-10 | MF-UD2017D | 200 x 170 mm | 220 mm | 410 x 342 mm | 270 x 240 mm | 220 mm | ±5° | 148 |
| 176-989-13 | MF-UD3017D | 300 x 170 mm | 220 mm | 510 x 342 mm | 370 x 240 mm | 220 mm | ±5° | 156 |
| 176-890-10 | MF-UD4020D | 400 x 200 mm | 220 mm | 610 x 342 mm | 440 x 240 mm | 220 mm | ±3° | 162 |

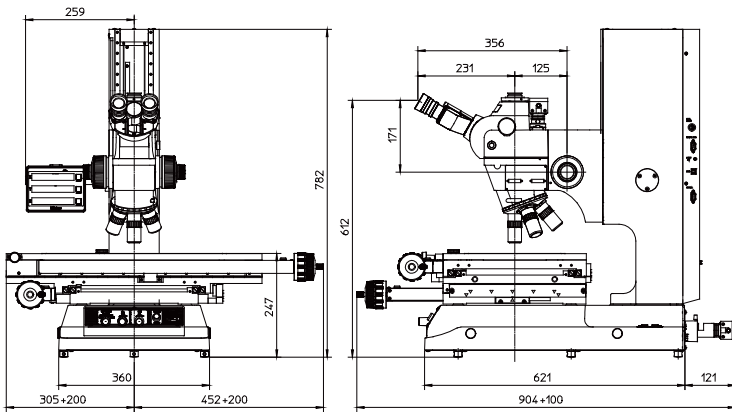
Bright Field (BF)

| No. | Model | XY stage travel range | Z-axis travel range | XY stage top size | Stage glass size [[mm]] | Max. work-piece height | Swiveling function (left) | Mass [kg] |
|------------|------------|-----------------------|---------------------|-------------------|-------------------------|------------------------|---------------------------|-----------|
| 176-976-13 | MF-UB1010D | 100 x 100 mm | 150 mm | 280 x 280 mm | 180 x 180 mm | 150 mm | | 67 |
| 176-977-13 | MF-UB2010D | 200 x 100 mm | 150 mm | 350 x 280 mm | 250 x 150 mm | 150 mm | | 71 |
| 176-978-13 | MF-UB2017D | 200 x 170 mm | 220 mm | 410 x 342 mm | 270 x 240 mm | 220 mm | ±5° | 148 |
| 176-979-13 | MF-UB3017D | 300 x 170 mm | 220 mm | 510 x 342 mm | 370 x 240 mm | 220 mm | ±5° | 156 |
| 176-980-13 | MF-UB4020D | 400 x 200 mm | 220 mm | 610 x 342 mm | 440 x 240 mm | 220 mm | ±3° | 162 |

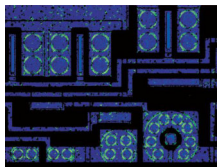
Measuring Microscope MF-U Generation D (Manual, 3-axis)



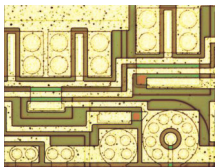
1010D



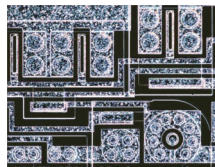
4020D



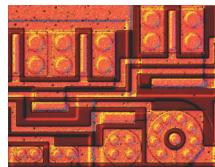
Polarized light



Bright field



Dark field



Differential interference contrast



176-450
LED transmitted/reflected illumination set



176-452
Halogen transmitted illumination set



176-316D
Halogen reflected illumination set 150W



176-211 Manual turret (BD), 4 Pos.
378-018 Manual turret (BF), 4 Pos.



176-212-11
Motorized turret (BD), 4 Pos.



378-216-11
Optional 5 positions motorized turret



Refer to the MF / MF-U microscopes brochure

Measuring Microscope MF-U Generation D (Z-axis Motor Drive)

Motor-Driven Z-axis MF-U Models

Motor-driven models allows in combination with optional Vision Unit ultra-high speed auto focus function

The ultra-high speed AF function has been installed to allow focusing on a surface to be measured at a speed of about one second. Freedom from burdensome focus adjustment even on a work-piece with many asperities allows the operator to perform stress-free measurement, drastically reducing operator's fatigue.

MF-U-J models are for bright field observations.

MF-U-K models are for bright field/dark field observations.

Specifications

| | |
|--|--|
| Observation image | Erect |
| 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 | 10X (field No.: 24 mm) Optional: 15X, 20X |
| Focusing method | Manual (coarse focusing: 10 mm/rev., fine focusing: 0,1 mm/rev.) |
| Indication accuracy (at 20°C) | XY-axis: (2,2+0,02L) μm Z-axis: (5+0,04L) μm L: Measuring length (mm) when not loaded, JIS B 7153 |
| Floating function | X and Y axes with Quick-release mechanism |
| Power supply | 220/240V AC, 50/60Hz |
| Turret (optional) | Manual or motorized |
| Objective lens (optional) | BF / BD Plan Apo objective from 1X to 100X |
| Transmitted illumination optional but required | Light source: Halogen bulb (12V, 50W) or LED illumination Optical system: Telecentric illumination with adjustable aperture diaphragms Functions: Light intensity adjustable, Non-stepped brightness adjustment |
| Surface illumination optional but required | Light source: Optional halogen illumination unit (fiber-optic cold light illumination) or LED illumination Optical system: Koehler illumination with adjustable aperture diaphragms Functions: Light intensity adjustable, Non-stepped brightness adjustment |
| Display unit | Resolution: 0,001mm / 5E-4mm / 1E-4mm No. of axis: 2 axis or 3 axis Functions: Zero-setting, Direction switching, Data output (USB and RS-232C interface) |
| Remote Box | - Speed adjustment - Coarse/Fine Speed switching - Jog shuttle - Emergency stop switch - AF button - Counter reset button - Data output button - Power switch - Limit setting (Z-axis) Remote Box |



MF-UJ2017D
(turret, objectives and illumination are optional)

| No. | Model | XY stage travel range | XY stage top size | Stage glass size [[mm]] | Max. stage loading | Swiveling function (left) | Mass [kg] |
|------------|------------|-----------------------|-------------------|-------------------------|--------------------|---------------------------|-----------|
| 176-894-13 | MF-UJ2017D | 200 x 170 mm | 410 x 342 mm | 270 x 240 mm | 20 kg | ±5° | 150 |
| 176-895-13 | MF-UJ3017D | 300 x 170 mm | 510 x 342 mm | 370 x 240 mm | 20 kg | ±5° | 158 |
| 176-896-13 | MF-UJ4020D | 400 x 200 mm | 610 x 342 mm | 440 x 240 mm | 15 kg | ±3° | 164 |
| 176-897-13 | MF-UK2017D | 200 x 170 mm | 410 x 342 mm | 270 x 240 mm | 20 kg | ±5° (left) | 150 |
| 176-898-13 | MF-UK3017D | 300 x 170 mm | 510 x 342 mm | 370 x 240 mm | 20 kg | ±5° (left) | 158 |
| 176-899-13 | MF-UK4020D | 400 x 200 mm | 610 x 342 mm | 440 x 240 mm | 15 kg | ±3° (left) | 164 |

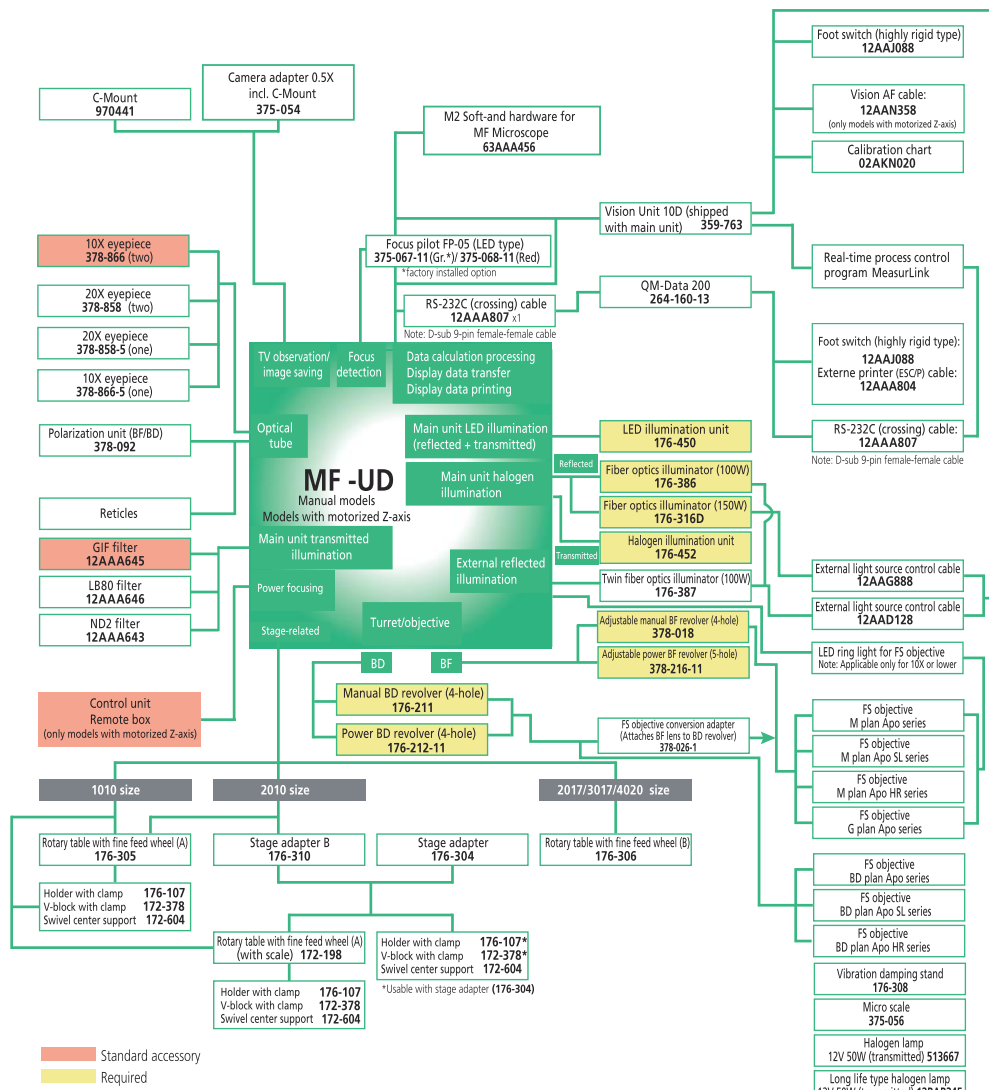


Refer to the MF / MF-U microscopes brochure

Note: Standard and optional accessories for MF-U (Z-axis Motor Drive) microscopes: see accessories at MF-U (Manual, 3-axis).

Accessories for Measuring Microscope MF-U Generation D

Accessories for MF-U Manual and Motorized Z-axis Models



Standard accessory
Required

Optional accessories

| No. | Description |
|---|--|
| 1. Eyepieces | |
| 378-858 | WF 20X/12 Eyepiece pair, Wide field of view eyepiece (2 pcs.) |
| 378-858-5 | WF 20X/12 Eyepiece single, Wide field of view eyepiece (1 pcs.) |
| 378-866-5 | WF 10X/24 Eyepiece single, Wide field of view eyepiece (1 pcs.) |
| 2. Objective lens turret | |
| 378-018 | Turret for MF-U, Manual (BF), 4 Pos. |
| 378-216-11 | Turret for MF-U, Motorized (BF), 5 Pos. |
| 176-212-11 | Turret for MF-U and FS-70, Motorized (BD), 4 Pos. |
| 176-211 | Turret for MF-U, Manual (BD), 4 Pos. |
| 3. Focus pilot FP-05 LED type (factory set option) | |
| 375-067-11 | Focus pilot FP-05U Green LED, For MF-U (factory installed option) |
| 375-068-11 | Focus pilot FP-05U Red LED, For MF-U (factory installed option) |
| 4. Optical filters | |
| 12AAA643 | Illumination Filter ND2 |
| 12AAA646 | Illumination Filter, LB80 |
| 5a. Illumination units | |
| 176-450 | LED illumination unit MF-U, Transmitted/Reflected illumination set |
| 176-452 | Halogen illumination unit MF-U, Transmitted illumination set |
| 176-316D | Halogen illumination unit MF-U, reflected illumination set 150W |
| 5b. Additional illumination units | |
| 176-387 | Twin fibre LED illumination unit, w/o power cord |
| 176-386 | Single fibre LED illumination unit |
| 6. Reticles | |
| 12AAG876 | Reticle for MF-U Gen. B, Broken Cross-hair (3 µm line width) |
| 12AAG877 | Reticle for MF-U Gen. B, Broken Cross-hair (5 µm line width) |
| 12AAG878 | Reticle for MF-U Gen. B, Broken Cross-hair (7 µm line width) |
| 12AAG879 | Reticle for MF-U Gen. B, Cross-hair and 45° Broken Lines |
| 12AAG880 | Reticle for MF-U Gen. B, Cross-hair and 60° Broken Lines |
| 7. Digital evaluation units | |
| 63AAA456 | M2 – Soft-and hardware for MF Microscope, Data processing software |
| 359-763 | Vision Unit 10D |
| 264-160-13 | QM-DATA200 (Stand type), 2D Data processor w/o power cord |
| 8. Camera adaptors | |
| 375-054 | Camera Adaptor, 0.5X incl. C-Mount |
| 970441 | Camera Adaptor, C-Mount |

*Note: At least one of the options is necessary for operation for 2. Objective lens turret, 5a. Illumination units and Objective lenses. All the Objective lenses are available at * Long Working Distance Objectives --> Objectives for Brightfield and for Brightfield/Darkfield Observation*

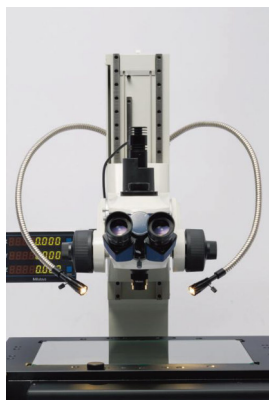
Please contact your Mitutoyo representatives for further fixture and camera solutions.



Refer to the MF / MF-U microscopes brochure
Refer to the M2 software for the profile projectors and microscopes brochure

Optional Accessories for Measuring Microscope MF/MF-U Generation D

Illumination Units for Measuring Microscope



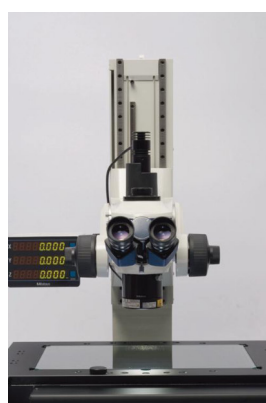
Dual Swan-neck
Light-pipe



Twin Fiber LED Illumination



LED Ring Light
(for M Plan objectives)



LED Ring Light
(for ML objectives)



LED Ring Light



Refer to the MF / MF-U microscopes brochure

| No. | Model | Applicable Microscope | Length of fibre cable | Light source | Mass [kg] |
|------------|----------------------------------|--|-----------------------|---|-----------|
| 176-367-2D | LED Ring Light | MF models with 1X, 3X, 5X, 10X objective | 1500 mm | White LED | 1 |
| 176-387 | Twin fibre LED illumination unit | MF/MF-U models | 700 mm | LED (20 W/400 lx) (Colour: White, Lifetime: 30000H Colour Temperature: 6500K) | 2,6 |

Optional accessories

| No. | Description |
|--------|--|
| 516576 | Reticle, Broken Cross hair and 60° Angle |
| 516577 | Reticle, Cross hair with 20 mm Scale |
| 516578 | Reticle, Concentric Circles |
| 516848 | Reticle, Cross hair |
| 516849 | Reticle, 10 mm Scale (0,01 mm reading) |
| 516850 | Reticle, 5 mm Scale (0,005 mm reading) |



Refer to the microscope units
and objective lenses brochure

Eyepieces for Measuring Microscopes

- Extra-wide field of view type.
- Optional reticles are available.
- Applicable microscope models: MF, MF-U, FS70.



378-866-5



378-858-5

| No. | Model | Remarks |
|-----------|----------|-------------|
| 378-858-5 | WF20X/12 | Single |
| 378-858 | WF20X/12 | Set of pair |
| 378-866-5 | WF10X/24 | Single |
| 378-866 | WF10X/24 | Set of pair |

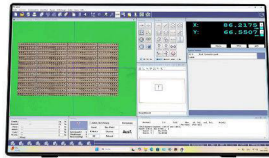
Vision Unit

Vision Unit

This vision system retrofit for microscopes allows you to complete your measurement in one easy step with its automatic edge-detection tools and various macro functions.

