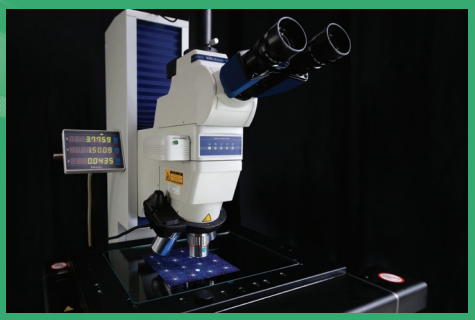
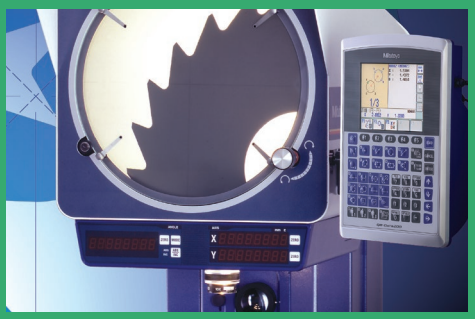
OPTICAL MEASURING

J

Microscopes



Profile Projectors



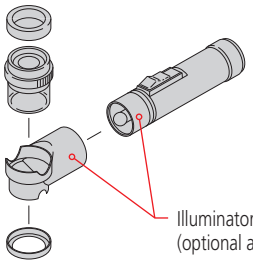
Contents

Pocket Comparators

SERIES 183 – Interchangeable Reticle Magnifier

- Small dimensions and angles, including radii and screw-thread form, can be checked easily at low resolution simply by interchanging optional reticles in the magnifier.
- An optional illuminator is available.

183-101



Technical Data

Reticle size: ø30 mm
Field of view: 24.5 mm
Includes box

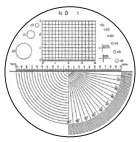
Optional Accessory

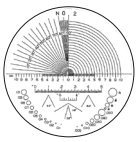
Code No.	Description	Price
950757	Illuminator (without battery)	£40.30

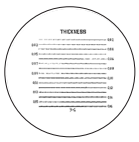
Specifications

Code No.	Magnification	Dimensions	Remarks	Price
183-101	8X	ø37 x 48 mm	Optional reticles available	£49.90
183-131	10X	ø37 x 45 mm	Optional reticles available	£81.80

Optional Reticles


183-102


183-103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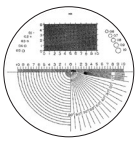
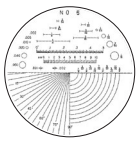
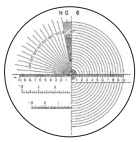
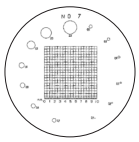
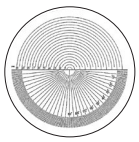

183-105

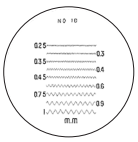

183-106


183-107


183-108


183-109


183-110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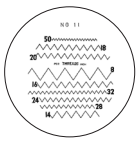
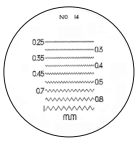

183-112


183-113


183-114


183-115

Code No.	Description	Price
183-102	Polar net, angle, radius	£25.00
183-103	Angle, radius, length, diameter	£25.00
183-104	Fine thickness	£25.00
183-105	Angle, radius, length, diameter, polar net (metric)	£25.00
183-106	Angle, radius, length, diameter	£25.00
183-107	Angle, radius, length	£25.00
183-108	Polar net, diameter	£25.00

Code No.	Description	Price
183-109	Length in mm	£25.00
183-110	Angle, radius	£25.00
183-111	Thread pitches (metric)	£25.00
183-112	Thread pitches (inch)	£25.00
183-113	Angle, radius, length	£25.00
183-114	Length in inches	£25.00
183-115	Thread pitches (metric)	£25.00

Magnifiers

SERIES 183 – Pocket Magnifiers

- Stable design, secure holding.
- Easy handling.
- Includes box and cleaning cloth.
- Suitable for inspecting metal surfaces.

183-201

183-202

183-203

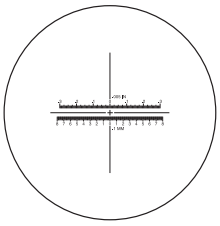
Specifications

Code No.	Magnification	Dimensions	Field of view	Remarks	Price
183-201	25X	ø14.5 x 125 mm	3.4 mm	Pen type	**£75.30**
183-202	25X	ø31.5 x 115 mm	3.3 mm	With stand	**£185.00**
183-203	50X	ø31.5 x 100 mm	1.6 mm	With stand	**£195.00**

SERIES 183 – Zoom Loupe Magnifier

- Allows the user 8X-16X zoom observation.
- Magnification indicator is provided for 8X, 10X, 12X, 14X, and 16X observation.
- Metric and inch scales are provided for measuring.
- Supplied with a carrying case.

183-304



Reticle provided

Specifications

Code No.	Magnification	Dimensions	Field of view	Remarks	Price
183-304	8X-16X zoom	ø45 x 70 mm	10-20 mm	With reticle (scale graduation: 0.1 mm, .005")	**£401.00**

SERIES 183 – Clear Loupe Magnifier

- Transparent draw tube enables clear imaging of the workpiece.
- Includes box and cleaning cloth.

183-301

183-302

183-303

Specifications

Code No.	Magnification	Dimensions	Field of view	Remarks	Price
183-301	7X	ø32 x 43 mm	25 mm	Drawtube removable	**£21.90**
183-302	10X	ø32 x 40 mm	24 mm	Drawtube removable	**£24.90**
183-303	15X	ø32 x 30 mm	10 mm	Drawtube removable	**£31.90**

TM Microscope

SERIES 176 – Toolmakers' Microscope

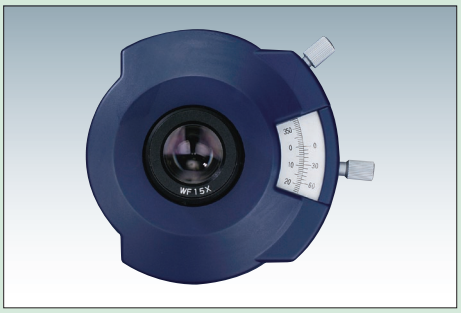
- The Mitutoyo TM Series is a toolmakers' microscope well suited for measuring dimensions and angles of workpiece features. It can also be used to check the shape of screws and gears by inserting an optional reticle in the eyepiece.
- The compact body makes it ideal for use on shop floors that have very limited space for measuring instruments.
- Angle measurement is performed easily by turning the angle scale to align the cross-hair reticle with the image of the edges that define a workpiece feature.
- Illumination intensity can be adjusted to suit the reflectance of the surface of the feature under investigation.

TM-505B
(shown with optional Digimatic micrometer heads)

TM-1005B
(shown with optional Digimatic micrometer heads)

Technical Data

Image type:	Erect
Optical tube:	Monocular (diopter adjustable)
Inclination:	60°
Reticle:	90° broken cross-hair (**176-126**)
Angle reading	
Range:	360°
Min. reading:	6' (by vernier)
Eyepiece:	15X (**176-116**), field number 13 mm Optional: 10X, 20X
Objective:	2X (**176-138**), working distance: 67 mm Optional: 5X, 10X
Total magnification:	30X
Transmitted illumination	
Light source:	White LED
Functions:	With green filter, light intensity adjustable
Surface illumination	
Light source:	White LED
Functions:	Light intensity adjustable
Power supply:	240VAC ±10%, 50/60 Hz



Angle reading.

Specifications

Model	TM-505B	TM-1005B
Code No.	**176-818E**	**176-819E**
XY stage travel range	50 x 50 mm	100 x 50 mm
Measurement method	Micrometer head (optional)	
XY stage size	152 x 152 mm	240 x 152 mm
Effective glass size	96 x 96 mm	154 x 96 mm
Maximum workpiece height	115 mm	107 mm
Maximum stage loading	5 kg	
Mass	14 kg	15 kg
Price	**£2790.00**	**£3600.00**

J

Optional Accessories

Code No.	Description	Price
152-389*[1]	Micrometer head for Y axis (range: 0-25 mm, reading: 0.005 mm)	£178.00
152-390*[1]	Micrometer head for X axis (range: 0-25 mm, reading: 0.005 mm)	£178.00
152-391*[1]	Micrometer head for X axis (range: 1", reading: .0001")	£178.00
152-392*[1]	Micrometer head for Y axis (range: 1", reading: .0001")	£178.00
164-164*[2]	Digimatic micrometer head (range: 2"/50 mm, reading: .00005"/0.001 mm)	£727.00
176-115	10X eyepiece	£145.00
176-116	15X projection lens set	£145.00
176-117	20X eyepiece	£145.00
176-137	Objective, 10X	£161.00
176-139	Objective, 5X	£161.00
176-204	Dial indicator attachment for Z-axis measurement	£141.00
611201-131	Gauge block (1")	£48.80
611202-131	Gauge block (2")	£68.20
611635-131	Gauge block (25 mm)	£37.90
611675-131	Gauge block (50 mm)	£50.80
959149	SPC data cable with pushbutton (1 m)	£34.60
959150	SPC data cable with pushbutton (2 m)	£39.40
02AZD790C	SPC data cable for U-WAVE-T (160 mm)	£60.10
06ADV380C	USB Input Tool Direct USB-ITN-A (2 m)	£105.00
63AAA001	LED ringlight	£430.00