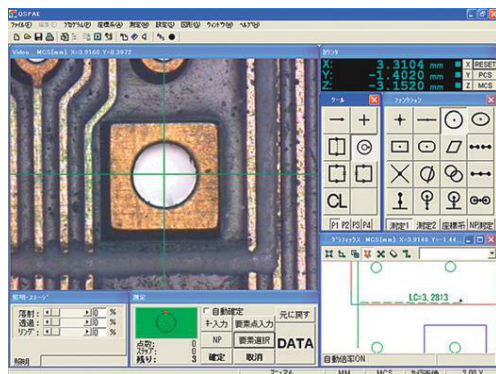
The Vision Unit offers you the following benefits:

- Easy operation due to the graphics and measurement navigation functions.
- Image data input/storage function.
- Measurement results are output to Microsoft® Excel®; this lets you generate an inspection table on the same computer.
- The unit allows you to verify that measurement results are within the tolerance zones and to carry out various types of statistical processing for each item.
- Combined use with the focus pilot gives you high accuracy in height measurements (patent pending).
- You can perform a series of measuring operations using just one screen display.
- The auto-brightness control function reproduces type and degree of illumination used.



MF microscope with Vision Unit camera and QSPAK-VUE software

| No. | Model | Description |
|---------|-----------------|--|
| 359-763 | Vision Unit 10D | For MF / MF-U generation D manual and motorized models |
| 359-727 | Vision Unit 9D | For MF generation C |
| 359-729 | Vision Unit 9UD | For MF-U generation C |
| 359-779 | Vision Unit 7D | For Hyper MF / Hyper MF-U generation B |



QSPAK VUE Measurement Window



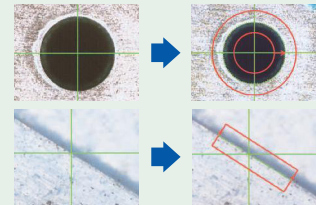
Refer to the QM-Data200 and vision unit brochure

Specifications

| | |
|------------------------------|--|
| Projected image | Inverted |
| Camera unit | Image sensor: 1/2" / 12,7 mm colour CMOS camera Dimensions: 100 x 58 x 89 mm (W x D x H) Mass: 0,4 kg |
| Adapter unit | Dimensions: 45 x 123 mm Magnification: 0,5X Mass: 0,3 kg |
| Magnification | 19X - 1900X on 22" / 56 cm monitor (image resizable) |
| QSPAK VUE, optional software | For observation/comparison of form - Template matching function - Manual pattern matching function For simple measurement - One-click edge detection tool function - Smart tool function - User macro function Functions for repeated measurement / auto-measurement - Quick navigation - Playback - Graphic - External data output - Statistical calculation Operating software: QSPAK VUE (optional) |

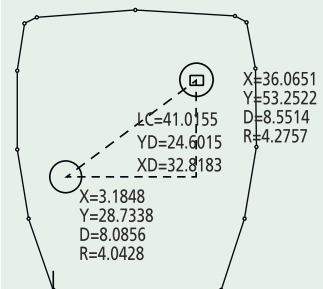
Standard accessories

| 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.

M3 Software for MF Microscopes

M3 Soft-and Hardware for MF-A/B Microscope

Speed up your 2D measurements with MF microscopes and the innovative M3 software

Spend more time measuring and less time reading manuals thanks to the M3 software's straightforward and easy-to-use interface. Thanks to the familiar use of a touch screen, the M3 software can be quickly integrated into your Mitutoyo MF measuring microscope and drastically improve work efficiency.

An intuitive and thoughtful icon driven user interface, flexible edge detection tools, and powerful tolerancing and programming functionality, make the M3 the perfect solution for the MF microscopes.

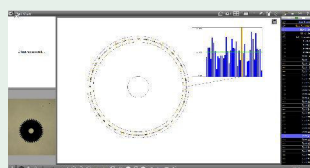
- Combine the excellent optical performance of the MF microscope with the versatile M3 software and turn it into a powerful vision measuring system.
- Gain access to many powerful features and an intuitive measuring interface. Precise video edge detection tools provide accurate results, as well as access to powerful, industrial grade, measurement functionality.

| No. | Model |
|----------|---------------------------------|
| 63AAA770 | M3 Soft-and hardware for MF-A/B |

- Pattern based playback and alignment
- DXF Overlays and profiling
- Multi-Touch software control
- Advanced video probe toolbox
- Programmable light control
- Graphical-based constructions
- Stored measurement routines and playback
- Flexible report and content formatting
- Stitching function from multiple field of views

The package consists of:

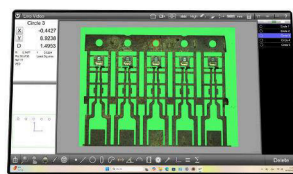
- M3 software with XYZ counter support, DXF overlay and Profiling s/w modules
- Colour camera, USB3, 2 MP, 80fps
- USB3 cable (3m) with screw connection for USB3 camera
- MNC114 controller for Mitutoyo MF microscopes
- Interface for support of XYZ zero-set buttons
- LED light units for transmitted and coaxial illumination



M3 optional module: Gear measuring



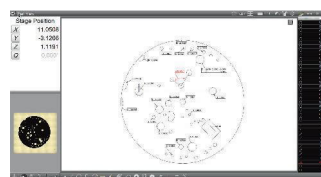
M3 optional module: Thread measuring



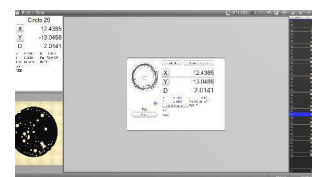
MF microscope with M3 image processing software



M3 measurement image



M3 measurement results image



M3 graphical form deviation image



Refer to the M3 software for the MF microscopes brochure

Microscope Cameras

Microscope Cameras, Sets and Accessories



TM-1005B with 2x digimatic micrometer heads and 63AAA353 camera set

1) Camera sets

| No. | Model | Set configuration |
|----------|--|---|
| 63AAA353 | FHD HDMI USB camera set for TM microscopes | Set includes: 63AAA059 - FHD camera, including HDMI cable, mouse and simple calculation and reporting software on SD card 63AAA060 - 0.37X C-Mount to eyepiece adapter for TM microscopes 63AAA155 - Mechanical adapter for mounting the HDMI camera on the ocular tube |
| 63AAA694 | 4K HDMI microscope camera set for MF | Set includes: 63AAA796 - 4K HDMI camera body with build-in basic software, flat enclosure C-Mount camera 63AAA067 - 0.5x camera adapter with C-mount for MF/MF-U microscope |
| 63AAA695 | 4K HDMI microscope camera set for TM | Set includes: 63AAA796 - 4K HDMI camera body with build-in basic software, flat enclosure C-Mount camera 63AAA517 - 0.5X eyepiece adapter 63AAA155 - Mechanical adapter for mounting the HDMI camera on the ocular tube |

2) Cameras

| No. | Model |
|----------|--|
| 63AAA059 | FHD camera, including HDMI cable, mouse and simple calculation and reporting software on SD card |
| 63AAA796 | 4K HDMI camera body with build-in basic software, flat enclosure C-Mount camera |

3) Accessories

| No. | Model |
|----------|--|
| 63AAA060 | 0,37x Eyepiece adapter |
| 63AAA517 | 0,5X Eyepiece adapter |
| 63AAA155 | Mechanical adapter for mounting the HDMI camera on the ocular tube |
| 63AAA067 | 0,5x camera adapter with C-Mount for MF/MF-U microscope |



Full HD-HDMI camera and accessories package for TM-microscope (63AAA353)



4K-HDMI camera and accessories package for MF-microscopes (63AAA694)



4K-HDMI camera and accessories package for TM-microscopes (63AAA695)



Full HD-HDMI microscope camera (63AAA059)



4K-HDMI microscope camera (63AAA796)



Refer to the digital camera upgrade for TM microscopes brochure
 Refer to the digital camera upgrade for MF / MF-U microscopes brochure

Video Microscope Unit VMU Series

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 378-514 only) |



Refer to the microscope units and objective lenses brochure

VMU

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

The VMU offers the following benefits:

- The optical system features ultra-long working distance objectives and correction for the wide range of radiation wavelengths in use.
- Reflected illumination keeps your workpiece free from thermal expansion (the fibreoptic illuminator is required.)
- Also available with a laser mount or turret (objective mount).
- The objective is optional.



VMU-S
378-404



VMU-V
378-505



VMU-H
378-506



VMU-LB
378-513



VMU-L4B
378-514

Selection Guide to System Configuration

(Depends on each system configuration)

| No. | Camera mount | Applicable Wavelength | Vertical camera C-mount | Horizontal camera C-mount | YAG laser mount | Fibre optic illumination unit mount | Mass [g] |
|---------|--|--|-------------------------|---------------------------|-----------------|-------------------------------------|----------|
| 378-404 | C mount (parfocal and axial alignment, independent adjustment mechanism) | Visible radiation | Yes | | | | 400 |
| 378-505 | | Near-infrared and visible radiation | Yes | | | Yes | 570 |
| 378-506 | | Near-infrared and visible radiation | | Yes | | Yes | 590 |
| 378-513 | | Near-infrared, visible, near-ultraviolet radiation | Yes | | Yes | Yes | 1300 |
| 378-514 | | Near infrared, visible, near ultraviolet and ultraviolet radiation | Yes | | Yes | Yes | 1300 |

Video Microscope Unit VMU Series

WIDE VMU

The WIDE VMU series takes video microscopy to the next level with a 7 times bigger field of view than conventional models. It supports both bright field and dark field observation.

The WIDE VMU offers the following benefits:

- Supported sensor size of 2-inch-equivalent, APS-C format
- Image field of $\varnothing 30$ mm with 1X tube lens
- Both F-mount and C-mount cameras can be mounted
- Bright field (BF) observations are supported by the WIDE VMU-V and -H models ,
- Bright field/Dark field (BD) observations are supported by the WIDE VMU-BDV and -BDH models
- With the flexible orientation for camera and illumination mounting very compact arrangements can be configured.
- The objective is optional.



WIDE VMU-BDV



WIDE VMU-BDH



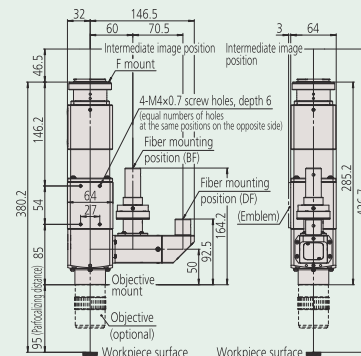
WIDE VMU-HR

| No. | Model | Camera mount | Observation type | Illumination mount | Suitable objectives | Mass [g] |
|---------|--------------|--------------|--------------------------------|--------------------|--|----------|
| 378-517 | WIDE VMU-BDV | Vertical | Bright field / Dark field (BD) | Dual port | BD Plan Apo, BD Plan Apo HR, BD Plan Apo SL | 2000 |
| 378-518 | WIDE VMU-BDH | Horizontal | Bright field / Dark field (BD) | Dual port | BD Plan Apo, BD Plan Apo HR, BD Plan Apo SL | 2150 |
| 378-519 | WIDE VMU-HR | Vertical | Bright field (BF) | Single port | M Plan Apo, M Plan Apo HR, M Plan Apo SL, G Plan Apo | 1400 |

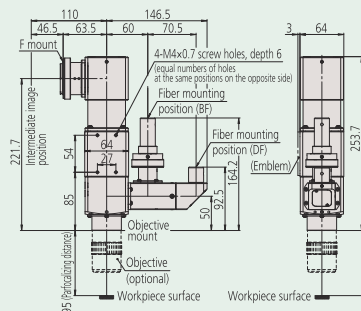
Optional accessories: Motorized turret, focusing unit, polarizer



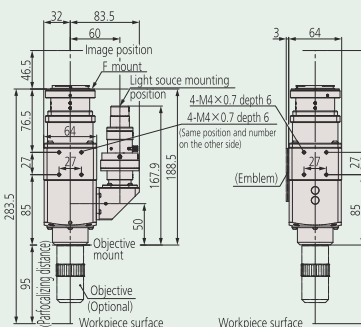
Highly compact configuration of 4 WIDE VMU units



WIDE VMU-BDV



WIDE VMU-BDH



WIDE VMU-HR



Refer to the microscope units and objective lenses brochure

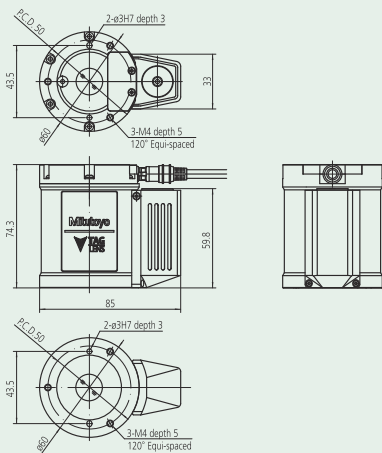
TAGLENS and Software

Specifications

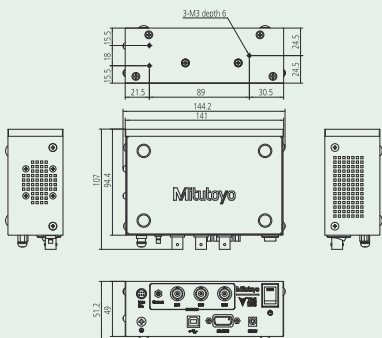
| | |
|---------------------------------------|---|
| Resonance frequency | 70 kHz |
| Effective aperture | ø11 mm |
| Transmittance | 90% or more (400 nm to 700 nm) |
| Refractivity range | 0,7 D to 1 D |
| Mountable posture | All directions |
| Accuracy guaranteed temperature range | 15°C to 30°C |
| Operating Environment / Humidity | 10°C to 40°C / 40% to 70% RH or less (non-condensing) |

Optional accessories

| No. | Description |
|-----------|---|
| 379-110 | VMU-T1 for TAGLENS-T1 |
| 379-200A | Pulsed Light Source (PLS), for TAGLENS-T1 |
| 02NEA067B | Software for TAGLENS-T1, TAGPAK-E V1.1 |



TAGLENS-T1 Dimensions



Controller Dimensions



Refer to the TAGLENS concept book brochure
 Refer to the TAGLENS brochure
 Refer to the OEM brochure

TAGLENS

The Mitutoyo TAGLENS

Ultra-deep-focus eliminates the most important conventional lens limitation. In optical inspection of three-dimensional targets the complicating factors of variable distance, inclination and movement inevitably result in some surfaces being out of focus in every image captured, which has always been the major issue with conventional lenses.

Ultra-high speed, varifocal lens.

A dedicated controller and the software TAGPAK-C V1.2 is equipped as standard.

| No. | Delivered | Mass [g] |
|------------|--|----------|
| 379-010-1A | TAGLENS -T1 includes software TAGPAK-C | 1500 |
| 379-011-1A | TAGLENS-T1 E-Set includes software TAGPAK-C and -E (2NEA67B) | 1500 |



TAGLENS-T1



Controller

The controller supplies power to the TAGLENS main unit and controls the lens main unit via TAGPAK-C. Other than the connector to the main unit, output connectors for synchronization with external devices are equipped. The AC adapter supplied should be used to supply power to the controller.

TAGLENS and Software

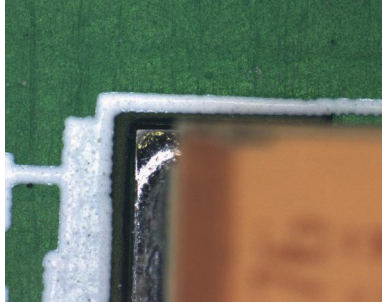
TAGPAK-E (Optional Software)

TAGPAK-E software converts images captured by the optical system using TAGLENS for extended depth of field (EDOF) images.

The software provides functions relating to EDOF images such as parameter setting, image ON/OFF and saving and loading the images.

An included SDK (Software Development Kit) enables the integration of TAGLENS functions into customers' software.

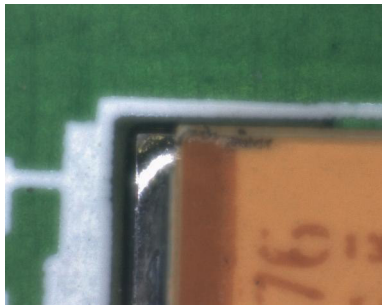
| No. | Description | Remarks |
|-----------|---------------------------------------|--|
| 02NEA067B | Software for TAGLENS-T1, TAGPAK-E V 1 | Software version V1.1 or higher is required for use in combination with the Pulsed Light Source (PLS) for TAGLENS. |



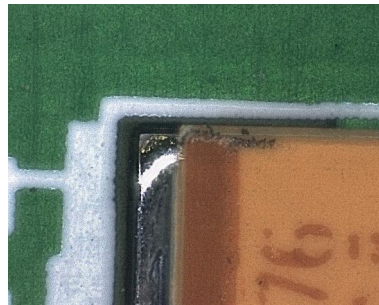
Normal microscope observation (lower)
With a height difference, only the upper or lower plane can be focused.



Normal microscope observation (upper)
With a height difference, only the upper or lower plane can be focused.



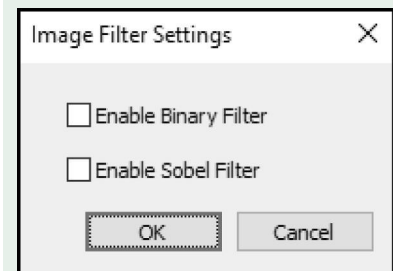
When using TAGLENS (TAGLENS ON)
TAGLENS changes the focus point at high speed. However, because the capturing time per frame is longer than the focusing time, the images will have optically mixed focus points from different heights, and the image will be blurred.



When using TAGLENS (EDOF ON)
Eliminate the blurriness caused by a change in the optical system or focus position, and you obtain an entirely sharper image. This is called the EDOF image.

Specifications

| | |
|--------------------------|--|
| Software | Optional Software for TAGLENS-T1 (Required for EDOF and checking inspection images) |
| OS compatibility | Windows10 Pro 64 bit |
| TAGLENS control software | TAGPAK-C Ver.1.2 |
| CPU | Clock frequency: 2 GHz or more Number of physical cores: 4 cores or more (Recommendation: 8 cores or more) |
| Memory | 8 GB or more |
| Hard disk | 25 GB or more |
| Optical Drive | DVD-ROM Drive for installation software |
| Communication port | TAGLENS control: USB 2 x 1 port and RS-232C x 1 port GigE Vision control: 1000BASE-T x 1 port USB3 Vision control: USB 3 x 1 port Dongle: USB 2 x 1 port Pulsed Light Source control: USB 2 x 1 port |
| Monitor | SXGA (1280x1024 Pixel) or more |



Two filters, the binarization filter and the Sobel* filter, are available for the image displayed on the viewer.

* A filter function to emphasize a contour.

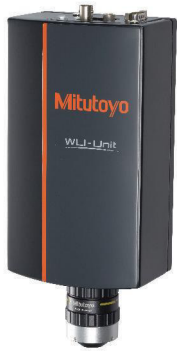


Refer to the TAGLENS concept book brochure
Refer to the TAGLENS brochure
Refer to the OEM brochure

Interferometer Units

Interferometer Units

- Non-contact high-accuracy fine surface texture measurement is possible through white light interference: 3D shape measurement, 3D roughness measurement
- Measurement enabled with high Z-resolution even with low-magnification lens
- Supports high aspect ratio shape measurement through detection not dependent on optical-based NA
- High robustness with regard to disturbance vibration
- Compact and lightweight



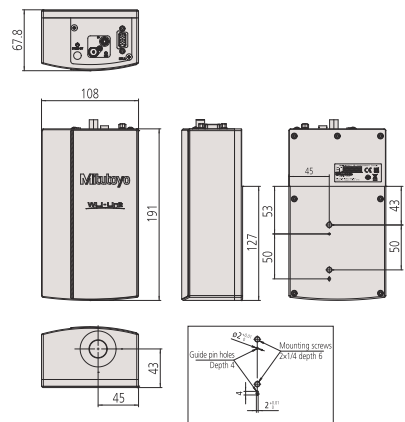
WLI-Unit Sensor Head



WLI-Unit Controller



| No. | Cable length [m] | Mass |
|---------|------------------|--|
| 554-001 | 3 | Sensor Head 1.7 kg / Controller 2.3 kg |
| 554-002 | 5 | Sensor Head 1.7 kg / Controller 2.3 kg |
| 554-003 | 10 | Sensor Head 1.7 kg / Controller 2.3 kg |



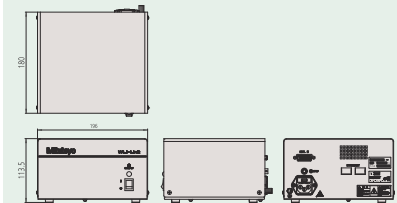
WLI-Unit Sensor Head

Specifications

| | | |
|-----------------------------|---|--|
| Power consumption | Max. 20 W | |
| Applicable objective lenses | WLI Plan Apo series | |
| Focal range f | 100 mm | |
| I/F | WLI-Unit sensor head terminal/stop connector/ GigaBit Ethernet: 2 ch | |
| Rated voltage | AC100~240 V / 50, 60 Hz | |
| Scanning mechanism | Mitutoyo Objective Lens Scanner | |
| Tube lens magnification | 1X | |
| Software | WLIPAK | WLI-Unit control library (SDK), sample code, WLIPAK Sample GUI |
| | WLI-Unit Calibration SW | Pixel calibration |
| | Analysis software (recommended option) | MCubeMap |

| | High Throughput | Standard | High Definition |
|------------------------------------|---------------------|---------------------|---------------------|
| Z Motion Range | 8,000 μm | | |
| WLI measurement Z range | 2,100 μm | 1,900 μm | 1,700 μm |
| Throughput @20 μm range | 3 s | 4 s | 6 s |
| Z resolution | - | 4 nm | |
| Z repeatability (σ) | - | 40 nm | |

554-001/554-002/554-003



WLI-Unit Controller



Refer to the microscope units and objective lenses brochure

Finity Corrected Objectives for ML-Series

Finity Corrected Objectives for ML series

The Mitutoyo 375 Series finity corrected objective lenses realize clear images and long working distance.

Specifications

Abbreviations in product table

N.A.: Numerical aperture
W.D.: Working distance
R: Resolving power
D.F.: Depth of field



Refer to the microscope units and objective lenses brochure



375-036-2



375-037-1



375-034-1



375-039



375-051



375-052



375-053

| No. | Model | Magnification | N.A. | W.D. [mm] | R [μm] | D.F. [μm] | Mass [g] |
|-----------|---------|---------------|------|-----------|---------------------|------------------------|----------|
| 375-036-2 | ML 1x | 1x | 0,03 | 61 | 9,2 | 306 | 80 |
| 375-037-1 | ML 3x | 3x | 0,09 | 77 | 3,06 | 34 | 55 |
| 375-034-1 | ML 5x | 5x | 0,13 | 61 | 2,12 | 23 | 75 |
| 375-039 | ML 10x | 10x | 0,21 | 51 | 1,31 | 6,2 | 125 |
| 375-051 | ML 20x | 20x | 0,42 | 20 | 0,65 | 1,6 | 310 |
| 375-052 | ML 50x | 50x | 0,55 | 13 | 0,5 | 0,9 | 350 |
| 375-053 | ML 100x | 100x | 0,7 | 6 | 0,4 | 0,6 | 380 |

Objectives for M Plan Series

The Mitutoyo 378 Series objectives have one of the world's longest working distances and an infinity-correction optical system. These objectives allow 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



Near-infrared wavelength corrected M Plan Apo NIR objectives

Specifications

Features

- The long working distance type objective lenses 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 lens is an excellent optical system. This objective provides a flat, chromatic aberration-free image throughout the field of view, making it is suitable for any type of microscope.

- Specially designed objective lenses 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 objective lenses are designed to conform to JIS B-7141-1994.



Refer to the microscope units
and objective lenses brochure

Objectives for Brightfield Observation

Specifications

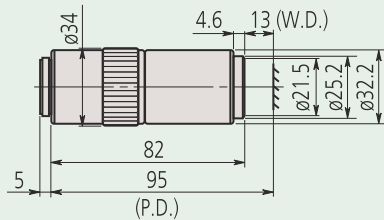
Abbreviations in product table

N.A.: Numerical aperture
 W.D.: Working distance
 P.D.: Parfocal distance
 f: Focal distance
 R: Resolving power
 D.F.: Depth of field
 FOV 1: Field of view when using ø24 mm eyepiece
 FOV 2: Field of view when using a digital camera with 1/2" chip size

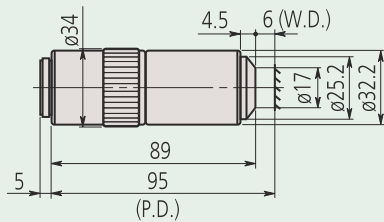
M Plan Apo

Features:

- Long Working Distances
- Infinity Corrected
- Bright Field Inspection
- High Quality Plan Apochromat Design
- Flat Image Surface over Entire Field of View



M Plan Apo 50X

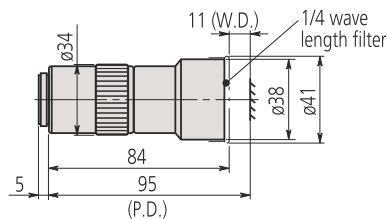


M Plan Apo 100X

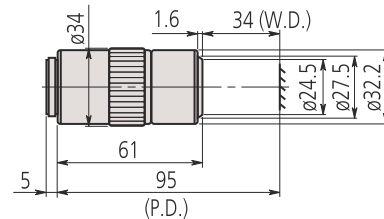


Refer to the microscope units and objective lenses brochure

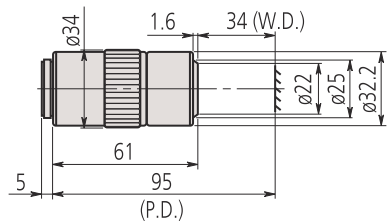
| No. | Model | Magnification | N.A. | W.D. [mm] | P.D. [mm] | f [mm] | R [μm] | D.F. [μm] | FOV 1 [mm] | FOV 2 [mm] | Mass [g] |
|------------|-----------------|---------------|-------|-----------|-----------|--------|--------|-----------|------------|-------------|----------|
| 378-800-12 | M Plan Apo 1X | 1x | 0,025 | 11 | 95 | 200 | 11 | 440 | ø24 | 4,8 x 6,4 | 300 |
| 378-801-12 | M Plan Apo 2X | 2x | 0,055 | 34 | 95 | 100 | 5 | 91 | ø12 | 2,4 x 3,2 | 220 |
| 378-802-12 | M Plan Apo 5X | 5x | 0,14 | 34 | 95 | 40 | 2 | 14 | ø4,8 | 0,96 x 1,28 | 262 |
| 378-807-3 | M Plan Apo 7,5X | 7,5x | 0,21 | 35 | 95 | 26,67 | 1,3 | 6,2 | ø3,2 | 0,64 x 0,85 | 240 |
| 378-803-3 | M Plan Apo 10X | 10x | 0,28 | 34 | 95 | 20 | 1 | 3,5 | ø2,4 | 0,48 x 0,64 | 240 |
| 378-804-3 | M Plan Apo 20X | 20x | 0,42 | 20 | 95 | 10 | 0,7 | 1,6 | ø1,2 | 0,24 x 0,32 | 270 |
| 378-805-3 | M Plan Apo 50X | 50x | 0,55 | 13 | 95 | 4 | 0,5 | 0,9 | ø0,48 | 0,1 x 0,13 | 290 |
| 378-806-3 | M Plan Apo 100X | 100x | 0,7 | 6 | 95 | 2 | 0,4 | 0,6 | ø0,24 | 0,05 x 0,06 | 320 |



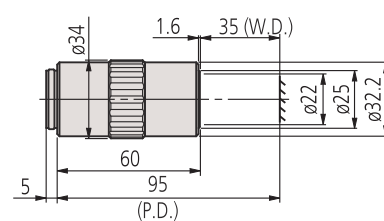
M Plan Apo 1X



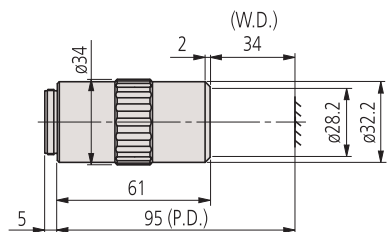
M Plan Apo 2X



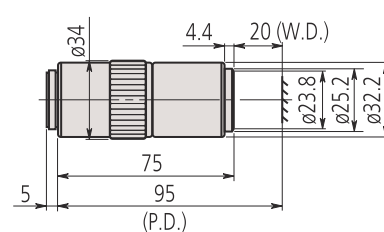
M Plan Apo 5X



M Plan Apo 7,5X



M Plan Apo 10X



M Plan Apo 20X

Objectives for Brightfield Observation

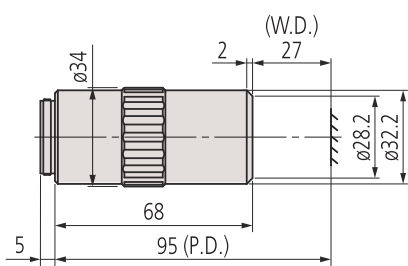
M Plan Apo HR

Features:

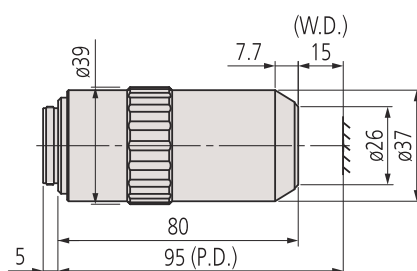
- High Resolution
- Infinity Corrected
- Bright Field Inspection
- High Quality Plan Apochromat
- Flat Image Surface over Entire Field of View



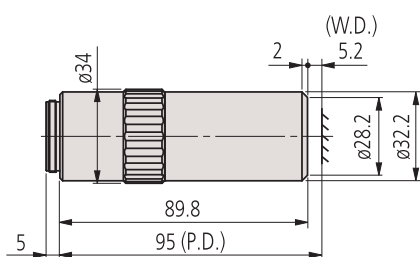
| No. | Model | Magnification | N.A. | W.D. [mm] | P.D. [mm] | f [mm] | R [μm] | D.F. [μm] | FOV 1 [mm] | FOV 2 [mm] | Mass [g] |
|------------|--------------------|---------------|------|-----------|-----------|--------|--------|-----------|------------|-------------|----------|
| 378-787-16 | M Plan Apo HR 5X | 5x | 0,21 | 27 | 95 | 40 | 1,3 | 6,2 | ∅4,8 | 0,96 x 1,28 | 285 |
| 378-788-15 | M Plan Apo HR 10X | 10x | 0,42 | 15 | 95 | 20 | 0,7 | 1,6 | ∅2,4 | 0,48 x 0,64 | 455 |
| 378-814-4 | M Plan Apo HR 50X | 50x | 0,75 | 5,2 | 95 | 4 | 0,4 | 0,49 | ∅0,48 | 0,1 x 0,13 | 400 |
| 378-815-4 | M Plan Apo HR 100X | 100x | 0,9 | 1,3 | 95 | 2 | 0,3 | 0,34 | ∅0,24 | 0,05 x 0,06 | 410 |



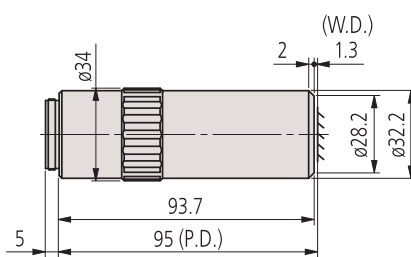
M Plan Apo HR 5X



M Plan Apo HR 10X



M Plan Apo HR 50X



M Plan Apo HR 100X

Specifications

Abbreviations in product table

N.A.: Numerical aperture
 W.D.: Working distance
 P.D.: Parfocal distance
 f: Focal distance
 R: Resolving power
 D.F.: Depth of field
 FOV 1: Field of view when using ∅24 mm eye-piece
 FOV 2: Field of view when using a digital camera with 1/2" chip size



Refer to the microscope units and objective lenses brochure

Objectives for Brightfield Observation

Specifications

Abbreviations in product table

N.A.: Numerical aperture
 W.D.: Working distance
 P.D.: Parfocal distance
 f: Focal distance
 R: Resolving power
 D.F.: Depth of field
 FOV 1: Field of view when using ø24 mm eyepiece
 FOV 2: Field of view when using a digital camera with 1/2" chip size



Refer to the microscope units and objective lenses brochure

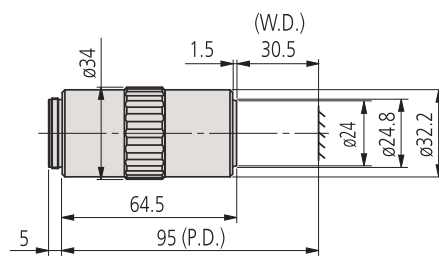
M Plan Apo SL

Features:

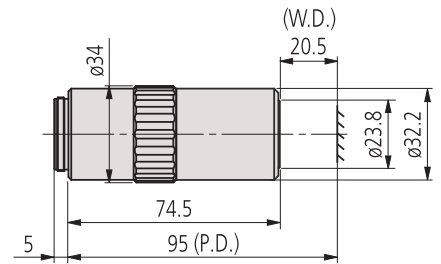
- Super Long Working Distances
- Infinty Corrected
- Bright Field Inspection
- High Quality Plan Apochromat Design
- Flat Image Surface over Entire Field of View



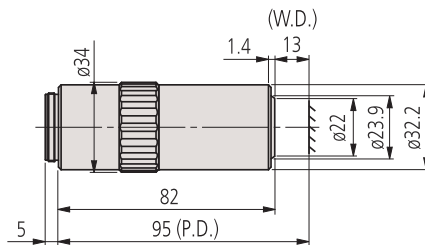
| No. | Model | Magnification | N.A. | W.D. [mm] | P.D. [mm] | f [mm] | R [μm] | D.F. [μm] | FOV 1 [mm] | FOV 2 [mm] | Mass [g] |
|------------|--------------------|---------------|------|-----------|-----------|--------|--------|-----------|------------|-------------|----------|
| 378-810-3 | M Plan Apo SL 20X | 20x | 0,28 | 30,5 | 95 | 10 | 1 | 3,5 | ø1,2 | 0,24 x 0,32 | 240 |
| 378-811-15 | M Plan Apo SL 50X | 50x | 0,42 | 20,5 | 95 | 4 | 0,7 | 1,6 | ø0,48 | 0,1 x 0,13 | 280 |
| 378-813-3 | M Plan Apo SL 100X | 100x | 0,55 | 13 | 95 | 2 | 0,5 | 0,9 | ø0,24 | 0,05 x 0,06 | 290 |



M Plan Apo SL 20X



M Plan Apo SL 50X



M Plan Apo SL 100X

Objectives for Brightfield Observation

G Plan Apo

Features:

- Infinity Corrected
- Bright Field Inspection
- High Quality Plan Apochromat Design
- Designed to observe Objects through 3.5 mm thick Cover Glass

Note: Contact Mitutoyo to custom order a specific cover glass correction to suit your application if required. Thickness, material and refractive index are all specifiable within usual limits.