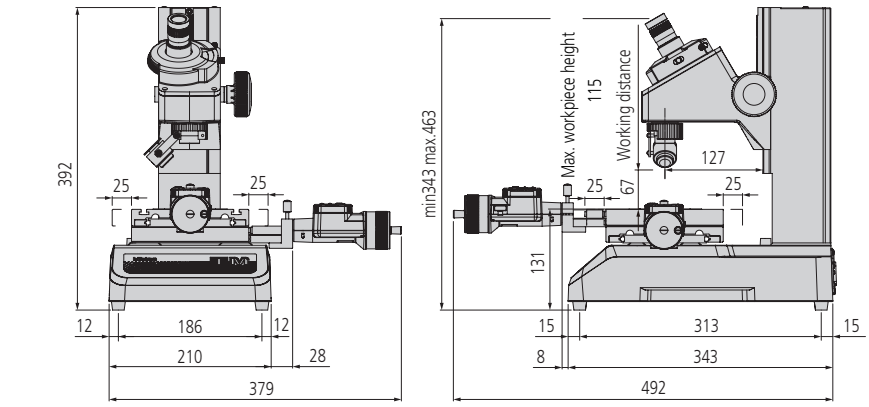
Fixture and stage accessories refer to page J-34.
Illumination units refer to page J-30.

*[1] For details refer to page B-86.
*[2] For details refer to page B-74.

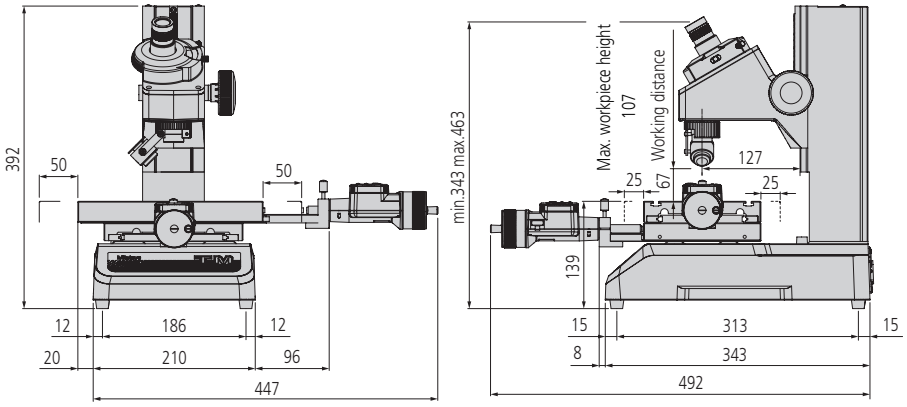
Dimensions

Unit: mm

TM-505B



TM-1005B



Optional Reticles for use with 2X Objective

Code No.	Remarks	Price
176-109	Metric screw threads (pitch = 0.25 - 1 mm)	£54.80
176-110	Metric screw threads (pitch = 1.25 - 2 mm)	£54.80
176-111	Concentric circles (up to ø4 mm, 0.05 mm increment)	£94.00
176-112	20° involute gear teeth (normal rack type)	£54.80
176-114	60° angle	£54.80
176-123	Unified screw threads (80 - 28TPI)	£54.80
176-124	Unified screw threads (24 - 14TPI)	£54.80
176-125	Unified screw threads (13 - 10TPI)	£54.80
176-140	ISO metric screw threads (pitch = 0.075 - 0.7 mm)	£54.80
176-141	ISO metric screw threads (pitch = 0.75 - 2 mm)	£72.70

MF Microscope (Manual Types)

SERIES 176 – Measuring Microscopes

- Standard measuring microscope that has a wide variety of optional accessories including a Vision Unit and various digital CCD cameras.
- The MF measuring microscopes' expandability, such as when used in combination with Mitutoyo's vision unit to boost performance or data management on a PC, promises further improved measuring efficiency.
- Observation with a clear and flare-free erect image and a wide field of view.
- Measuring accuracy that is the highest in its class (and conforms to JIS B7153).
- ML series, high-NA objectives that are specially designed for the MF series (long working distance type).
- Illumination unit (reflected/transmitted) selectable from high-intensity LED or halogen bulb types (required).
- Variable aperture diaphragm (reflected/transmitted) allows observation and measurement while suppressing light diffraction.
- Variety of standardised stages in sizes to suit practically any application.
- Quick-release mechanism useful for moving the stage rapidly between measuring points when measuring workpieces that are large in size or quantity.
- Coarse/fine feed handles equipped as standard on both sides allow precise focus and observation measurement regardless of handedness.
- High-magnification eyepiece observation up to 2000X.

MF-B2017D
(The binocular tube and illumination unit are optional accessories)

Technical Data

Image type:	BF (Brightfield)/erect
Measurement method:	Linear encoder
Optical tube (optional):	Monocular or binocular tube (inclination: 25°), reticle projection method, with TV mount, optical path ratio (eyepiece/TV mount: 50/50)
Eyepiece (optional):	10X, 15X, 20X
Objective:	3X (standard accessory); 1X, 5X 10X, 20X, 50X, 100X (optional accessories)
Transmitted illumination	
Light source:	Halogen bulb (12V, 50W) or white LED
Optical system:	Telecentric illumination with adjustable aperture diaphragms
Functions:	Light intensity adjustable, continuous brightness adjustment
Surface illumination	
Light source:	Halogen bulb (12V, 50W) or white LED
Optical system:	Koehler illumination with adjustable aperture diaphragms
Functions:	Light intensity adjustable, continuous brightness adjustment
Display unit	
No. of axes:	2 (MF-A type) or 3 (MF-B type)
Resolution:	0.001/0.0005/0.0001 mm, .0001"/.00005"/.00001"
Functions:	Zero-setting, direction switching, data output (via RS-232C or USB interface)
Power supply:	240VAC ±10%, 50/60 Hz

Illumination Unit (required option)

Type	LED	Halogen
Code No.	**176-445E**	**176-447E**

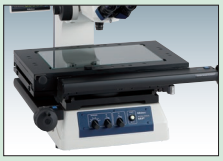
Using optional slide type nosepiece with 2-lens mount (factory-fit option).

Specifications

Without Z-axis scale	**Model**	**MF-A1010D**	**MF-A2010D**	**MF-A2017D**	**MF-A3017D**	**MF-A4020D**
	Code No.	**176-861-10**	**176-862-10**	**176-863-10**	**176-864-10**	**176-865-10**
With Z-axis scale	**Model**	**MF-B1010D**	**MF-B2010D**	**MF-B2017D**	**MF-B3017D**	**MF-B4020D**
	Code No.	**176-866-10**	**176-867-10**	**176-868-10**	**176-869-10**	**176-870-10**
XY stage travel range		100 x 100 mm	200 x 100 mm	200 x 170 mm	300 x 170 mm	400 x 200 mm
Focussing method		Manual focussing (coarse 30 mm/rev., fine 0.2 mm/rev.)				
Resolution (switchable)		0.001/0.0005/0.0001 mm (.0001/.00005/.00001")				
Measuring accuracy (at 20°C)		X/Y axes: ±(2.2+2L/100) µm when not loaded, JIS B7153, L = measured length (mm)				
Quick-release mechanism		X and Y axes				
XY stage size		280 x 280 mm	350 x 280 mm	410 x 342 mm	510 x 342 mm	610 x 342 mm
Effective glass size		180 x 180 mm	250 x 150 mm	270 x 240 mm	370 x 240 mm	440 x 240 mm
Swivel function		—		±5° (left)		±3° (left)
Max. stage loading		10 kg		20 kg		15 kg
Max. workpiece height		150 mm		220 mm		
Price		**POA**	**POA**	**POA**	**POA**	**POA**

1010D stage.

2010D stage.



3017D stage.

4020D stage.

Optional Accessories

Code No.	Description	Price
176-308	Vibration damping stand	**£2610.00**
176-309	Mounting stand	**£800.00**
970441	C-mount adapter	**£51.90**
375-054	0.5X camera adapter (with C-mount adapter)	**£1420.00**
375-056	Stage micrometer	**£263.00**
12AAJ088	Footswitch	**£244.00**
Filters		
12AAA643	ND2 colour filter	**£68.00**
12AAA644	ND8 colour filter	**£68.00**
12AAA645	GIF filter	**£72.20**
12AAA646	LB80 filter	**£68.00**
Mounts		
176-370-1	Slide type nosepiece (2-mount, parfocal)	**£570.00**
176-370-2	Slide type nosepiece (2-mount, mag. adjusted)	**£570.00**

Eyepieces and objective lenses refer to pages J-24 to J-29.
Fixture and stage accessories refer to page J-34.
Illumination units refer to page J-30.

QM-Data200 2D data processing unit (optional accessory) refer to page J-31 for more details.

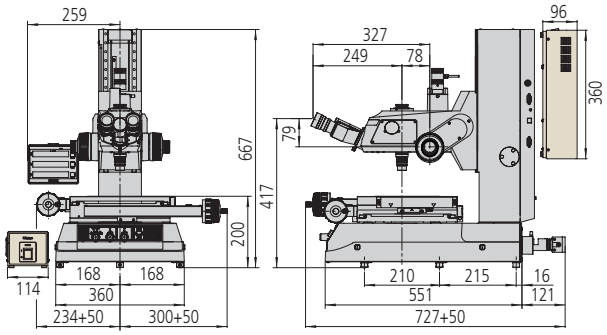
Vision Unit PC-based vision measuring system (optional accessory) refer to page J-32 for more details.

Focus Pilot FP-05 Focus assisting system (optional accessory) refer to page J-33 for more details.

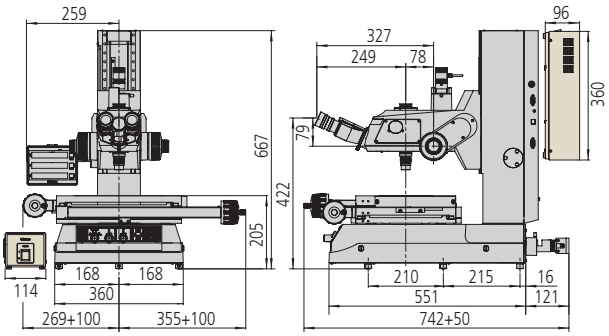
Dimensions

Unit: mm

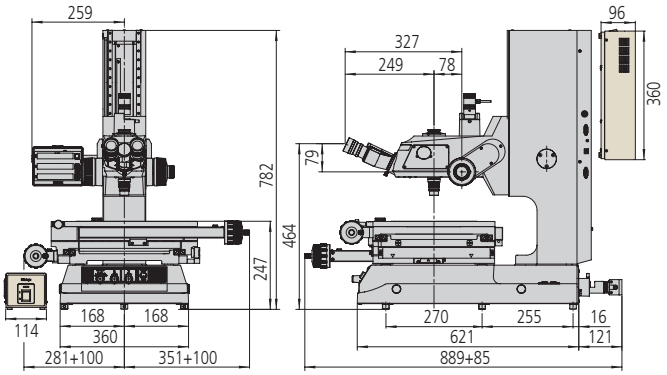
MF-B1010D



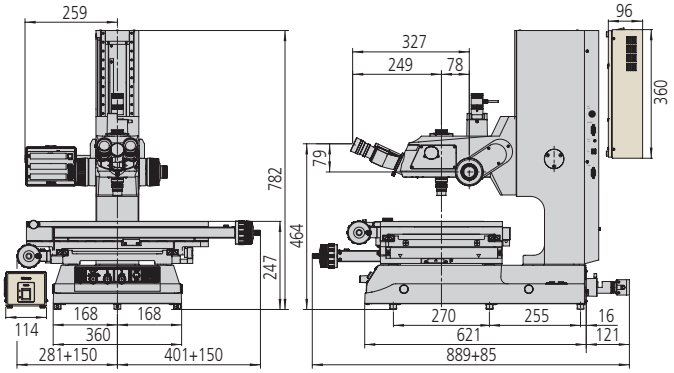
MF-B2010D



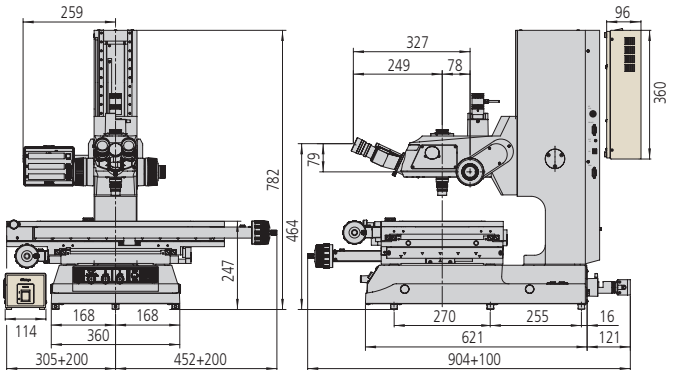
MF-B2017D



MF-B3017D



MF-B4020D



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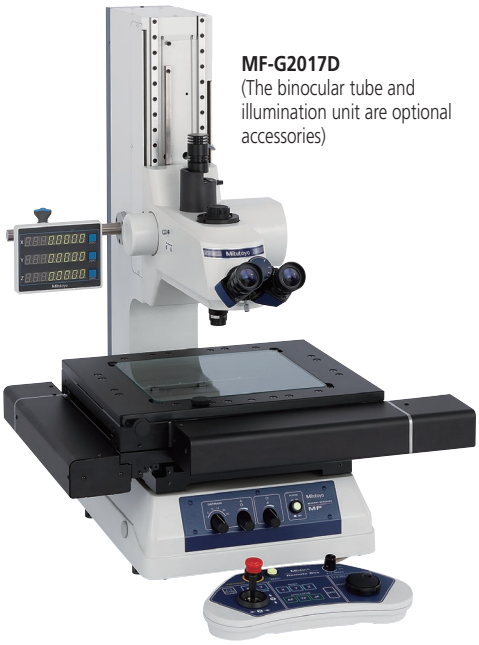
Mitutoyo

MF Microscope (Motor-Driven Types)

SERIES 176 – Measuring Microscopes

- Standard measuring microscope that has a wide variety of optional accessories including a Vision Unit and various digital CCD cameras.
- A motorized Z-axis renders fast and accurate Auto Focus when used in combination with the optional Vision Unit.
- Motor drive on all axes offers the high performance expected of a measuring microscope where efficiency and operability is concerned by enabling rapid and fatigue-free stage movement when measuring large or numerous workpieces.
- Available in 3 stage sizes.
- Observation with a clear and flare-free erect image and a wide field of view.
- Measuring accuracy that is the highest in its class (and conforms to JIS B7153).
- ML series, high-NA objectives that are specially designed for the MF series (long working distance type).
- Illumination unit (reflected/transmitted) selectable from high-intensity LED or halogen bulb types (required).
- Variable aperture diaphragm (reflected/transmitted) allows observation and measurement while suppressing light diffraction.
- Quick-release mechanism useful for moving the stage rapidly between measuring points when measuring workpieces that are large in size or quantity.
- Coarse/fine feed handles equipped as standard on both sides allow precise focus and measurement regardless of handedness on MF-J models.
- High-magnification eyepiece observation up to 2000X.

MF-J2017D
(The binocular tube and illumination unit are optional accessories)



MF-G2017D
(The binocular tube and illumination unit are optional accessories)

Technical Data

Image type:	BF (Brightfield)/erect
Measurement method:	Linear encoder
Optical tube (optional):	Monocular or binocular tube (inclination: 25°), reticle projection method, with TV mount, optical path ratio (eyepiece/TV mount: 50/50)
Eyepiece (optional):	10X, 15X, 20X
Objective:	3X (standard accessory); 1X, 5X 10X, 20X, 50X, 100X (optional accessories)
Transmitted illumination	
Light source:	Halogen bulb (12V, 50W) or white LED
Optical system:	Telecentric illumination with adjustable aperture diaphragms
Functions:	Light intensity adjustable, continuous brightness adjustment
Surface illumination	
Light source:	Halogen bulb (12V, 50W) or white LED
Optical system:	Koehler illumination with adjustable aperture diaphragms
Functions:	Light intensity adjustable, continuous brightness adjustment
Display unit	
Resolution:	0.001/0.0005/0.0001 mm, .0001/.00005/.00001"
Functions:	Zero-setting, direction switching, data output (via RS-232C or USB interface)
Power supply:	240VAC ±10%, 50/60 Hz
Remote box functions:	All models: 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) MF-G models only: Joystick (X and Y axes drive), lock button (X and Y axes), speed adjustment (X,Y and Z axes), coarse/fine adjustment button (X, Y and Z axes)

Illumination Unit (required option)