Specifications

Abbreviations in product table

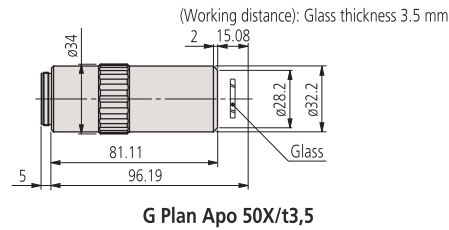
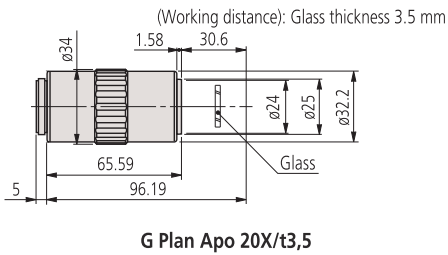
Mag.: Magnification
 N.A.: Numerical aperture
 W.D.: Working distance
 P.D.: Parfocal distance
 f: Focal distance
 R: Resolving power
 D.F.: Depth of field
 FOV 1: Field of view when using ø24 mm eyepiece
 FOV 2: Field of view when using a digital camera with 1/2" chip size



Refer to the microscope units and objective lenses brochure



| No. | Model | Magnification | N.A. | W.D. [mm] | P.D. [mm] | f [mm] | R [μm] | D.F. [μm] | FOV 1 [mm] | FOV 2 [mm] | Mass [g] |
|-----------|----------------|---------------|------|-----------|-----------|--------|--------|-----------|------------|-------------|----------|
| 378-847 | G Plan Apo 20X | 20x | 0,28 | 29,42 | 96,19 | 10 | 1 | 3,5 | ø1,2 | 0,24 x 0,32 | 270 |
| 378-848-3 | G Plan Apo 50X | 50x | 0,5 | 13,89 | 96,19 | 4 | 0,6 | 1,1 | ø0,48 | 0,1 x 0,13 | 320 |



Objectives for Brightfield/Darkfield Observation

Specifications

Abbreviations in product table

N.A.: Numerical aperture
 W.D.: Working distance
 P.D.: Parfocal distance
 f: Focal distance
 R: Resolving power
 D.F.: Depth of field
 FOV 1: Field of view when using $\phi 24$ mm eye-piece
 FOV 2: Field of view when using a digital camera with 1/2" chip size

BD Plan Apo

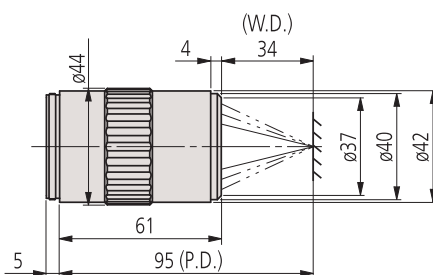
Features:

- Bright/Dark Field Inspection
- Infinity corrected
- Long Working Distance
- High Quality Plan Apochromat Design
- Suited for inspection of scratches, concavity and convexity on surfaces

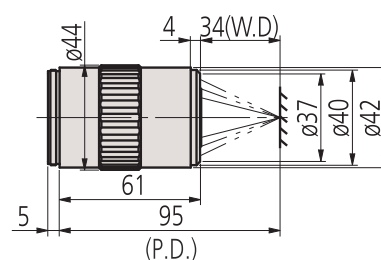
| No. | Model | Magnification | N.A. | W.D. [mm] | f [mm] | R [μ m] | D.F. [μ m] | FOV 1 [mm] | FOV 2 [mm] | Mass [g] |
|------------|------------------|---------------|-------|-----------|--------|--------------|-----------------|-------------|-------------|----------|
| 378-831-12 | BD Plan Apo 2x | 2x | 0,055 | 34 | 100 | 5 | 91 | $\phi 1,2$ | 2,4 x 3,2 | 340 |
| 378-832-12 | BD Plan Apo 5X | 5x | 0,14 | 34 | 40 | 2 | 14 | $\phi 4,8$ | 0,96 x 1,28 | 350 |
| 378-830-7 | BD Plan Apo 7,5X | 7,5x | 0,21 | 34 | 26,67 | 1,3 | 6,2 | $\phi 3,6$ | 0,64 x 0,85 | 350 |
| 378-833-7 | BD Plan Apo 10X | 10x | 0,28 | 34 | 20 | 1 | 3,5 | $\phi 2,4$ | 0,48 x 0,64 | 350 |
| 378-834-7 | BD Plan Apo 20X | 20x | 0,42 | 20 | 10 | 0,7 | 1,6 | $\phi 1,2$ | 0,24 x 0,32 | 400 |
| 378-835-7 | BD Plan Apo 50X | 50x | 0,55 | 13 | 4 | 0,5 | 0,9 | $\phi 0,48$ | 0,1 x 0,13 | 440 |
| 378-836-7 | BD Plan Apo 100X | 100x | 0,7 | 6 | 2 | 0,4 | 0,6 | $\phi 0,24$ | 0,05 x 0,06 | 460 |



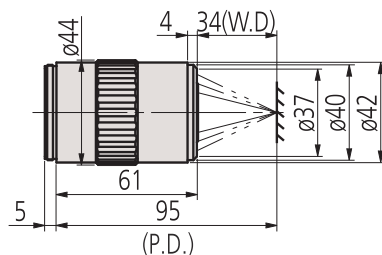
Refer to the microscope units and objective lenses brochure



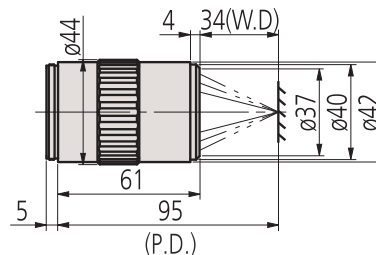
BD Plan Apo 2X



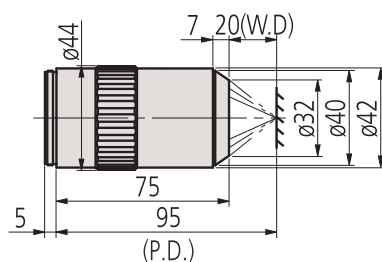
BD Plan Apo 5X



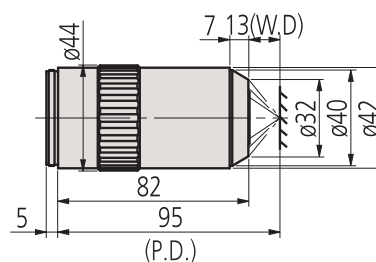
BD Plan Apo 7,5X



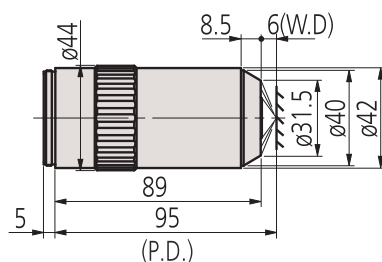
BD Plan Apo 10X



BD Plan Apo 20X



BD Plan Apo 50X



BD Plan Apo 100X

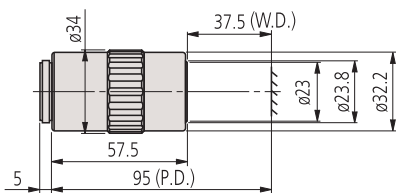
Objectives for NIR

M Plan Apo NIR / M Plan Apo NIR HR

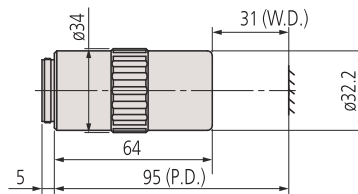
Features:

- Infinity Corrected
- Suitable for Bright Field Inspection and Laser Applications
- Long Working Distance
- High Quality Plan Apochromat Design
- Wavelength Correction from Visible to Near Infrared (480-1800 nm)
- High-Resolving Power Type available (M Plan Apo NIR HR)

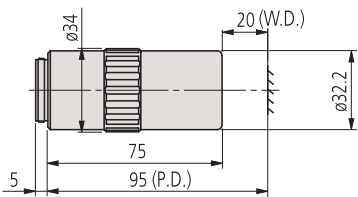
| No. | Model | Magnification | N.A. | W.D. [mm] | P.D. [mm] | f [mm] | R [μm] | D.F. [μm] | FOV 1 [mm] | FOV 2 [mm] | Mass [g] |
|------------|------------------------|---------------|------|-----------|-----------|--------|---------------------|------------------------|--------------------|-------------|----------|
| 378-822-5 | M Plan Apo NIR 5X | 5x | 0,14 | 37,5 | 95 | 40 | 2 | 14 | $\varnothing 4,8$ | 0,96 x 1,28 | 220 |
| 378-823-15 | M Plan Apo NIR 10X | 10x | 0,26 | 31 | 95 | 20 | 1,1 | 4,1 | $\varnothing 2,4$ | 0,48 x 0,64 | 250 |
| 378-824-16 | M Plan Apo NIR 20X | 20x | 0,4 | 20 | 95 | 10 | 0,7 | 1,7 | $\varnothing 1,2$ | 0,24 x 0,32 | 300 |
| 378-825-17 | M Plan Apo NIR 50X | 50x | 0,42 | 17 | 95 | 4 | 0,7 | 1,6 | $\varnothing 0,48$ | 0,1 x 0,13 | 350 |
| 378-826-15 | M Plan Apo NIR 100X | 100x | 0,5 | 12 | 95 | 2 | 0,6 | 1,1 | $\varnothing 0,24$ | 0,05 x 0,06 | 335 |
| 378-854 | M Plan APO NIR HR 20x | 20x | 0,6 | 12 | 95 | 10 | 0,46 | 0,8 | $\varnothing 1,2$ | 0,33 x 0,44 | 470 |
| 378-863-5 | M Plan Apo NIR HR 50X | 50x | 0,65 | 10 | 95 | 4 | 0,4 | 0,7 | $\varnothing 0,48$ | 0,1 x 0,13 | 450 |
| 378-864-15 | M Plan Apo NIR HR 100X | 100x | 0,7 | 10 | 95 | 2 | 0,4 | 0,6 | $\varnothing 0,24$ | 0,05 x 0,06 | 490 |



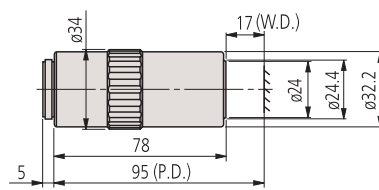
M Plan Apo NIR 5X



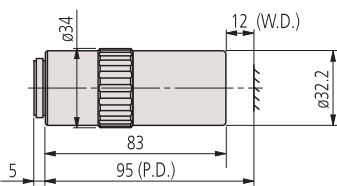
M Plan Apo NIR 10X



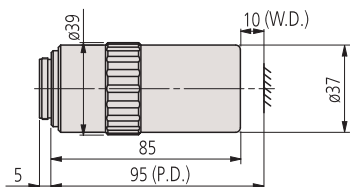
M Plan Apo NIR 20X



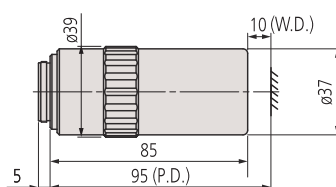
M Plan Apo NIR 50X



M Plan Apo NIR 100X



M Plan Apo NIR HR 50X



M Plan Apo NIR HR 100X

Specifications

Abbreviations in product table

N.A.: Numerical aperture
W.D.: Working distance
P.D.: Parfocal distance
f: Focal distance
R: Resolving power
D.F.: Depth of field
FOV 1: Field of view when using $\varnothing 24$ mm eyepiece
FOV 2: Field of view when using a digital camera with 1/2" chip size

M Plan Apo NIR

Note:
These objective lenses 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.



Refer to the microscope units and objective lenses brochure

Objectives for NIR

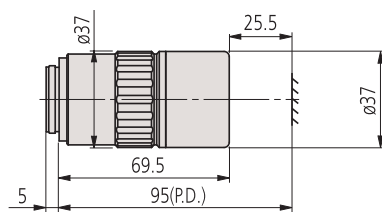
M Plan Apo NIR B

Features:

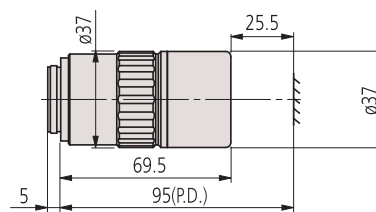
- Infinity Corrected
- Suitable for Bright Field Inspection and Laser Applications
- Long Working Distance 25.5 mm
- High Quality Plan Apochromat Design
- Wavelength Correction from Visible to Near Infrared (420-1064 nm)



| No. | Model | Magnification | N.A. | W.D. [mm] | P.D. [mm] | f [mm] | R [μm] | D.F. [μm] | FOV 1 [mm] | FOV 2 [mm] | Mass [g] |
|-----------|----------------------|---------------|------|-----------|-----------|--------|--------|-----------|------------|-------------|----------|
| 378-867-5 | M Plan Apo NIR B 20X | 20x | 0,4 | 25,5 | 95 | 10 | 0,7 | 1,7 | ∅1,2 | 0,24 x 0,32 | 350 |
| 378-868-5 | M Plan Apo NIR B 50X | 50x | 0,42 | 25,5 | 95 | 4 | 0,7 | 1,6 | ∅0,48 | 0,24 x 0,13 | 375 |



M Plan Apo NIR B 20X



M Plan Apo NIR B 50X

Specifications

Abbreviations in product table

N.A.: Numerical aperture
 W.D.: Working distance
 P.D.: Parfocal distance
 f: Focal distance
 R: Resolving power
 D.F.: Depth of field
 FOV 1: Field of view when using ∅24 mm eye-piece
 FOV 2: Field of view when using a digital camera with 1/2" chip size

M Plan Apo NIR B

Note:
 This series of objective has greatly improved in operability thanks to the achievement of an ultra-long working distance of 25,5 mm while maintaining the NA of the NIR series 20X/50X.

M Plan Apo NIR

Note:
 These objective lenses 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.