Type	LED	Halogen
Code No.	**176-445E**	**176-447E**

Specifications

Motor-driven Z-axis	**Model**	**MF-J2017D**	**MF-J3017D**	**MF-J4020D**
	Code No.	**176-891E**	**176-892E**	**176-893E**
Motor-driven XYZ-axes	**Model**	**MF-G2017D**	**MF-G3017D**	**MF-G4020D**
	Code No.	**176-781E**	**176-782E**	**176-783E**
XY stage travel range		200 x 170 mm	300 x 170 mm	400 x 200 mm
Focussing method		Motor drive (max. measuring speed 20 mm/s)		
Resolution (switchable)		0.001/0.0005/0.0001 mm (.0001/.00005/.00001")		
Measuring accuracy (at 20°C)		X/Y axes: (±(2.2+2L/100) µm when not loaded, JIS B7153, L = measured length (mm)		
Quick-release mechanism		X and Y axes		
XY stage size		410 x 342 mm	510 x 342 mm	610 x 342 mm
Effective glass size		270 x 240 mm	370 x 240 mm	440 x 240 mm
Swivel function		±5° (left)		±3° (left)
Max. stage loading		20 kg		15 kg
Max. workpiece height		220 mm		
Price		**POA**	**POA**	**POA**

Optional Accessories

Code No.	Description	Price
176-308	Vibration damping stand	**£2610.00**
176-309	Mounting stand	**£800.00**
375-054	0.5X camera adapter (with C-mount adapter)	**£1420.00**
375-056	Stage micrometer	**£263.00**
970441	C-mount adapter	**£51.90**
12AAJ088	Footswitch	**£244.00**
Filters		
12AAA643	ND2 colour filter	**£68.00**
12AAA644	ND8 colour filter	**£68.00**
12AAA645	GIF filter	**£72.20**
12AAA646	LB80 filter	**£68.00**
Mounts		
176-370-1	Slide type nosepiece (2-mount, parfocal)	**£570.00**
176-370-2	Slide type nosepiece (2-mount, mag. adjusted)	**£570.00**

Eyepieces and objective lenses refer to pages J-24 to J-29.
Fixture and stage accessories refer to page J-34.
Illumination units refer to page J-30.

QM-Data200 2D data processing unit (optional accessory) refer to page J-31 for more details.

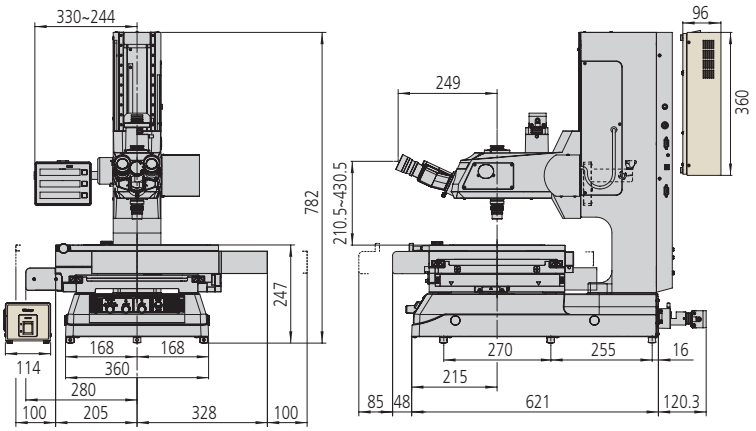
Vision Unit PC-based vision measuring system (optional accessory) refer to page J-32 for more details.

Focus Pilot FP-05 Focus assisting system (optional accessory) refer to page J-33 for more details.

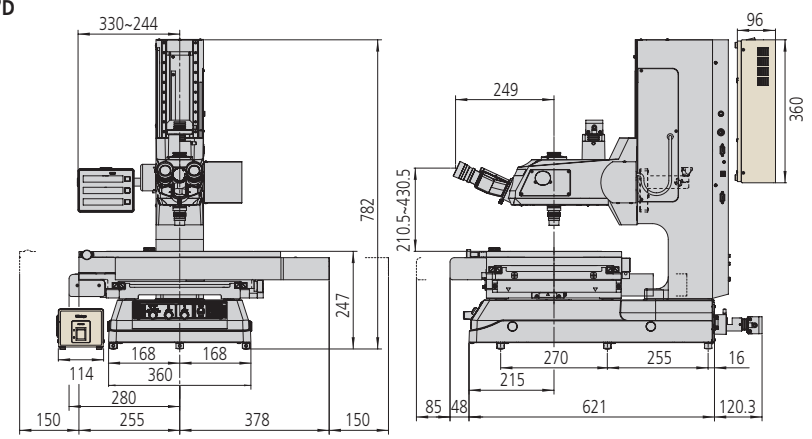
Dimensions

Unit: mm

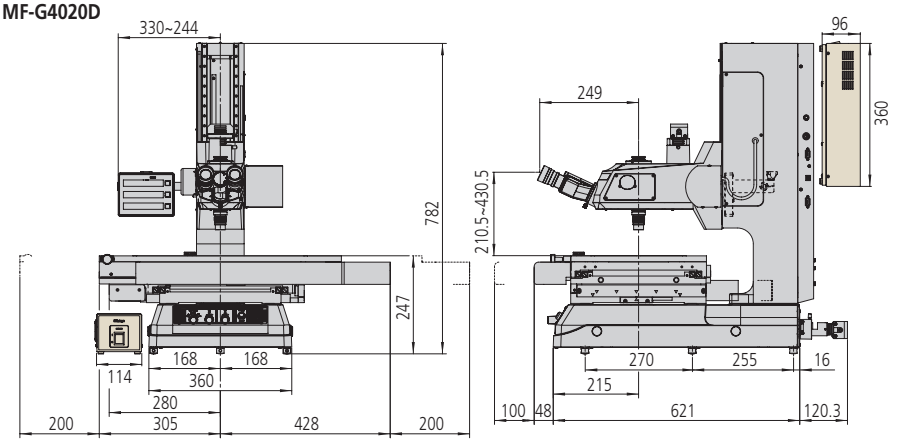
MF-G2017D



MF-G3017D



MF-G4020D



J

Mitutoyo

MF-U Microscope (Manual Types)

SERIES 176 – High-Power Multi-Function Measuring Microscopes

- Observation with a clear and flare-free erect image and a wide field of view.
- Measuring accuracy that is the highest in its class (and conforms to JIS B7153).
- Proven high-NA objectives from the FS optical system (long working distance type).
- Integration of metallurgical and measurement microscope functions provides high-resolution observation and a high-accuracy measurement solution.
- Illumination unit (reflected/transmitted) selectable from high-intensity LED or halogen bulb types (required).
- Variable aperture diaphragm (reflected/transmitted) allows observation and measurement while suppressing light diffraction.
- Variety of standardised stages in sizes to suit practically any application.
- Quick-release mechanism useful for moving the stage rapidly between measuring points when measuring workpieces that are large in size or quantity.
- High-magnification eyepiece observation up to 4000X.
- Low-noise design.

MF-UB2017D
(The turret, objectives and illumination unit are optional accessories.)

1010D stage.

2010D stage.

3017D stage.

4020D stage.

Technical Data

Image type:	Erect
Measurement method:	Linear encoder
Optical tube:	Siedentoph type (pupil distance adjustment: 51-76 mm), 1X tube lens, Binocular tube (inclination: 0-30°), Reticle projection method, with TV mount, Optical path ratio (eyepiece/TV mount: 50/50)
Eyepiece:	10X (field number 24 mm)), Optional: 15X, 20X
Turret (optional):	Manual or power
Objective (optional):	M/BD Plan Apo objective from 1X to 200X
Transmitted illumination	
Light source:	Halogen bulb (12V, 50W) or white LED
Optical system:	Telecentric illumination with adjustable aperture diaphragms
Functions:	Light intensity adjustable, continuous brightness adjustment
Surface illumination	
Light source:	Halogen bulb (12V, 50W) or white LED
Optical system:	Koehler illumination with adjustable aperture diaphragms
Functions:	Light intensity adjustable, continuous brightness adjustment
Display unit	
No. of axes:	2 or 3
Resolution:	0.001/0.0005/0.0001 mm (.0001/.00005/.00001")
Functions:	Zero-setting, direction switching, data output (via RS-232C or USB interface)
Power supply:	240VAC ±10%, 50/60 Hz

Illumination Unit (required option)

Type	LED	Halogen
Code No.	**176-446E**	**176-448E**

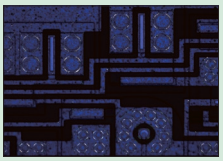
Note: Because the MF-U is not supplied with an illumination unit as standard, it is necessary to purchase either an LED or a Halogen illumination unit in addition to the basic instrument.

Specifications

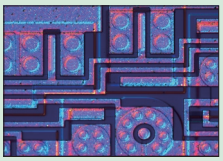
Type		BF (brightfield)				
Without Z-axis scale	**Model**	**MF-UA1010D**	**MF-UA2010D**	**MF-UA2017D**	**MF-UA3017D**	**MF-UA4020D**
	Code No.	**176-871-10**	**176-872-10**	**176-873-10**	**176-874-10**	**176-875-10**
With Z-axis scale	**Model**	**MF-UB1010D**	**MF-UB2010D**	**MF-UB2017D**	**MF-UB3017D**	**MF-UB4020D**
	Code No.	**176-876-10**	**176-877-10**	**176-878-10**	**176-879-10**	**176-880-10**

Type		BD (brightfield/darkfield)				
Without Z-axis scale	**Model**	**MF-UC1010D**	**MF-UC2010D**	**MF-UC2017D**	**MF-UC3017D**	**MF-UC4020D**
	Code No.	**176-881-10**	**176-882-10**	**176-883-10**	**176-884-10**	**176-885-10**
With Z-axis scale	**Model**	**MF-UD1010D**	**MF-UD2010D**	**MF-UD2017D**	**MF-UD3017D**	**MF-UD4020D**
	Code No.	**176-886-10**	**176-887-10**	**176-888-10**	**176-889-10**	**176-890-10**

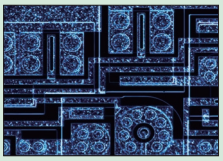
XY stage travel range	100 x 100 mm	200 x 100 mm	200 x 170 mm	300 x 170 mm	400 x 200 mm
Focussing method	Manual focussing (coarse 10 mm/rev., fine 0.1 mm/rev.)				
Resolution (switchable)	0.001/0.0005/0.0001 mm (.0001/.00005/.00001")				
Measuring accuracy (at 20°C)	X/Y axes: ±(2.2+2L/100) µm when not loaded, JIS B7153, L = measured length (mm)				
Quick-release mechanism	X and Y axes				
XY stage size	280 x 280 mm	350 x 280 mm	410 x 342 mm	510 x 342 mm	610 x 342 mm
Effective glass size	180 x 180 mm	250 x 150 mm	270 x 240 mm	370 x 240 mm	440 x 240 mm
Swivel function	—		±5° (left)		±3° (left)
Max. stage loading	10 kg		20 kg		15 kg
Max. workpiece height	150 mm		220 mm		
Price	**POA**	**POA**	**POA**	**POA**	**POA**



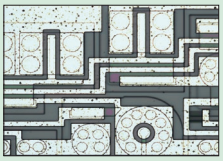
Polarized light observation
Used for observing materials with special optical characteristics, such as minerals and liquid crystals.



Differential Interference Contrast (DIC) observation
Effective in detecting fine scratches and steps on the surface of metals, liquid crystals and semiconductors.



Dark Field (DF) observation
Scratches and dust that cannot be viewed in bright field observation can be observed by this method and in high contrast.



Bright Field (BF) observation
Directly views the light scattered from the surface of the workpiece. This is the commonest method of observation.

Optional Accessories

Code No.	Description	Price
176-308	Vibration damping stand	**£2610.00**
375-054	0.5X camera adapter (with C-mount adapter)	**£1420.00**
375-056	Stage micrometer	**£263.00**
517181	Halogen bulb (12V, 100W)	**£60.00**
970441	C-mount adapter	**£51.90**
12AAJ088	Footswitch	**£244.00**
12BAD602	Halogen bulb (high intensity type, 12V, 100W)	**£41.40**
DIC units		
378-076	DIC unit for 100X, SL80X, SL50X objective	**£1830.00**
378-078	DIC unit for 50X, SL20X objective	**£1830.00**
378-079	DIC unit for 20X objective	**£1830.00**
378-080	DIC unit for 10X, 5X objective	**£1830.00**
Filters		
12AAA643	ND2 colour filter	**£68.00**
12AAA644	ND8 colour filter	**£68.00**
12AAA645	GIF filter	**£72.20**
12AAA646	LB80 filter	**£68.00**
12AAG806	GIF filter	**£132.00**
12AAG807	LB80 filter	**£113.00**

Turrets refer to page J-33.
Eyepieces and objective lenses refer to pages J-24 to J-29.
Fixture and stage accessories refer to page J-34.
Illumination units refer to page J-30.

QM-Data200 2D data processing unit (optional accessory) refer to page J-31 for more details.

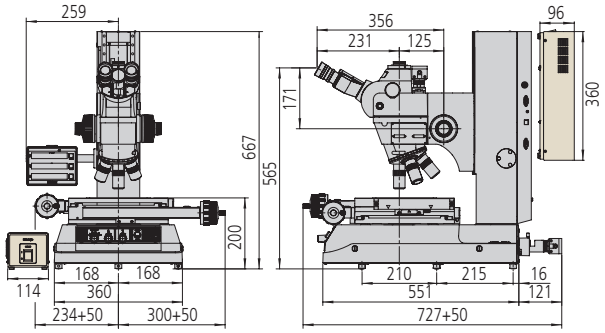
Vision Unit PC-based vision measuring system (optional accessory) refer to page J-32 for more details.

Focus Pilot FP-05 Focus assisting system (optional accessory) refer to page J-33 for more details.

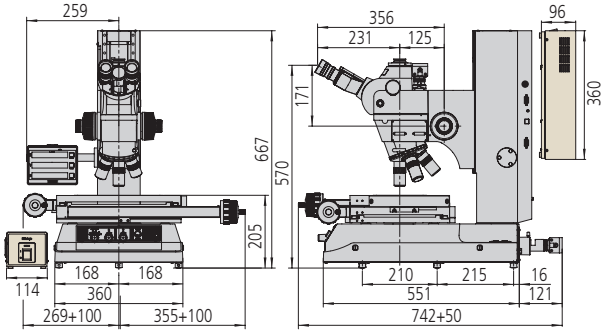
Dimensions

Unit: mm

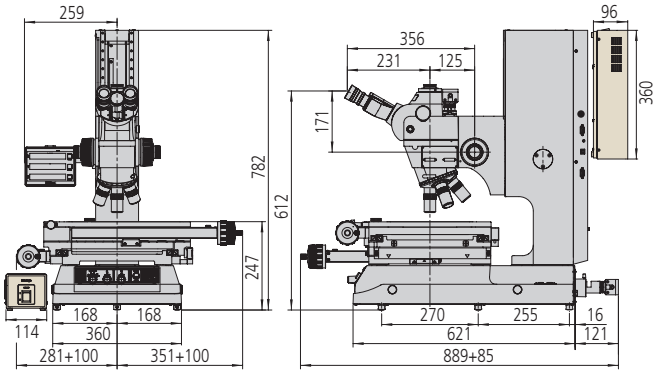
MF-UB1010D



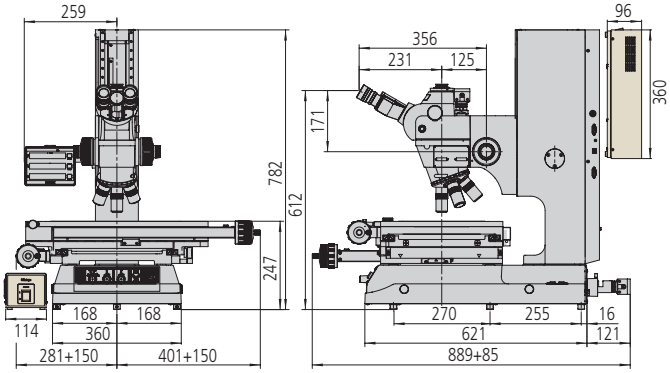
MF-UB2010D



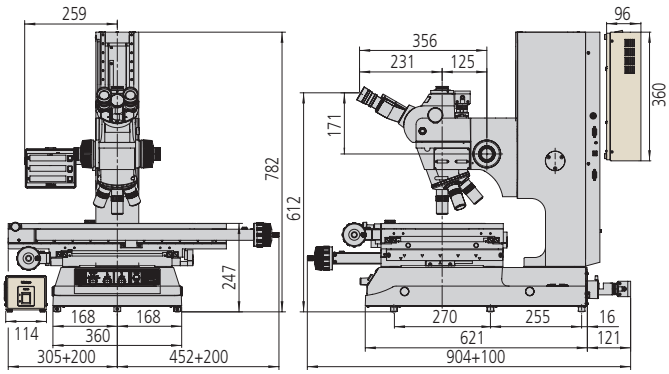
MF-UB2017D



MF-UB3017D



MF-UB4020D



J

Mitutoyo

MF-U Microscope (Motor-Driven Z-Axis Types)

SERIES 176 – High-Power Multi-Function Measuring Microscopes

- A motorized Z-axis renders fast and accurate Auto Focus when used in combination with the optional Vision Unit.
- Available in 3 stage sizes.
- Observation with a clear and flare-free erect image and a wide field of view.
- Measuring accuracy that is the highest in its class (and conforms to JIS B7153).
- Proven high-NA objectives from the FS optical system (long working distance type).
- Integration of metallurgical and measurement microscope functions provides high-resolution observation and a high-accuracy measurement solution.
- Illumination unit (reflected/transmitted) selectable from high-intensity LED or halogen bulb types (required).
- Variable aperture diaphragm (reflected/transmitted) allows observation measurement while suppressing light diffraction.
- Quick-release mechanism useful for moving the stage rapidly between measuring points when measuring workpieces that are large in size or quantity.
- High-magnification eyepiece observation up to 4000X.
- Low-noise design.

MF-UJ2017D
(The turret, objectives and illumination unit are optional accessories.)