Refer to the microscope units and objective lenses brochure

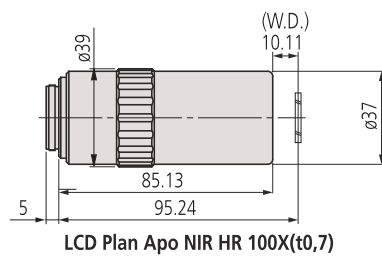
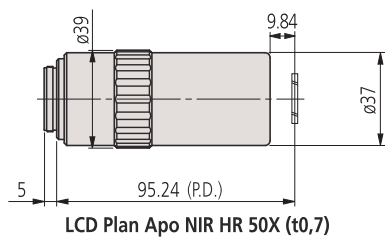
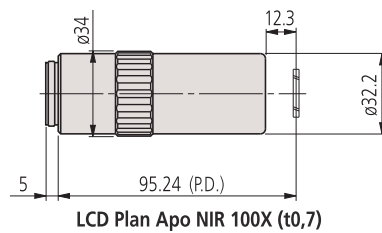
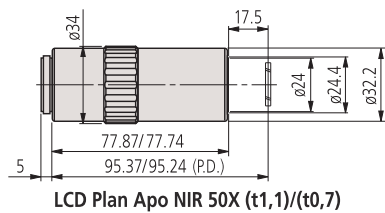
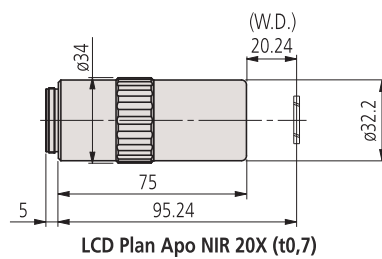
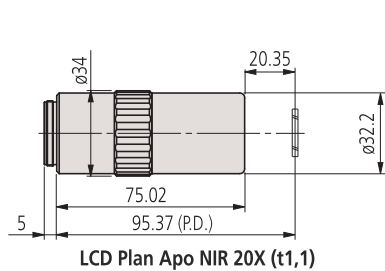
Objectives for NIR LCD

LCD Plan Apo NIR/LCD Plan Apo NIR HR

Features:

- Suitabel for Bright Field Inspection and Laser-based repair Applications through 0.7 or 1.1 mm LCD cover-glass
- Long Working Distance
- High Quality Plan Apochromat Design
- Wavelength correction from Visible to Near Infrared (1800 nm)

| No. | Model | Magnification | N.A. | W.D. [mm] | f [mm] | R [μm] | D.F. [μm] | FOV 1 [mm] | FOV 2 [mm] | Mass [g] |
|------------|---------------------------------|---------------|------|-----------|--------|--------|-----------|------------|-------------|----------|
| 378-827-16 | LCD Plan Apo NIR 20X (t1,1) | 20x | 0,4 | 19,98 | 10 | 0,7 | 1,7 | ø1,2 | 0,24 x 0,32 | 305 |
| 378-821-16 | LCD Plan Apo NIR 20X(t0,7) | 20x | 0,4 | 20 | 10 | 0,7 | 1,7 | ø1,2 | 0,24 x 0,32 | 305 |
| 378-828-16 | LCD Plan Apo NIR 50X (t1,1) | 50x | 0,42 | 17,13 | 4 | 0,7 | 1,6 | ø0,47 | 0,1 x 0,13 | 320 |
| 378-829-16 | LCD Plan Apo NIR 50X (t0,7) | 50x | 0,42 | 17,26 | 4 | 0,7 | 1,6 | ø0,48 | 0,1 x 0,13 | 320 |
| 378-754-15 | LCD Plan Apo NIR 100X (t0,7) | 100x | 0,5 | 12,06 | 2 | 0,6 | 1,1 | ø0,24 | 0,05 x 0,06 | 335 |
| 378-869-5 | LCD Plan Apo NIR HR 50X (t0,7) | 50x | 0,65 | 9,6 | 4 | 0,4 | 0,7 | ø0,48 | 0,1 x 0,13 | 450 |
| 378-870-15 | LCD Plan Apo NIR HR 100X (t0,7) | 100x | 0,7 | 9,87 | 2 | 0,4 | 0,6 | ø0,24 | 0,05 x 0,06 | 490 |



Specifications

Abbreviations in product table

N.A.: Numerical aperture
 W.D.: Working distance
 P.D.: Parfocal distance
 f: Focal distance
 R: Resolving power
 D.F.: Depth of focus
 FOV 1: Field of view when using ø24 mm eye-piece
 FOV 2: Field of view when using a digital camera with 1/2" chip size



Refer to the microscope units and objective lenses brochure

Objectives for NUV

M Plan Apo NUV/M Plan Apo NUV HR

Features:

- Suitable for Bright Field Inspection and Laser Applications
- Long Working Distance
- High Quality Plan Apochromat Design
- Wavelength correction from Visible to Near Ultraviolet (355 nm)
- High Power Type available (M Plan Apo NUV HR)

| No. | Model | Magnification | N.A. | W.D. [mm] | P.D. [mm] | f [mm] | R [μm] | D.F. [μm] | FOV 1 [mm] | FOV 2 [mm] | Mass [g] |
|------------|-----------------------|---------------|------|-----------|-----------|--------|--------|-----------|------------|-------------|----------|
| 378-809-5 | M Plan Apo NUV 10X | 10x | 0,28 | 30,5 | 95 | 20 | 1 | 3,5 | ø2,4 | 0,48 x 0,64 | 255 |
| 378-817-8 | M Plan Apo NUV 20X | 20x | 0,42 | 17 | 95 | 10 | 0,7 | 1,7 | ø1,2 | 0,24 x 0,32 | 350 |
| 378-818-8 | M Plan Apo NUV 50X | 50x | 0,44 | 15 | 95 | 4 | 0,6 | 1,4 | ø0,48 | 0,1 x 0,13 | 390 |
| 378-819-15 | M Plan Apo NUV 100X | 100x | 0,5 | 11 | 95 | 2 | 0,6 | 1,1 | ø0,24 | 0,05 x 0,06 | 380 |
| 378-888-6 | M Plan Apo NUV HR 50X | 50x | 0,65 | 10 | 95 | 4 | 0,42 | 0,65 | ø0,48 | 0,1 x 0,13 | 550 |

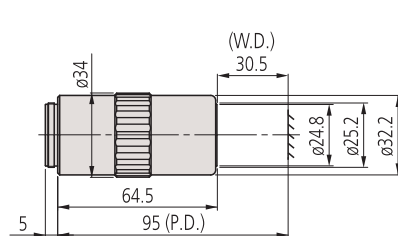
Specifications

Abbreviations in product table

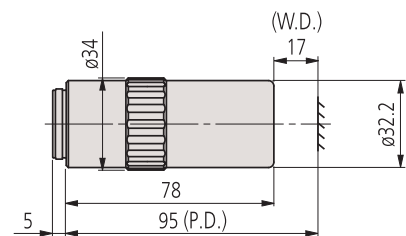
N.A.: Numerical aperture
 W.D.: Working distance
 P.D.: Parfocal distance
 f: Focal distance
 R: Resolving power
 D.F.: Depth of focus
 FOV 1: Field of view when using ø24 mm eye-piece
 FOV 2: Field of view when using a digital camera with 1/2" chip size



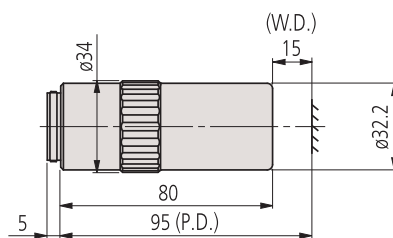
Refer to the microscope units and objective lenses brochure



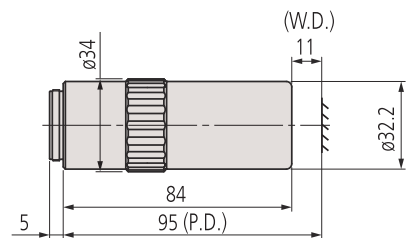
M Plan Apo NUV 10X



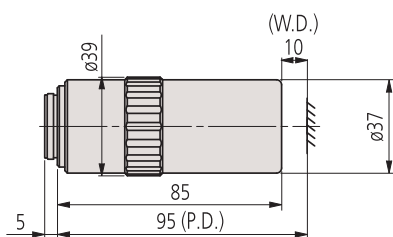
M Plan Apo NUV 20X



M Plan Apo NUV 50X



M Plan Apo NUV 100X



M Plan Apo NUV HR 50X

Objectives for NUV LCD

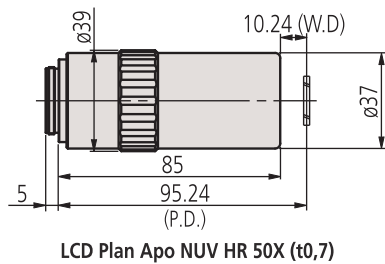
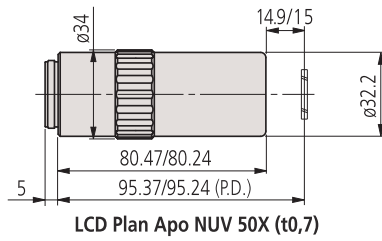
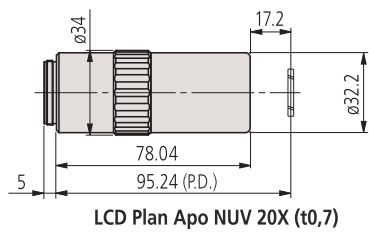
M Plan Apo NUV LCD

Features:

- Suitable for Bright Field Inspection and Laser Applications through 0,7 or 1,1 mm LCD conver-glass
- Long Working Distance
- High Quality Plan Apochromat Design
- Wavelength correction from Visible to Near Ultraviolet (355 nm)
- High Resolution Type available (LCD Plan Apo NUV HR)



| No. | Model | Magnification | N.A. | W.D. [mm] | P.D. [mm] | f [mm] | R [μm] | D.F. [μm] | FOV 1 [mm] | FOV 2 [mm] | Mass [g] |
|-----------|--------------------------------|---------------|------|-----------|-----------|--------|--------|-----------|------------|-------------|----------|
| 378-890-8 | LCD plan Apo NUV 20X (t0,7) | 20x | 0,42 | 16,96 | 95 | 10 | 0,7 | 1,6 | ø1,2 | 0,24 x 0,32 | 340 |
| 378-820-8 | LCD Plan Apo NUV 50X (t0,7) | 50x | 0,44 | 14,76 | 95 | 4 | 0,6 | 1,4 | ø0,48 | 0,1 x 0,13 | 350 |
| 378-891-6 | LCD plan Apo NUV HR 50X (t0,7) | 50x | 0,65 | 9,76 | 95 | 4 | 0,4 | 0,7 | ø0,48 | 0,1 x 0,13 | 500 |



Specifications

Abbreviations in product table

N.A.: Numerical aperture
 W.D.: Working distance
 P.D.: Parfocal distance
 f: Focal distance
 R: Resolving power
 D.F.: Depth of focus
 FOV 1: Field of view when using ø24 mm eyepiece
 FOV 2: Field of view when using a digital camera with 1/2" chip size



Refer to the microscope units and objective lenses brochure

Specifications

Abbreviations in product table

N.A.: Numerical aperture
 W.D.: Working distance
 P.D.: Parfocal distance
 f: Focal distance
 R: Resolving power
 D.F.: Depth of focus
 FOV 1: Field of view when using ø24 mm eyepiece
 FOV 2: Field of view when using a digital camera with 1/2" chip size



Refer to the microscope units and objective lenses brochure

Objectives for UV

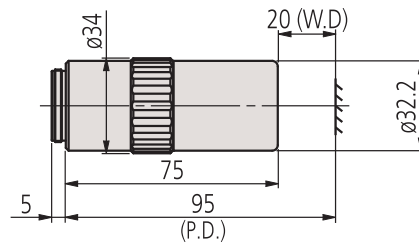
M Plan UV

Features:

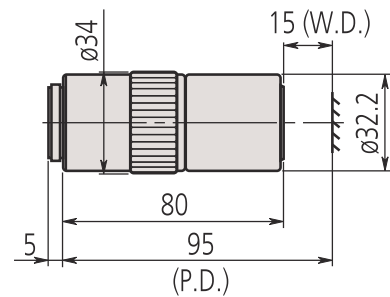
- Suitable for Bright Field Inspection and Laser Applications
- Long Working Distance
- High Quality Plan Design
- Wavelength optimized for Visible and Ultraviolet (266 nm) Wavelength
- High Transmission in Ultraviolet Range



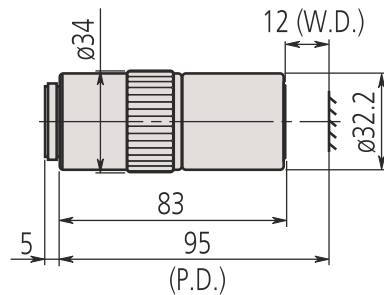
| No. | Model | Magnification | N.A. | W.D. [mm] | P.D. [mm] | f [mm] | R [μm] | D.F. [μm] | FOV 1 [mm] | FOV 2 [mm] | Mass [g] |
|------------|---------------|---------------|------|-----------|-----------|--------|--------|-----------|------------|-------------|----------|
| 378-844-15 | M Plan UV 10X | 10x | 0,25 | 20 | 95 | 20 | 1,1 | 4,4 | ø2,4 | 0,48 x 0,64 | 310 |
| 378-837-7 | M Plan UV 20X | 20x | 0,36 | 15 | 95 | 10 | 0,8 | 2,1 | ø1,2 | 0,24 x 0,32 | 330 |
| 378-838-8 | M Plan UV 50X | 50x | 0,41 | 12 | 95 | 4 | 0,7 | 1,6 | ø0,48 | 0,1 x 0,13 | 400 |
| 378-839-5 | M Plan UV 80X | 80x | 0,55 | 10 | 95 | 2,6 | 0,5 | 0,9 | ø0,3 | 0,06 x 0,08 | 380 |



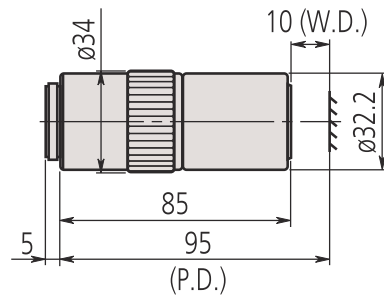
M Plan UV 10X



M Plan UV 20X



M Plan UV 50X



M Plan UV 80X

Objectives for UV LCD

M Plan Apo UV LCD

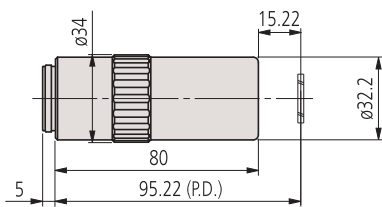
Features:

- Suitable for Bright Field Inspection and Laser Applications through 0,7 mm LCD cover-glass
- Long Working Distance
- High Quality Plan Design
- Wavelength optimized for Visible and Ultraviolet (266 nm)

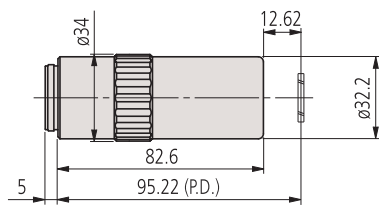


Refer to the microscope units and objective lenses brochure

| No. | Model | Magnification | N.A. | W.D. [mm] | P.D. [mm] | f [mm] | R [μm] | D.F. [μm] | FOV 1 [mm] | FOV 2 [mm] | Mass [g] |
|-----------|------------------------|---------------|------|-----------|-----------|--------|--------|-----------|------------|-------------|----------|
| 378-892-8 | LCD Plan UV 20X (t0,7) | 20x | 0,37 | 15 | 95 | 10 | 0,8 | 2,1 | ø1,2 | 0,24 x 0,32 | 370 |
| 378-893-8 | LCD Plan UV 50X (t0,7) | 50x | 0,41 | 12,4 | 95 | 4 | 0,7 | 1,6 | ø0,48 | 0,1 x 0,13 | 400 |



LCD Plan UV 20X (t0,7)



LCD Plan UV 50X (t0,7)

Specifications

Abbreviations in product table

N.A.: Numerical aperture
 W.D.: Working distance
 P.D.: Parfocal distance
 f: Focal distance
 R: Resolving power
 D.F.: Depth of focus
 FOV 1: Field of view when using ø24 mm eyepiece
 FOV 2: Field of view when using a digital camera with 1/2" chip size



Refer to the microscope units and objective lenses brochure

Objectives for Interferometer

Specifications

| | |
|--------------------------------|--|
| Abbreviations in product table | N.A.: Numerical aperture W.D.: Working distance P.D.: Parfocal distance f: Focal distance R: Resolving power |
| Applicable tube lens f | 100 mm |
| Mounting screws | RMS / 20,32 mm x36 TP |



Refer to the microscope units and objective lenses brochure

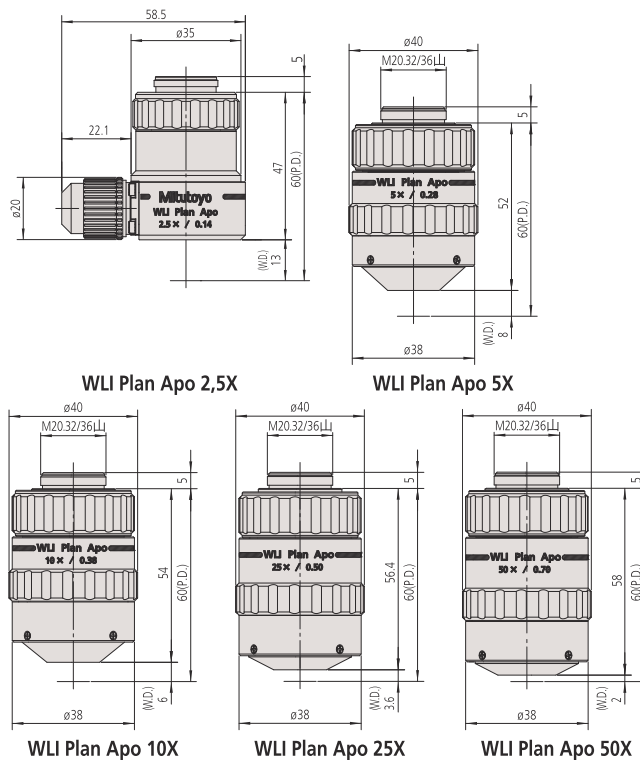
Interferometer Objectives

- New design matching the WLI-Unit
- Ensures long working distance while more compact and lighter-weight (parfocal 60 mm)
- High NA, high resolution
- Plan Apochromat
- Beam splitter and reference mirror mounted inside objective lens
- Interference fringe adjustment mechanism equipped as standard



| No. | Model | Magnification | N.A. | W.D. [mm] | P.D. [mm] | f [mm] | R [μm] | FOV 2/3 inch camera [mm] |
|---------|-------------------|---------------|------|-----------|-----------|--------|--------|--------------------------|
| 378-400 | WLI Plan Apo 2,5x | 2,5x | 0,14 | 13 | 60 | 40 | 2 | 2,64x3,52 |
| 378-005 | WLI Plan Apo 5x | 5x | 0,28 | 8 | 60 | 20 | 0,98 | 1,32x1,76 |
| 378-401 | WLI Plan Apo 10x | 10x | 0,38 | 6 | 60 | 10 | 0,72 | 0,66x0,88 |
| 378-402 | WLI Plan Apo 25x | 25x | 0,5 | 3,6 | 60 | 4 | 0,55 | 0,26x0,35 |
| 378-403 | WLI Plan Apo 50x | 50x | 0,7 | 2 | 60 | 2 | 0,39 | 0,13x0,18 |

| No. | FOV WLI-Unit [mm] | Mirror tube length (excl. mounting screws) | Outermost diameter | Mass [g] |
|---------|-------------------|--|---|----------|
| 378-400 | 2,94x2,25 | 47 | 36,4 (excluding interference unit) 58,5 (Max) | 320 |
| 378-005 | 1,46x1,12 | 52 | 40 | 210 |
| 378-401 | 0,73x0,56 | 54 | 40 | 220 |
| 378-402 | 0,29x0,22 | 57 | 40 | 290 |
| 378-403 | 0,14x0,11 | 58 | 40 | 300 |



Measuring Projector PJ-PLUS Series

PJ-PLUS

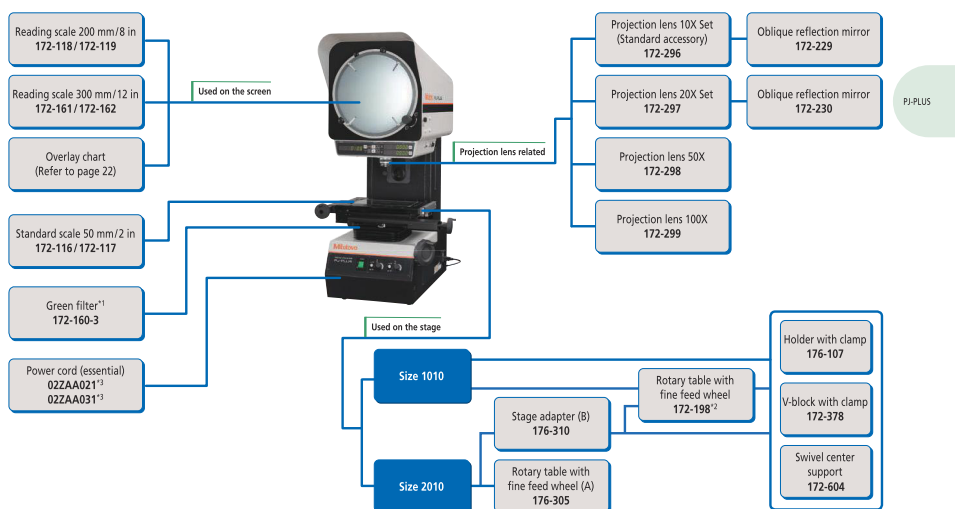
The measuring projector that "can be operated intuitively" even by inexperienced people and also has excellent durability and energy-saving performance thanks to the adoption of an "LED illumination source" and "fanless cooling system". It provides stable dimension and angle measurements in harsher environments, such as manufacturing and processing lines, than can be handled by conventional models.



PJ-P1010A

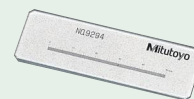
| No. | Model | Quick-release mechanism | XY stage table top size [mm] | XY stage effective area [mm] | Stage glass No. | Max stage loading [kg] | Mass [kg] |
|------------|-----------|-------------------------|------------------------------|------------------------------|-----------------|------------------------|-----------|
| 302-801-10 | PJ-P1010A | X and Y axes | 250 x 250 | 142 x 142 | 12BAE041 | 10 | 114 |
| 302-802-10 | PJ-P2010A | X and Y axes | 350 x 280 | 240 x 140 | 12BAD760 | 8 | 118 |

System Diagram



Optional accessories

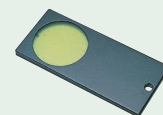
| No. | Description |
|------------|--|
| 172-116 | Inspection tool, Standard scale 50 mm/0,1 mm |
| 172-118 | Inspection tool, Reading scale 200 mm/0,5 mm |
| 172-119 | Inspection tool, Reading scale 8"/0.02" |
| 172-161 | Inspection tool, Reading Scale 300 mm/0,5 mm |
| 172-162 | Inspection tool, Reading Scale 12"/0.02" |
| 172-160-3 | Green Filter, Colour filter |
| 172-604 | Swivel center support, Fixture/clamping material |
| 172-229 | Lens accessory, Oblique reflecting mirror for 10X lens |
| 172-230 | Lens accessory, Oblique reflecting mirror for 20X lens |
| 172-378 | V-BLOCK, with clamp |
| 176-107 | Fixture/clamping material, Holder with clamp |
| 12AAE671 | Attachment, OPTOEYE-200 Attachment A, 250-350 mm |
| 332-161 | OPTOEYE200, Edge detection sensor for QMData200 |
| 176-106 | Rotary table |
| 172-196 | Rotary table, 100 mm for TM-1005B |
| 172-198 | Rotary table, 100 mm with fine feed knob for TM-1005B |
| 264-160-13 | QM-DATA200 (Stand type), 2D Data processor w/o power cord |
| 264-161-13 | QM-DATA200 (Arm type), 2D Data processor w/o power cord |
| 172-502 | LED Circular Illuminator (PJ-PLUS), for 10x and 20x + adapter 12AAX044, w/o power cord |
| 12AAX044 | DAMPING RING A (FOR PJ 20X), to connect LED illumination 172-502 on 20x lens |
| 172-296 | Projection lens set, 10X magnification |
| 172-297 | Projection lens set, 20X magnification |
| 172-298 | Projection lens set, 50X magnification |
| 172-299 | Projection lens set, 100X magnification |
| 63AAA406 | M2-2D software for PJ and PH series, Non-Edge detection unit incl. PC mounting kit |
| 63AAA407 | M2-2D software for PJ and PH series, Edge detection unit incl. PC mounting kit |
| 63AAA795 | ASUS AiO PC for M2 system, Intel Celeron N4500/8GB/256GB SSD M.2/ W11Pro/ 15.6" FHD Touch Screen |



172-116
Inspection tool



172-229
Lens accessory



172-160-3
Green filter



172-502
LED Circular Illuminator



Refer to the PJ / PV / PH profile projectors brochure
Refer to the M2 software for the profile projectors and microscopes brochure

Measuring Projector PJ-H30

Specifications

| | |
|------------------------|---|
| Projected image | Erect |
| Projector screen | Effective diameter: 306 mm 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 |
| Contor 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 |
| Focussing | Manual focus |
| Power supply | 220V AC, 50/60Hz |
| Resolution | 0,001 mm |

PJ-H30 Measuring Projector

This measuring projector has adjustable incident illumination.

The PJ-H30 offers you the following benefits:

- By rotating the condenser lens and changing the angle of the mirror in the objective, you can represent even poorly reflecting surfaces 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 enabling you to switch smoothly 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.
- RS-232C output.

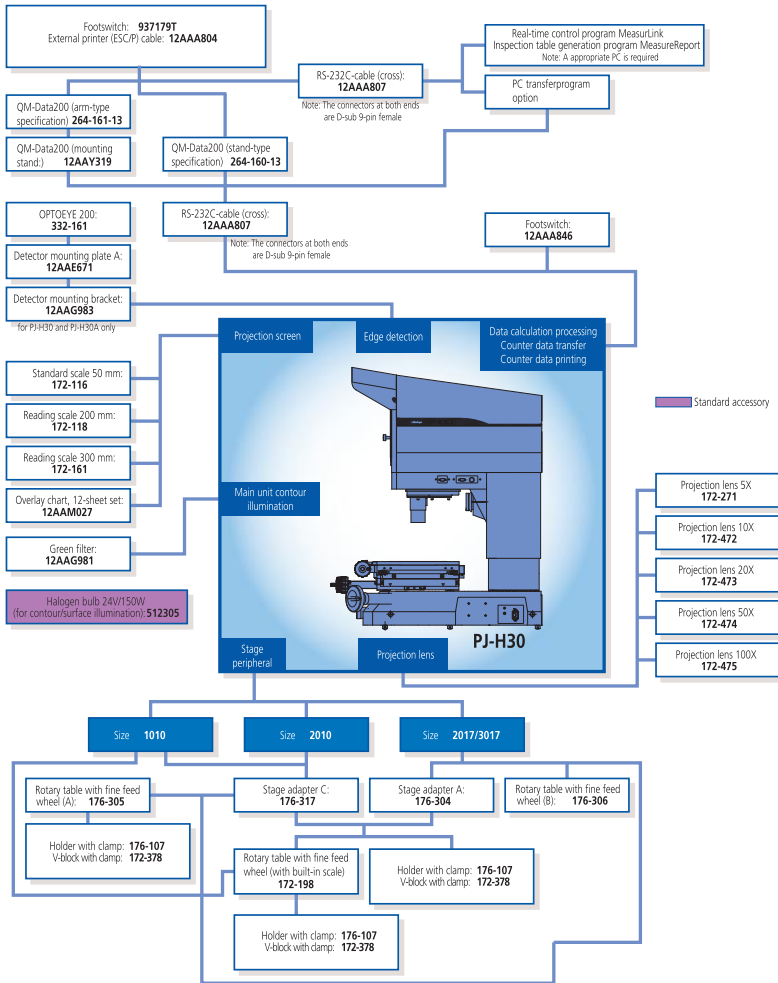
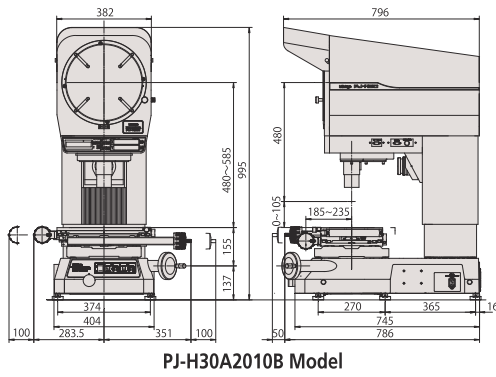


3017B model



| No. | Model | XY stage table top size [mm] | XY stage effective area [mm] | Stage glass No. | Table swiveling function | Max stage loading [kg] | Mass [kg] |
|------------|---------------|------------------------------|------------------------------|-----------------|--------------------------|------------------------|-----------|
| 303-716-13 | PJ-H30A 1010B | 300 x 240 | 180 x 150 | 380412 | $\pm 3^\circ$ | 10 | 176 |
| 303-717-13 | PJ-H30A 2010B | 350 x 280 | 250 x 150 | 382762 | $\pm 3^\circ$ | 10 | 178 |
| 303-718-13 | PJ-H30A 2017B | 410 x 342 | 270 x 240 | 12BAD363 | $\pm 5^\circ$ | 20 | 205 |
| 303-719-13 | PJ-H30A 3017B | 510 x 342 | 370 x 240 | 12BAD330 | $\pm 5^\circ$ | 20 | 212 |

Measuring Projector PJ-H30



Optional accessories

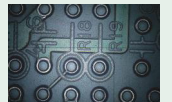
| No. | Description |
|------------|--|
| 12AAG983 | Attachment, Optoeye-200 Attachment for PJ-H30 Series |
| 12AAG981 | Filter, Green filter for PJ-H30 Series projector |
| 176-306 | Rotary table with fine feed wheel, Type B, glass diameter = 238 mm |
| 172-271 | Projection lens, 5X magnification for PJ-311 |
| 172-473 | Projection lens, 20X magnification for PJ-H30 Series |
| 172-474 | Projection lens, 50X magnification for PJ-H30 Series |
| 172-475 | Projection lens, 100X magnification for PJ-H30 Series |
| 172-378 | V-BLOCK, with clamp |
| 12AAY319 | QMDATA200 Attachment stand, for QMDATA on PJ-H30 |
| 264-160-13 | QM-DATA200 (Stand type), 2D Data processor w/o power cord |
| 264-161-13 | QM-DATA200 (Arm type), 2D Data processor w/o power cord |
| 011534 | MC Special Cleaner |
| 332-161 | OPTOEYE200, Edge detection sensor for QMData200 |
| 172-116 | Inspection tool, Standard scale 50 mm/0,1 mm |
| 172-118 | Inspection tool, Reading scale 200 mm/0,5 mm |
| 172-161 | Inspection tool, Reading Scale 300 mm/0,5 mm |
| 12AAE671 | Attachment, OPTOEYE-200 Attachment A, 250-350 mm |
| 63AAA406 | M2-2D software for PJ and PH series, Non-Edge detection unit incl. PC mounting kit |
| 63AAA407 | M2-2D software for PJ and PH series, Edge detection unit incl. PC mounting kit |
| 63AAA795 | ASUS AiO PC for M2 system, Intel Celeron N4500/8GB/256GB SSD M.2/ W11Pro/ 15.6" FHD Touch Screen |

Printer and interface

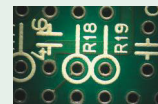
| | |
|----------|---|
| 12AAA807 | Cable RS-232C, 2m for LH-600 B, C, D, E Tables |
| 176-305 | Rotary Table, Type A, D=240 mm |
| 172-604 | Swivel center support, Fixture/clamping material |
| 172-198 | Rotary table, 100 mm with fine feed knob for TM-1005B |



Vertical/oblique switchable surface illumination



Vertical illumination



Oblique illumination



264-160-13
QM-Data 200



Refer to the PJ / PV / PH profile projectors brochure
Refer to the M2 software for the profile projectors and microscopes brochure

Measuring Projector PV-5110

PV-5110 Measuring Projector

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

Specifications

| | |
|------------------------|--|
| Projected image | Inverted |
| Projector screen | Effective diameter: 508 mm 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 |
| Contor 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 |
| Focussing | Manual |
| Resolution | 0,001 mm |
| Power supply | 220 - 240V AC, 50/60Hz |
| Mass | 210 kg |



304-919-12
Counter is optional

Standard accessories

| No. | Description |
|--------|--|
| 512305 | Halogen Lamp for Measuring Projector, 24V/150W |
| 382762 | Stage glass, 280 x 180 mm, for projector |