Technical Data

Image type:	Erect
Measurement method:	Linear encoder
Optical tube:	Siedentoph type (pupil distance adjustment: 51-76 mm), 1X tube lens, Binocular tube (inclination: 0-30°), Reticle projection method, with TV mount, Optical path ratio (eyepiece/TV mount: 50/50)
Eyepiece:	10X (field number 24 mm), Optional: 15X, 20X
Turret (optional):	Manual or power
Objective (optional):	M/BD Plan Apo objective from 1X to 200X
Transmitted illumination	
Light source:	Halogen bulb (12V, 50W) or white LED
Optical system:	Telecentric illumination with adjustable aperture diaphragms
Functions:	Light intensity adjustable, continuous brightness adjustment
Surface illumination	
Light source:	Halogen bulb (12V, 50W) or white LED
Optical system:	Koehler illumination with adjustable aperture diaphragms
Functions:	Light intensity adjustable, continuous brightness adjustment
Display unit	
No. of axes:	3
Resolution:	0.001/0.0005/0.0001 mm (.0001/.00005/.00001")
Functions:	Zero-setting, direction switching, data output (via RS-232C or USB interface)
Power supply:	240VAC ±10%, 50/60 Hz
Remote box functions:	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)

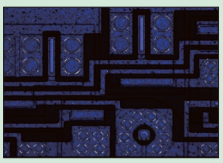
Illumination Unit (required option)

Type	LED	Halogen
Code No.	**176-446E**	**176-448E**

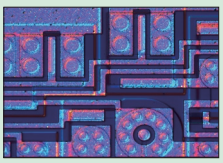
Note: Because the MF-U is not supplied with an illumination unit as standard, it is necessary to purchase either an LED or a Halogen illumination unit in addition to the basic instrument.

Specifications

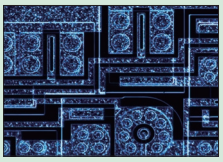
BF (brightfield)	**Model**	**MF-UJ2017D**	**MF-UJ3017D**	**MF-UJ4020D**
	Code No.	**176-894E**	**176-895E**	**176-896E**
BD (brightfield/ darkfield)	**Model**	**MF-UK2017D**	**MF-UK3017D**	**MF-UK4020D**
	Code No.	**176-897E**	**176-898E**	**176-899E**
XY stage travel range		200 x 170 mm	300 x 170 mm	400 x 200 mm
Focussing method		Motor drive (max. measuring speed 20 mm/s)		
Resolution (switchable)		0.001/0.0005/0.0001 mm (.0001/.00005/.00001")		
Measuring accuracy (at 20°C)		X/Y axes: ±(2.2+2L/100) µm when not loaded, JIS B7153, L = measured length (mm)		
Quick-release mechanism		X and Y axes		
XY stage size		410 x 342 mm	510 x 342 mm	610 x 342 mm
Effective glass size		270 x 240 mm	370 x 240 mm	440 x 240 mm
Swivel function		±5° (left)		±3° (left)
Max. stage loading		20 kg		15 kg
Max. workpiece height		220 mm		
Price		**POA**	**POA**	**POA**



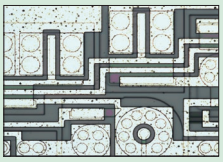
Polarized light observation
Used for observing materials with special optical characteristics, such as minerals and liquid crystals.



Differential Interference Contrast (DIC) observation
Effective in detecting fine scratches and steps on the surface of metals, liquid crystals and semiconductors.



Dark Field (DF) observation
Scratches and dust that cannot be viewed in bright field observation can be observed by this method and in high contrast.



Bright Field (BF) observation
Directly views the light scattered from the surface of the workpiece. This is the commonest method of observation.

Optional Accessories

Code No.	Description	Price
176-308	Vibration damping stand	**£2610.00**
375-054	0.5X camera adapter (with C-mount adapter)	**£1420.00**
375-056	Stage micrometer	**£263.00**
517181	Halogen bulb (12V, 100W)	**£60.00**
970441	C-mount adapter	**£51.90**
12AAJ088	Footswitch	**£244.00**
12BAD602	Halogen bulb (high intensity type, 12V, 100W)	**£41.40**
DIC units		
378-076	DIC unit for 100X, SL80X, SL50X objective	**£1830.00**
378-078	DIC unit for 50X, SL20X objective	**£1830.00**
378-079	DIC unit for 20X objective	**£1830.00**
378-080	DIC unit for 10X, 5X objective	**£1830.00**
Filters		
12AAA643	ND2 colour filter	**£68.00**
12AAA644	ND8 colour filter	**£68.00**
12AAA645	GIF filter	**£72.20**
12AAA646	LB80 filter	**£68.00**
12AAG806	GIF filter	**£132.00**
12AAG807	LB80 filter	**£113.00**

Turrets refer to page J-33.
Eyepieces and objective lenses refer to pages J-24 to J-29.
Fixture and stage accessories refer to page J-34.
Illumination units refer to page J-30.

QM-Data200 2D data processing unit (optional accessory) refer to page J-31 for more details.

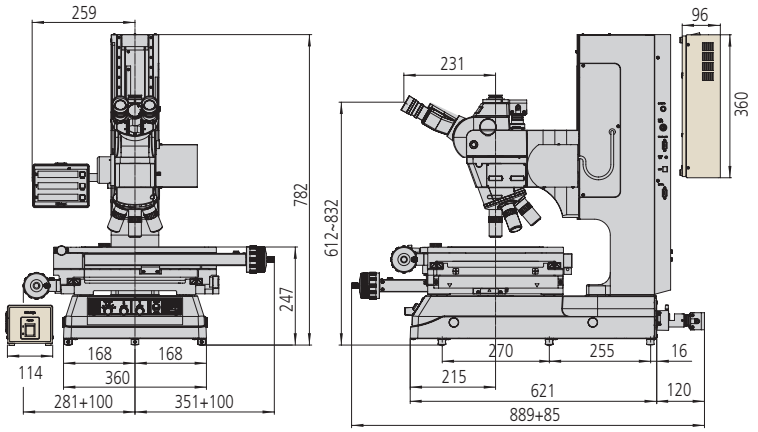
Vision Unit PC-based vision measuring system (optional accessory) refer to page J-32 for more details.

Focus Pilot FP-05 Focus assisting system (optional accessory) refer to page J-33 for more details.

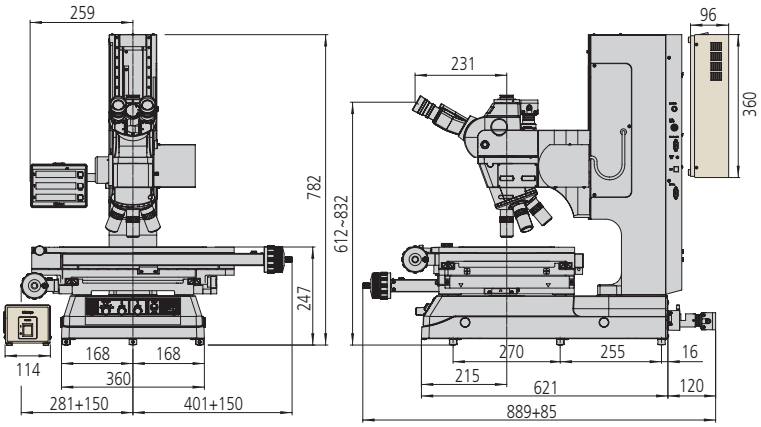
Dimensions

Unit: mm

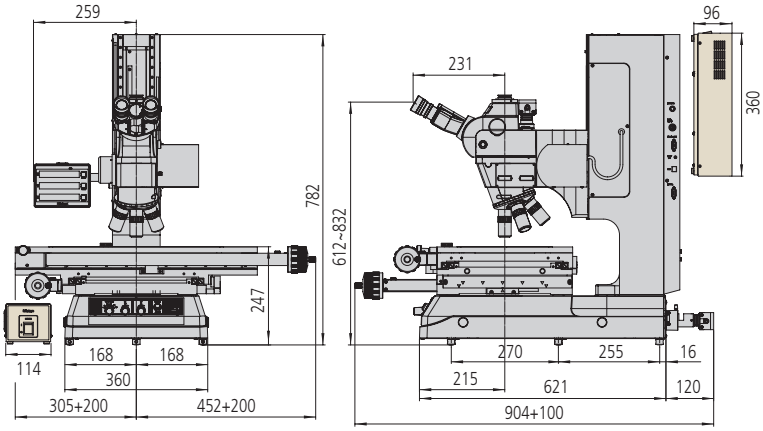
MF-UJ2017D



MF-UJ3017D



MF-UJ4020D



J

Mitutoyo

MF-U Microscope (Motor-Driven Types)

SERIES 176 – High-Power Multi-Function Measuring Microscopes

- Motor drive on all axes offers the high performance expected of a measuring microscope where efficiency and operability is concerned by enabling rapid and fatigue-free stage movement when measuring large or numerous workpieces.
- Available in 3 stage sizes.
- Observation with a clear and flare-free erect image and a wide field of view.
- Measuring accuracy that is the highest in its class (and conforms to JIS B7153).
- Proven high-NA objectives from the FS optical system (long working distance type).
- Integration of metallurgical and measurement microscope functions provides high-resolution observation and a high-accuracy measurement solution.
- Illumination unit (reflected/transmitted) selectable from high-intensity LED or halogen bulb types (required).
- Variable aperture diaphragm (reflected/transmitted) allows observation measurement while suppressing light diffraction.
- High-magnification eyepiece observation up to 4000X.
- Low-noise design.