KA Counter



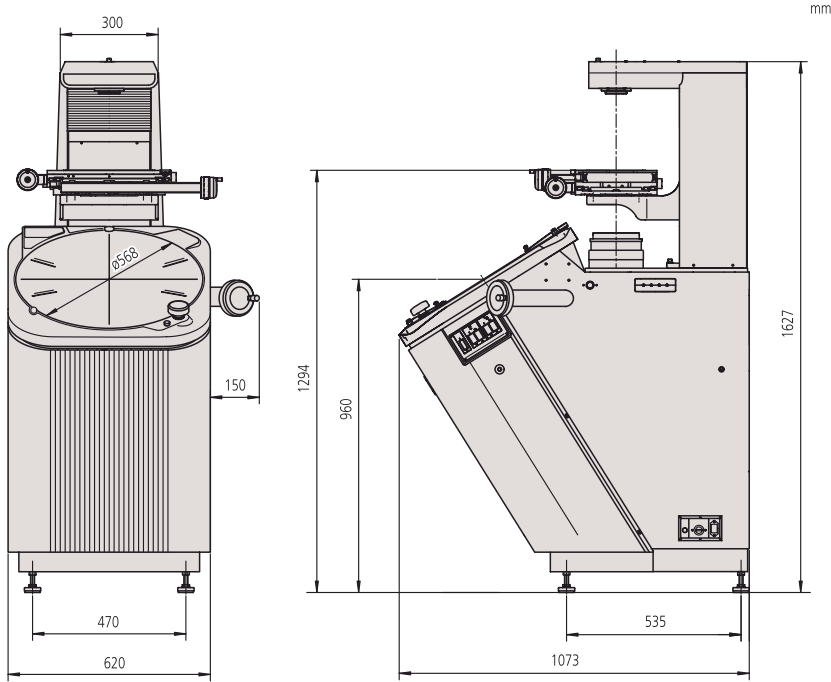
QM-Data 200



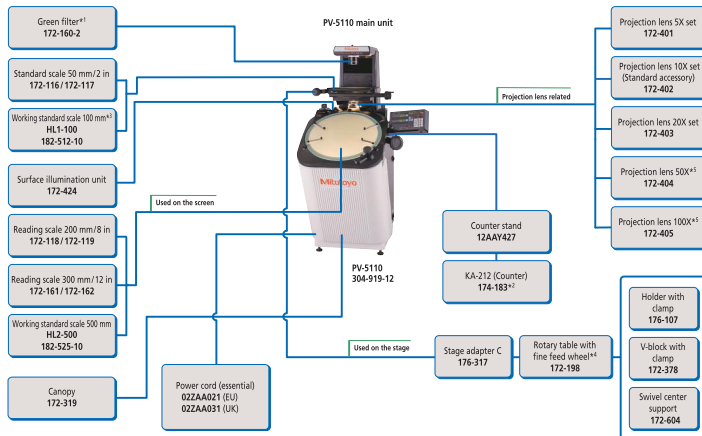
OPTOEYE 200

| No. | Model | XY stage [mm] | Measuring method | Quick-release mechanism | XY stage table top size [mm] | XY stage effective area [mm] | Stage glass No. | Table swiveling function | Max stage loading [kg] | Mass [kg] |
|------------|---------|---------------|------------------|-------------------------|------------------------------|------------------------------|-----------------|--------------------------|------------------------|-----------|
| 304-919-12 | PV-5110 | 200 x 100 | Linear encoder | X and Y axes | 380 x 250 | 266 x 170 | 382762 | $\pm 3^\circ$ | 5 | 210 |

Measuring Projector PV-5110



System Diagram



*1 This is inserted in the contour light source section during use.
 *2 To denote your AC power cable add the following suffixes to the code No.: A for UL/CSA, D for CE, DC for CCC, E for BS, K for KC, C and No suffix are required for PSE.
 *3 Used on the stage. It is projected onto the screen to check the magnification accuracy with a reading scale or working standard scale.
 *4 Since the rotary stage section is small, if it is used for a large stage, some restrictions may be imposed on the measuring range.
 *5 When using a 50X or a 100X projection lens, you need to remove the stage glass in order to prevent a collision between the stage glass for the X/Y stage and the projection lens.
 *6 Not provided with the product. Please order it separately.
 Note: If an optional unit is installed on the stage, the H (Max. workpiece height) length is reduced by the optional unit height.

Optional accessories

| No. | Description |
|------------|--|
| 172-198 | Rotary table, 100 mm with fine feed knob for TM-1005B |
| 172-161 | Inspection tool, Reading Scale 300 mm/0,5 mm |
| 172-116 | Inspection tool, Standard scale 50 mm/0,1 mm |
| 172-330 | Inspection tool, Standard scale 80 mm/0,1 mm |
| 172-329 | Inspection tool, Reading scale 600 mm/0,5 mm |
| 011534 | MC Special Cleaner |
| 264-161-13 | QM-DATA200 (Arm type), 2D Data processor w/o power cord |
| 332-161 | OPTOEYE200, Edge detection sensor for QMData200 |
| 172-160-2 | Green filter |
| 172-319 | Canopy |
| 12AAY427 | Counter Stand, For PV-5110 projector |
| 174-183D | Linear Scale Counter KA-212 |
| 12AAE672 | Attachment, OPTOEYE-200 Attachment B, 500-600 mm |
| 172-604 | Swivel center support, Fixture/clamping material |
| 172-378 | V-BLOCK, with clamp |
| 176-107 | Fixture/clamping material, Holder with clamp |
| 63AAA795 | ASUS AiO PC for M2 system, Intel Celeron N4500/8GB/256GB SSD M.2/ W11Pro/ 15.6" FHD Touch Screen |
| 63AAA462 | M2-2D soft and hardware for PV5110, incl. edge detection unit and tablet mount |

| | Magnification | | | | |
|------------|---------------|-------|-------|--------|-------|
| | 5X | 10X | 20X | 50X | 100X |
| View field | ø101.6 | ø50.8 | ø25.4 | ø10.16 | ø5.08 |
| 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



172-319



Refer to the PJ / PV / PH profile projectors brochure
 Refer to the M2 software for the profile projectors
 and microscopes brochure

Measuring Projector PH-3515F

Specifications

| | |
|------------------------|--|
| Projected image | Erect |
| Projector screen | Effective diameter: 353 mm 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 (172-482) Optional: 5X, 20X, 50X, 100X |
| Magnification accuracy | Contour illumination: $\pm 0,1\%$ or better Surface illumination: $\pm 0,15\%$ or better |
| Contor 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 |
| Focussing | Manual |
| Resolution | 0,001 mm |
| Power supply | 220 - 240V AC, 50/60Hz |
| Mass | 150 kg |

Standard accessories

| No. | Description |
|----------|--|
| 512305 | Halogen Lamp for Measuring Projector, 24V/150W |
| 12BAA637 | Bulb, Halogen 24V/200W for PH-3515F twin fiber |

PH-3515F Measuring Projector

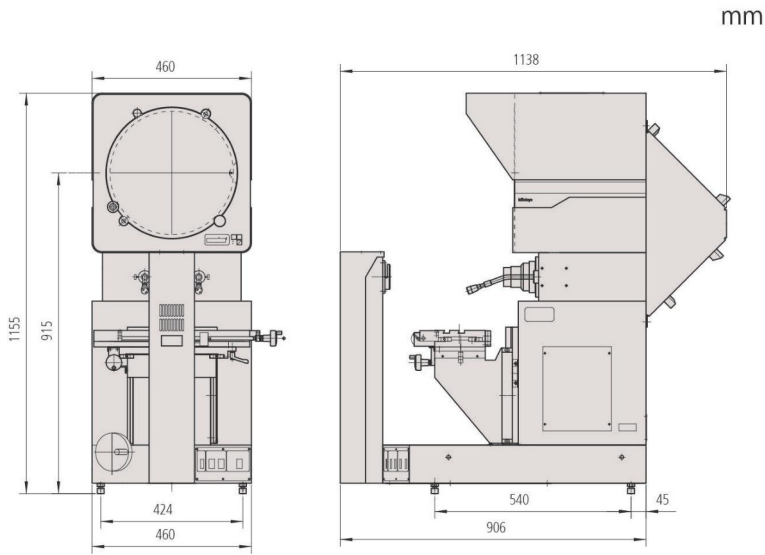
- Due to the PH-3515F's horizontal-beam illumination, you can easily measure larger and heavier workpieces including toothed racks and punching tools.
- You can use the projector for a wide range of applications due to its generous 254 x 152 mm stage travel and 45 kg allowable stage loading.



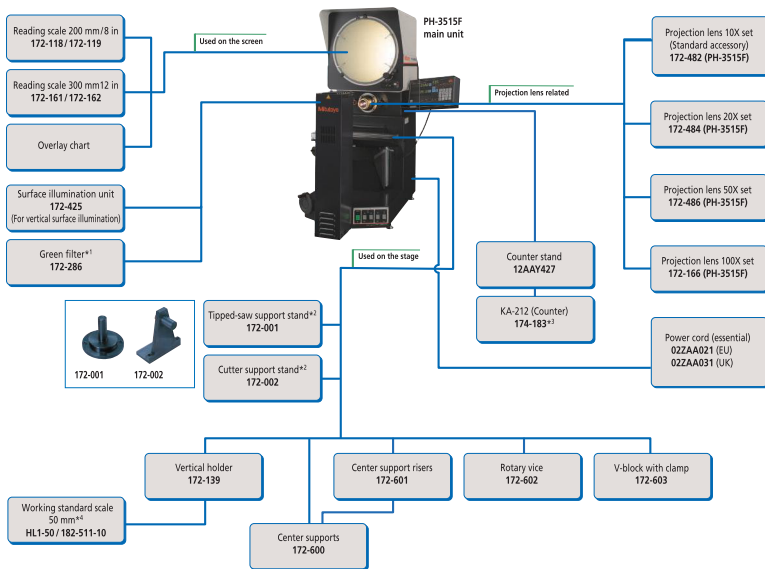
172-868-12

| No. | Model | XY stage [mm] | Measuring method | Quick-release mechanism | XY stage table top size [mm] | Table swiveling function | Max stage loading [kg] | Mass [kg] |
|------------|----------|---------------|------------------|-------------------------|------------------------------|--------------------------|------------------------|-----------|
| 172-868-12 | PH-3515F | 254 x 152 | Linear encoder | X axis | 450 x 146 | $\pm 10^\circ$ | 45 | 150 |

Measuring Projector PH-3515F



System Diagram



*1 This is inserted in the contour light source section during use.

*2 The tipped-saw and cutter support stands support a center hole diameter of 25.4 mm.

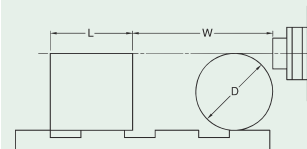
*3 The AC cord is not provided with the product. Please order it separately 02ZAA021 (EU), 02ZAA031 (UK).

*4 This scale for checking the magnification accuracy. It is fixed on the stage with a vertical holder and projected on the screen to check the magnification with reading scale.

*5 Not provided with the product. Please order it separately.

Optional accessories

| No. | Description |
|------------|--|
| 332-161 | OPTOEYE200, Edge detection sensor for QMData200 |
| 12AAE671 | Attachment, OPTOEYE-200 Attachment A, 250-350 mm |
| 172-116 | Inspection tool, Standard scale 50 mm/0,1 mm |
| 172-161 | Inspection tool, Reading Scale 300 mm/0,5 mm |
| 27AAA057 | Overlay chart set for Profile Projectors, Set consists of charts No. 11-22 |
| 172-118 | Inspection tool, Reading scale 200 mm/0,5 mm |
| 174-183D | Linear Scale Counter KA-212 |
| 172-425 | Surface Illumination Unit (PH-3515F), Illumination |
| 172-286 | Filter, Colour filter |
| 172-600 | Center support, Fixture/clamping material |
| 172-601 | Center support riser set, Fixture/clamping material |
| 172-602 | Rotary vise, Fixture/clamping material |
| 172-603 | V-block with clamp, Fixture/clamping material |
| 172-139 | Vertical workpiece holder, Fixture/clamping material |
| 12AA427 | Counter Stand, For PV-5110 projector |
| 011534 | MC Special Cleaner |
| 63AAA795 | ASUS AiO PC for M2 system, Intel Celeron N4500/8GB/256GB SSD M.2/ W11Pro/ 15.6" FHD Touch Screen |
| 63AAA406 | M2-2D software for PJ and PH series, Non-Edge detection unit incl. PC mounting kit |
| 63AAA407 | M2-2D software for PJ and PH series, Edge detection unit incl. PC mounting kit |
| 264-161-13 | QM-DATA200 (Arm type), 2D Data processor w/o power cord |



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



QM-Data 200



Refer to the PJ / PV / PH profile projectors brochure
Refer to the M2 software for the profile projectors and microscopes brochure

Data Processing Unit QM-Data 200

QM-Data 200

The Data Processing Unit QM-Data 200 has been especially designed to process measurement data generated by a profile projector or measuring microscope.

The QM-Data 200 offers you the following benefits:

- Measuring instructions, measuring values and calculation results for various operations are shown on the back-lit LCD in a clear, easy to understand style.
- You can also print measuring results, either on a small and convenient thermal printer (available as a special option) or on an ESC/P printer and continuous paper.

Specifications

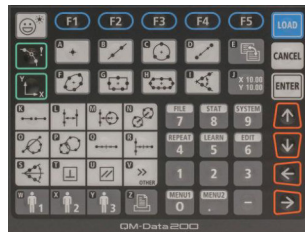
| | |
|---------------------------------|---|
| Dimensions [mm] | 260 x 242 x 310: Stand-mount type 318 x 153 x 275: Arm-mount type |
| Screen | Colour graphics TFT LCD (320 x 240 dots, with background lighting) |
| Program functions | Part program creation, execution, editing |
| Statistical processing | Number of data, maximum value, minimum value, mean value, standard deviation, range, histogram |
| Display language | Japanese/English/German/French/Italian/Spanish/Portuguese/Czech/Traditional Chinese/Simplified Chinese/Korean/Turkish/Swedish/Polish/Dutch/Hungarian |
| 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. |
| Measurement result file output | CSV format; MUX-10F format |
| Functions | Mitutoyo's AI Function: The AI function (AI=Artificial Intelligence) renders choosing the element type before measuring obsolete. Point measurements are analyzed 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 repetitive measurements. Additionally macro commands and part programs as well as frequently used standard operations can be stored as user settings. |



Stand-mount type



Arm-mount type

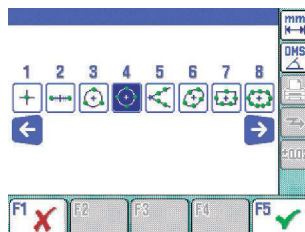


Intuitive panel design

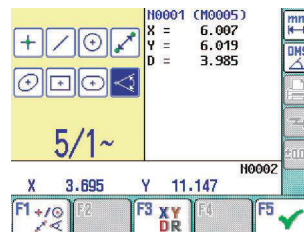
| No. | Resolution | Power supply | Data output | Data input | Description | Mass [kg] |
|------------|------------|-----------------------|-----------------------|---|------------------|-----------|
| 264-160-13 | 1 / 0,1 µm | 100/240V AC, 50/60 Hz | USB, RS-232C, Printer | USB, RS-232C, X/Y/Z-axis signal, Footswitch | Stand-mount type | 2,9 |
| 264-161-13 | 1 / 0,1 µm | 100/240V AC, 50/60 Hz | USB, RS-232C, Printer | USB, RS-232C, X/Y/Z-axis signal, Footswitch | Arm-mount type | 2,8 |

Optional accessories

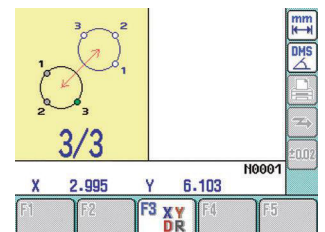
| No. | Description |
|----------|---|
| 12AAA807 | Cable RS-232C, 2m for LH-600 B, C, D, E |
| 63AAA108 | RS-232C Signal Cable, D-Sub-25-D-Sub-9, 2m |
| 332-161 | OPTOEYE200, Edge detection sensor for QMData200 |



Clear function icons



Coloured LCD display with backlight



Guided measurements



Refer to the QM-Data200 and vision unit brochure

Data Processing Unit QM-Data 200

Edge Detection Sensor OPTOEYE 200

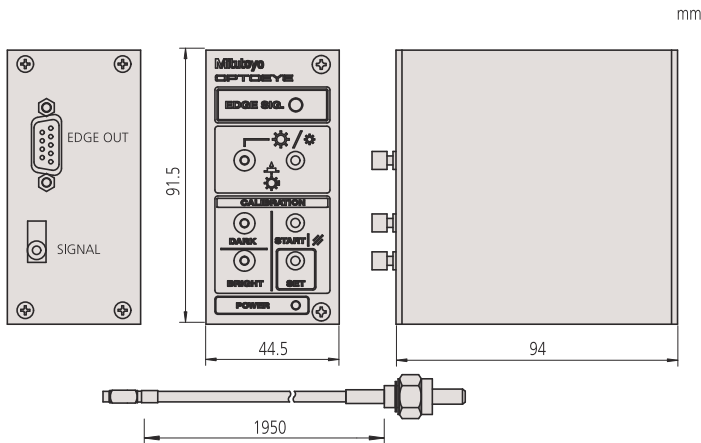
This edge sensor allows you to make accurate measurements independent of your skill level by automatically detecting edges used in measurements.