MF-UG4020D
(The turret, objectives and illumination unit are optional accessories)

Technical Data

Image type:	Erect
Measurement method:	Linear encoder
Optical tube:	Siedentoph type (pupil distance adjustment: 51-76 mm), 1X tube lens, Binocular tube (inclination: 0-30°), Reticle projection method, with TV mount, Optical path ratio (eyepiece/TV mount: 50/50)
Eyepiece:	10X (field number 24 mm), Optional: 15X, 20X
Turret (optional):	Manual or power
Objective (optional):	M/BD Plan Apo objective from 1X to 200X
Transmitted illumination	
Light source:	Halogen bulb (12V, 50W) or white LED
Optical system:	Telecentric illumination with adjustable aperture diaphragms
Functions:	Light intensity adjustable, continuous brightness adjustment
Surface illumination	
Light source:	Halogen bulb (12V, 50W) or white LED
Optical system:	Koehler illumination with adjustable aperture diaphragms
Functions:	Light intensity adjustable, continuous brightness adjustment
Display unit	
No. of axes:	3
Resolution:	0.001/0.0005/0.0001 mm (.0001/.00005/.00001")
Functions:	Zero-setting, direction switching, data output (via RS-232C or USB interface)
Power supply:	240VAC ±10%, 50/60 Hz
Remote box functions:	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), joystick (X and Y axes drive), lock button (X and Y axes), speed adjustment (X,Y and Z axes), coarse/fine adjustment button (X, Y and Z axes)

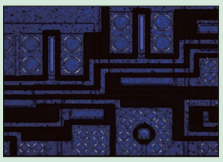
Illumination Unit (required option)

Type	LED	Halogen
Code No.	**176-446E**	**176-448E**

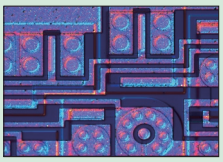
Note: Because the MF-U is not supplied with an illumination unit as standard, it is necessary to purchase either an LED or a Halogen illumination unit in addition to the basic instrument.

Specifications

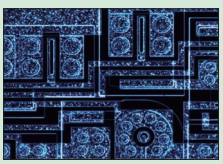
BF (brightfield)	**Model**	**MF-UG2017D**	**MF-UG3017D**	**MF-UG4020D**
	Code No.	**176-784E**	**176-785E**	**176-786E**
BD (brightfield/ darkfield)	**Model**	**MF-UH2017D**	**MF-UH3017D**	**MF-UH4020D**
	Code No.	**176-787E**	**176-788E**	**176-789E**
XY stage travel range		200 x 170 mm	300 x 170 mm	400 x 200 mm
Focussing method		Motor drive (max. measuring speed 20 mm/s)		
Resolution (switchable)		0.001/0.0005/0.0001 mm (.0001/.00005/.00001")		
Measuring accuracy (at 20°C)		X/Y axes: ±(2.2+2L/100) µm when not loaded, JIS B7153, L = measured length (mm)		
XY stage size		410 x 342 mm	510 x 342 mm	610 x 342 mm
Effective glass size		270 x 240 mm	370 x 240 mm	440 x 240 mm
Swivel function		±5° (left)		±3° (left)
Max. stage loading		20 kg		15 kg
Max. workpiece height		220 mm		
Price		**POA**	**POA**	**POA**



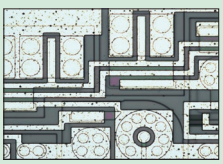
Polarized light observation
Used for observing materials with special optical characteristics, such as minerals and liquid crystals.



Differential Interference Contrast (DIC) observation
Effective in detecting fine scratches and steps on the surface of metals, liquid crystals and semiconductors.



Dark Field (DF) observation
Scratches and dust that cannot be viewed in bright field observation can be observed by this method and in high contrast.



Bright Field (BF) observation
Directly views the light scattered from the surface of the workpiece. This is the commonest method of observation.

Optional Accessories

Code No.	Description	Price
176-308	Vibration damping stand	**£2610.00**
375-054	0.5X camera adapter (with C-mount adapter)	**£1420.00**
375-056	Stage micrometer	**£263.00**
517181	Halogen bulb (12V, 100W)	**£60.00**
970441	C-mount adapter	**£51.90**
12AAJ088	Footswitch	**£244.00**
12BAD602	Halogen bulb (high intensity type, 12V, 100W)	**£41.40**
DIC units		
378-076	DIC unit for 100X, SL80X, SL50X objective	**£1830.00**
378-078	DIC unit for 50X, SL20X objective	**£1830.00**
378-079	DIC unit for 20X objective	**£1830.00**
378-080	DIC unit for 10X, 5X objective	**£1830.00**
Filters		
12AAA643	ND2 colour filter	**£68.00**
12AAA644	ND8 colour filter	**£68.00**
12AAA645	GIF filter	**£72.20**
12AAA646	LB80 filter	**£68.00**
12AAG806	GIF filter	**£132.00**
12AAG807	LB80 filter	**£113.00**

Turrets refer to page J-33.
Eyepieces and objective lenses refer to pages J-24 to J-29.
Fixture and stage accessories refer to page J-34.
Illumination units refer to page J-30.

QM-Data200 2D data processing unit (optional accessory) refer to page J-31 for more details.

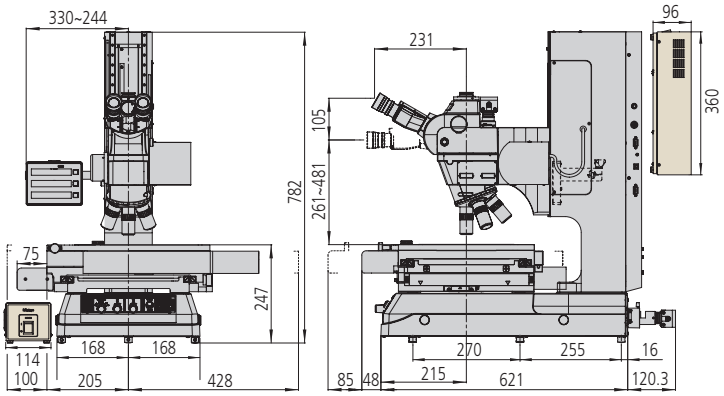
Vision Unit PC-based vision measuring system (optional accessory) refer to page J-32 for more details.

Focus Pilot FP-05 Focus assisting system (optional accessory) refer to page J-33 for more details.

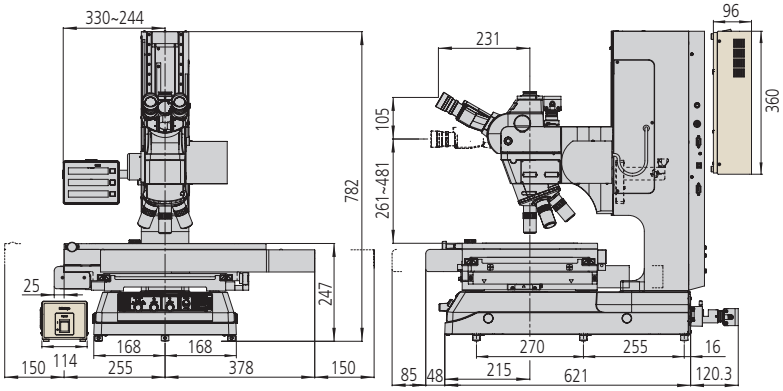
Dimensions

Unit: mm

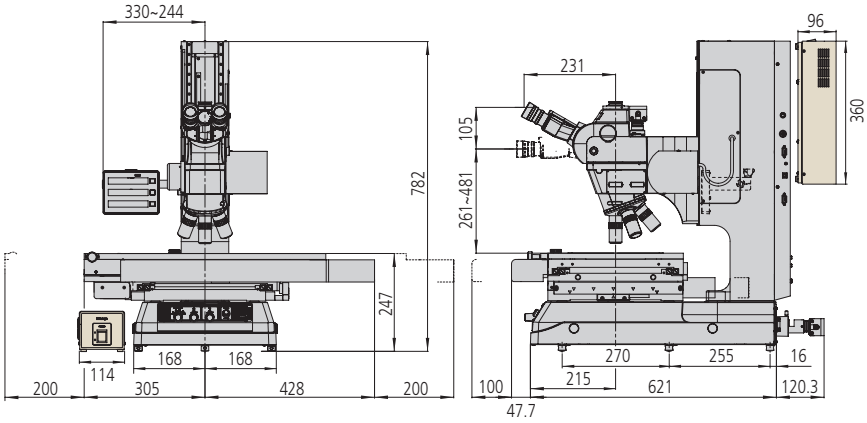
MF-UG2017D



MF-UG3017D



MF-UG4020D



J

MF-U Microscope (Motor-Driven Types with LAF)

SERIES 176 – High-Power Multi-Function Measuring Microscopes

- Motor drive on all axes offers the high performance expected of a measuring microscope where efficiency and operability is concerned by enabling rapid and fatigue-free stage movement when measuring large or numerous workpieces.
- Laser Auto Focus keeps the target surface in focus even when the stage is moving.
- Available in 3 stage sizes.
- Observation with a clear and flare-free erect image and a wide field of view.
- Measuring accuracy that is the highest in its class (and conforms to JIS B7153).
- Proven high-NA objectives from the FS optical system (long working distance type).
- Integration of metallurgical and measurement microscope functions provides high-resolution observation and a high-accuracy measurement solution.
- Illumination unit (reflected/transmitted) selectable from high-intensity LED or halogen bulb types (required).
- Variable aperture diaphragm (reflected/transmitted) allows observation measurement while suppressing light diffraction.
- High-magnification eyepiece observation up to 4000X.
- Low-noise design.