The Optoeye 200 offers you the following benefits:

- OPTOEYE 200 reduces the effect of operator skill level on accuracy by automatically detecting edges used in measurements.
- PJ-H30: You can use the OPTOEYE edge detector on models PJ-H30A (requires adapter plate 12AAG983).
- PV-5110 and PJ-3515F: You can use the OPTOEYE edge detector in combination with the QM-Data 200.
- PJ-PLUS: You can use the OPTOEYE edge detector on models 302-801-10/302-802-10 in combination with the QM-Data 200.
- When you are using the OPTOEYE all projector scales must be connected to QM-Data 200 directly and built-in counters can no longer be used (except PJ-H30D type).



| No. | Function | Description |
|---------|--------------------------|-----------------------------------|
| 332-161 | Automatic edge detection | Edge detection sensor OPTOEYE 200 |



Specifications

| | |
|---------------|--------------------|
| Min. diameter | 2 mm on the screen |
| Min. width | 1 mm on the screen |

Optional accessories

| No. | Description |
|----------|--|
| 12AAE671 | Attachment, OPTOEYE-200 Attachment A, 250-350 mm |
| 12AAE672 | Attachment, OPTOEYE-200 Attachment B, 500-600 mm |



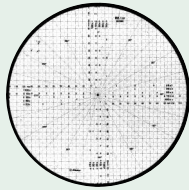
Refer to the QM-Data200 and vision unit brochure

Accessories for Measuring Projectors

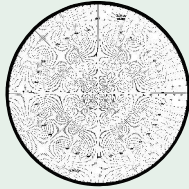
Specifications

Grid divisions

10X: 0,1 mm
20X: 0,05 mm
50X: 0,02 mm
100X: 0,01 mm



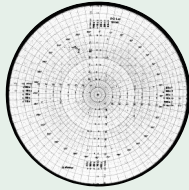
Grid/protractor chart



Radius/protractor chart



Radius chart



Protractor chart

Overlays for Measuring Projectors

These standard overlay charts increase the range of application and the efficiency of Mitutoyo measuring projectors.

This chart set offers you the following benefits:

- The charts are supplied in sizes $\varnothing 250$, 300, 340, 500 to suit the screens of Mitutoyo projectors.
- A large range of scales and profiles is provided that enables you to test workpiece features quickly and easily. You can test length, height, parallelism, angle, radius, taper, bore position, diameter, as well as all standardized thread and tooth profiles.
- All charts are made of a distortion-free special plastics compound and are provided with a protective coating.

Grid/protractor chart

Angle: 15° increments

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

| No. | Diameter [mm] | Mass [g] |
|----------|---------------|----------|
| 201380 | 250 | 100 |
| 63AAA536 | 300 | 100 |
| 63AAA538 | 500 | 100 |

Protractor chart

Angle: Divisions at 1° and 30'

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

| No. | Diameter [mm] | Mass [g] |
|----------|---------------|----------|
| 63AAA545 | 250 | 100 |
| 63AAA551 | 300 | 100 |
| 63AAA553 | 500 | 100 |

Radius and Protractor chart

Angle: Divisions at 1° and 30'

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

| No. | Diameter [mm] | Mass [g] |
|----------|---------------|----------|
| 63AAA530 | 250 | 100 |
| 63AAA579 | 300 | 100 |
| 201393 | 340 | 100 |

Radius chart

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

| No. | Diameter [mm] | Mass [g] |
|----------|---------------|----------|
| 63AAA531 | 250 | 100 |
| 63AAA546 | 300 | 100 |
| 63AAA547 | 340 | 100 |
| 63AAA548 | 500 | 100 |



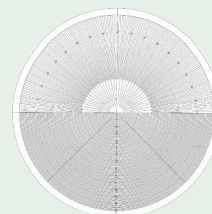
Refer to the PJ / PV / PH profile projectors brochure

Accessories for Measuring Projectors

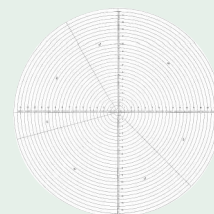
Group 2 - Makes inspection of projected images an easy process.

Metric

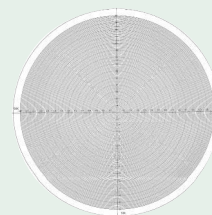
| No. | Diameter [mm] | Model | Mass [g] |
|----------|---------------|---|----------|
| 27AAA044 | 300 | No. 11 Circle/protractor chart metric | 8 |
| 27AAA045 | 300 | No. 12 Circle chart 5 mm pitch metric | 8 |
| 27AAA046 | 300 | No. 13 Circle chart 1 mm pitch metric | 8 |
| 27AAA047 | 300 | No. 14 Grid chart 20X-50X, 1mm pitch | 8 |
| 27AAA048 | 300 | No.15 Grid chart 10 mm pitch metric | 8 |
| 27AAA049 | 300 | No. 16 Crossed lines chart metric | 8 |
| 27AAA050 | 300 | No. 17 Grid chart 1 mm pitch metric | 8 |
| 27AAA051 | 300 | No. 18 Protractor chart 1° pitch metric | 8 |
| 27AAA052 | 300 | No. 19 Hor.lines chart 1 mm pitch | 8 |
| 27AAA053 | 300 | No. 20 Circle/protractor chart metric | 8 |
| 27AAA054 | 300 | No. 21 Thread chart Metric, Unified, Whitworth | 8 |
| 27AAA055 | 300 | No. 22 Thread/gear chart metric | 8 |
| 27AAA056 | 300 | Staggered cross hairline | 8 |
| 27AAA057 | 300 | Overlay chart set, consists of charts No. 11-22 | |



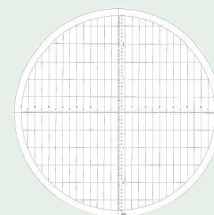
27AAA044



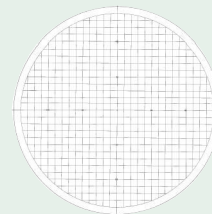
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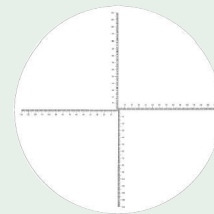
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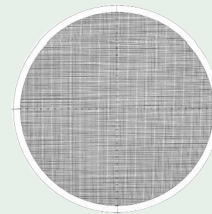
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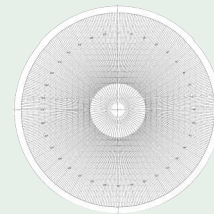
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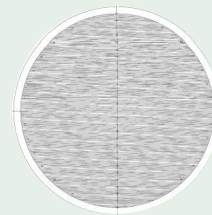
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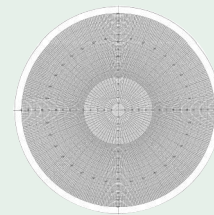
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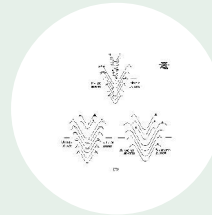
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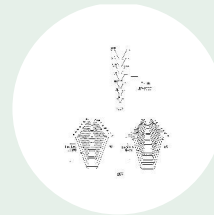
27AAA052



27AAA053



27AAA054



27AAA055



Refer to the PJ / PV / PH profile projectors brochure

Accessories for Measuring Projectors

Workpiece Fixtures for Measuring Projectors and Microscopes



172-600

Centre Support

| No. | Max. workpiece height | Mass [kg] |
|---------|-----------------------|-----------|
| 172-600 | 120 mm | 3,3 |



172-601

Centre Support Riser

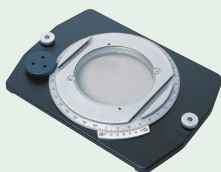
| No. | Max. workpiece height | Mass [kg] |
|---------|-----------------------|-----------|
| 172-601 | 240 mm | 3,3 |



176-107

Holder with Clamp

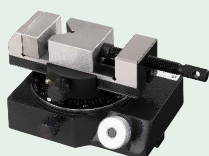
| No. | Max. workpiece height | Mass [kg] |
|---------|-----------------------|-----------|
| 176-107 | 35 mm | 0,42 |



172-198

Rotary Tables

| No. | Effective glass dia. [mm] | Angular resolution ° | Fine feed | Mass [kg] |
|---------|---------------------------|----------------------|-----------|-----------|
| 176-106 | 66 | 6 | | 1,7 |
| 172-196 | 100 | 1 | | 2,5 |
| 172-198 | 96 | 1 | Available | 2,4 |
| 176-305 | 182 | | Available | 5,5 |
| 176-306 | 238 | | Available | 6,5 |



172-602

Rotary Vice

| No. | Rotary range | Angle graduations ° | Max. workpiece height | Mass [kg] |
|---------|--------------|---------------------|-----------------------|-----------|
| 172-602 | 360° | 5° | 60 mm | 2,8 |



172-604

Swivel Centre Support

| No. | Max workpiece dia. [mm] | Swivel range | Max. workpiece length [mm] | Mass [kg] |
|---------|------------------------------|--------------|----------------------------|-----------|
| 172-604 | 80 (65) when swiveled 10° | ±10° | 140 | 2,5 |



172-603

V-Block with Clamp

| No. | Max workpiece dia. [mm] | Width of block [mm] | Mass [kg] |
|---------|-------------------------|---------------------|-----------|
| 172-603 | 50 | 60 | 1,24 |
| 172-378 | 25 | 41 | 0,8 |

Vertical Holder

| No. | Mass [kg] |
|---------|-----------|
| 172-139 | 1,3 |



Refer to the PJ / PV / PH profile projectors brochure

Accessories for Measuring Projectors

Optional Illumination Units

LED illumination light can emphasize the contrast of projected workpiece images, providing stereoscopic and sharp observation. Projected image can be observed with high colour reproducibility, which is never realized by the existing halogen-type surface illumination.



LED Illuminator

| No. | Model | Compatible models | Illumination source | Illumination angle | Power consumption | LED life (reference) | Mass [g] |
|---------|---|--|-----------------------|--------------------|--|----------------------|---|
| 172-501 | LED Circular Illuminator for Measuring Projectors (PJ-H30) | PJ-H30 (10x Projection Lens with C mount, Projection lens 10x and 20x) | Bullet type white LED | 52° | LED ring 22 V /14,4 W LED box 12 V /17,4 W (power cord has to be ordered separately) | 30000 h | Approx. 640g + AC adapter: approx. 250g |
| 172-502 | LED Circular Illuminator for Measuring Projectors (PJ-PLUS). Damping ring 12AAX44 is necessary for the connection to PJ-PLUS 20x. | PJ-PLUS (Projection lens 10x and 20x). | Bullet type white LED | 52° | LED ring 22 V /14,4 W LED box 12 V /17,4 W (power cord has to be ordered separately) | 30000 h | Approx. 640g + AC adapter: approx. 250g |

Vertical Illuminator

| No. | Model | Compatible models | Mass [kg] |
|---------|--|----------------------------------|-----------|
| 172-424 | Vertical Surface Illuminator for Measuring Projectors (PV-5110) | PV-5110 | 5,5 |
| 172-425 | Vertical Surface Illuminator for Measuring Projectors (PH-3515F) | PH-3515F (Condenser lens 10-50x) | 5 |

Consumables for Measuring Projectors



932987

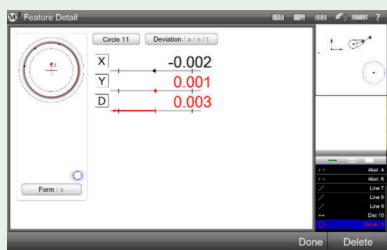
Half Mirror

| No. | Model |
|--------|--|
| 932987 | Half Mirror 10x For Projector PJ-300, PJ-3000, PJ-A3000 |
| 932988 | Half Mirror 20x For Projector PJ-300, PJ-3000, PJ-A3000 |

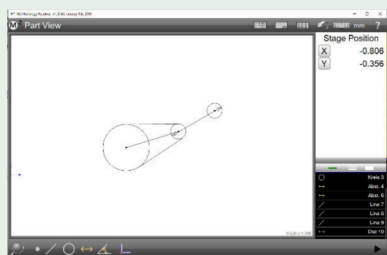


Refer to the PJ / PV / PH profile projectors brochure

M2 Software for Measuring Microscopes and Projectors



Geometric tolerancing
With only a few taps of the screen, you can measure features, apply tolerances, set nominals and view deviation results.



Graphics-based constructions
Construction types such as intersections and endpoints can be created from within the graphical part view.



M2 system for TM, 63AAA455



M2 system for MF/MF-U, 63AAA456



ASUS AiO PC, 63AAA795



Refer to the M2 software for the profile projectors and microscopes brochure

M2 Software for Measuring Microscopes and Projectors

Quick and easy measuring, with the innovative M2 software

Spend more time measuring and less time reading manuals thanks to the M2 software's straightforward and easy to operate user interface. Thanks to the familiar use of a touch screen, the M2 software can be quickly integrated into your process and drastically improve work efficiency.

- The M2 software interface is available for use in both portrait and landscape mode, providing maximum flexibility for the display or mounting device of your choosing.
- Gain access to many powerful features and an intuitive measuring interface whether you are using an optical edge equipped system or an externally generated crosshair device. Precise optical edge detection mechanisms provide accurate results as well as access to powerful, industrial grade, measurement functionality.



Microscope MF Series



Microscope TM Series



PJ-PLUS Measuring Projector



PV-5110



PJ-H30

M2 Software for Measuring Microscopes

| No. | Applicable models | System consist of | Function | Optional but necessary accessory |
|----------|--|---|------------------------|--|
| 63AAA455 | TM-Microscopes | M2 Metrology software on USB stick, 2 axis interface box for Digimatic, Power supply and USB cable | Without edge detection | 2x 164-164 or 164-163 Digimatic Micrometer Head, 2x 905338 Digimatic cable, 63AAA795 All-in-One-PC with touch screen |
| 63AAA456 | MF/MF-U microscopes with XY or XYZ counter | M2 Metrology software on USB stick, 3(2) axis interface box, 3 connecting cables (XYZ) for scales, Power supply and USB cable | Without edge detection | 63AAA795 All-in-One-PC with touch screen |

M2 Software for Measuring Microscopes and Projectors

M2 Software for Measuring Projectors

| No. | Applicable models | System consist of | Function | Optional but necessary accessory |
|----------|-----------------------------------|---|------------------------|--|
| 63AAA406 | PJ-PLUS, PJ-H30, PV5110, PH-3515F | M2 Metrology software, 2 axis interface box and 15 pin connecting cables, Power supply and USB cable, Machine bracket, RAM Ball, RAM arm, VESAs mount (75 x 75 mm) for mounting the optional tablet PC to the projector body | Without edge detection | 63AAA795 All-in-One-PC with touch screen |
| 63AAA407 | PJ-PLUS, PH-3515F | M2 Metrology software, 2 axis interface box and 15 pin connecting cables, Optical fibre and magnetic holder for sensor, Power supply and USB cable Machine bracket, RAM Ball, RAM arm, VESAs mount (75 x 75 mm) for mounting the optional tablet PC to the projector body | With edge detection | 63AAA795 All-in-One-PC with touch screen |
| 63AAA462 | PV5110 | M2 Metrology software, 2 axis interface box and 15 pin connecting cables, Optical fibre and magnetic holder for sensor, Power supply and USB cable Machine bracket, RAM Ball, RAM arm, VESAs mount (75 x 75 mm) for mounting the optional tablet PC to the projector body | With edge detection | 63AAA795 All-in-One-PC with touch screen |