MF-UE2017D
(The turret, objectives and illumination unit are optional accessories.)

Technical Data

Image type:	Erect
Measurement method:	Linear encoder
Optical tube:	Siedentoph type (pupil distance adjustment: 51-76 mm), 1X tube lens, Binocular tube (inclination: 0-30°), Reticle projection method, with TV mount, Optical path ratio (eyepiece/TV mount: 50/50)
Eyepiece:	10X (field number 24 mm), Optional: 15X, 20X
Turret (optional):	Manual or power
Objective (optional):	M/BD Plan Apo objective from 1X to 200X
Transmitted illumination	
Light source:	Halogen bulb (12V, 50W) or white LED
Optical system:	Telecentric illumination with adjustable aperture diaphragms
Functions:	Light intensity adjustable, continuous brightness adjustment
Surface illumination	
Light source:	Halogen bulb (12V, 50W) or white LED
Optical system:	Koehler illumination with adjustable aperture diaphragms
Functions:	Light intensity adjustable, continuous brightness adjustment
Display unit	
No. of axes:	3
Resolution:	0.001/0.0005/0.0001 mm (.0001/.00005/.00001")
Functions:	Zero-setting, direction switching, data output (via RS-232C or USB interface)
Power supply:	240VAC ±10%, 50/60 Hz
Remote box functions:	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), joystick (X and Y axes drive), lock button (X and Y axes), speed adjustment (X,Y and Z axes), coarse/fine adjustment button (X, Y and Z axes)

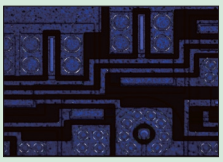
Illumination Unit (required option)

Type	LED	Halogen
Code No.	**176-446E**	**176-448E**

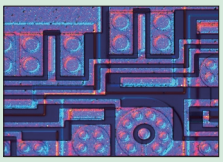
Note: Because the MF-U is not supplied with an illumination unit as standard, it is necessary to purchase either an LED or a Halogen illumination unit in addition to the basic instrument.

Specifications

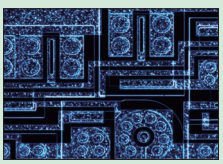
BF (brightfield)	**Model**	**MF-UE2017D**	**MF-UE3017D**	**MF-UE4020D**
	Code No.	**176-790E**	**176-791E**	**176-792E**
BD (brightfield/ darkfield)	**Model**	**MF-UF2017D**	**MF-UF3017D**	**MF-UF4020D**
	Code No.	**176-793E**	**176-794E**	**176-795E**
XY stage travel range		200 x 170 mm	300 x 170 mm	400 x 200 mm
Focussing method		Motor drive (max. measuring speed 20 mm/s)		
Resolution (switchable)		0.001/0.0005/0.0001 mm (.0001/.00005/.00001")		
Measuring accuracy (at 20°C)		X/Y axes: ±(2.2+2L/100) µm when not loaded, JIS B7153, L = measured length (mm)		
XY stage size		410 x 342 mm	510 x 342 mm	610 x 342 mm
Effective glass size		270 x 240 mm	370 x 240 mm	440 x 240 mm
Swivel function		±5° (left)		±3° (left)
Max. stage loading		20 kg		15 kg
Max. workpiece height		220 mm		
Price		**POA**	**POA**	**POA**



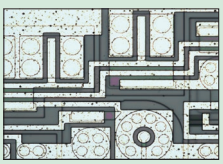
Polarized light observation
Used for observing materials with special optical characteristics, such as minerals and liquid crystals.



Differential Interference Contrast (DIC) observation
Effective in detecting fine scratches and steps on the surface of metals, liquid crystals and semiconductors.



Dark Field (DF) observation
Scratches and dust that cannot be viewed in bright field observation can be observed by this method and in high contrast.



Bright Field (BF) observation
Directly views the light scattered from the surface of the workpiece. This is the commonest method of observation.

Optional Accessories

Code No.	Description	Price
176-308	Vibration damping stand	**£2610.00**
375-054	0.5X camera adapter (with C-mount adapter)	**£1420.00**
375-056	Stage micrometer	**£263.00**
517181	Halogen bulb (12V, 100W)	**£60.00**
970441	C-mount adapter	**£51.90**
12AAJ088	Footswitch	**£244.00**
12BAD602	Halogen bulb (high intensity type, 12V, 100W)	**£41.40**
DIC units		
378-076	DIC unit for 100X, SL80X, SL50X objective	**£1830.00**
378-078	DIC unit for 50X, SL20X objective	**£1830.00**
378-079	DIC unit for 20X objective	**£1830.00**
378-080	DIC unit for 10X, 5X objective	**£1830.00**
Filters		
12AAA643	ND2 colour filter	**£68.00**
12AAA644	ND8 colour filter	**£68.00**
12AAA645	GIF filter	**£72.20**
12AAA646	LB80 filter	**£68.00**
12AAG806	GIF filter	**£132.00**
12AAG807	LB80 filter	**£113.00**

Turrets refer to page J-33.
Eyepieces and objective lenses refer to pages J-24 to J-29.
Fixture and stage accessories refer to page J-34.
Illumination units refer to page J-30.

QM-Data200 2D data processing unit (optional accessory) refer to page J-31 for more details.

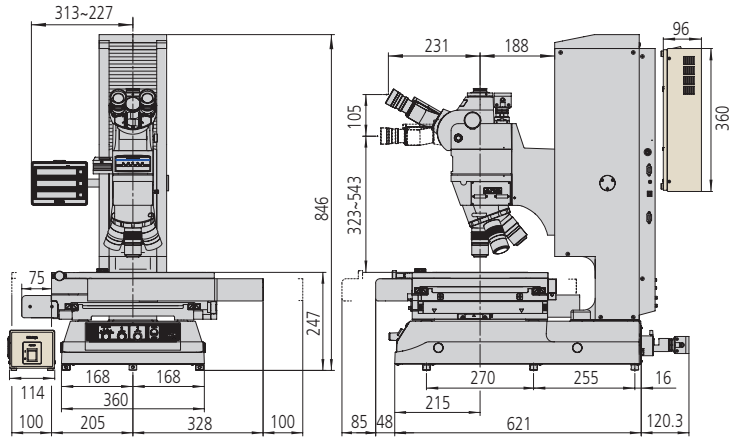
Vision Unit PC-based vision measuring system (optional accessory) refer to page J-32 for more details.

Focus Pilot FP-05 Focus assisting system (optional accessory) refer to page J-33 for more details.

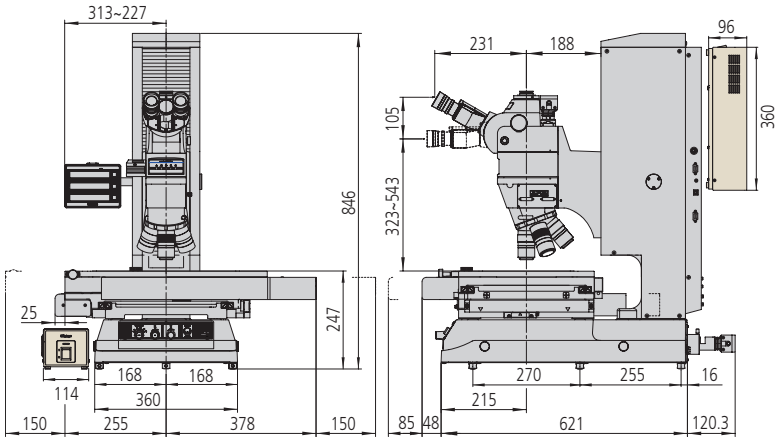
Dimensions

Unit: mm

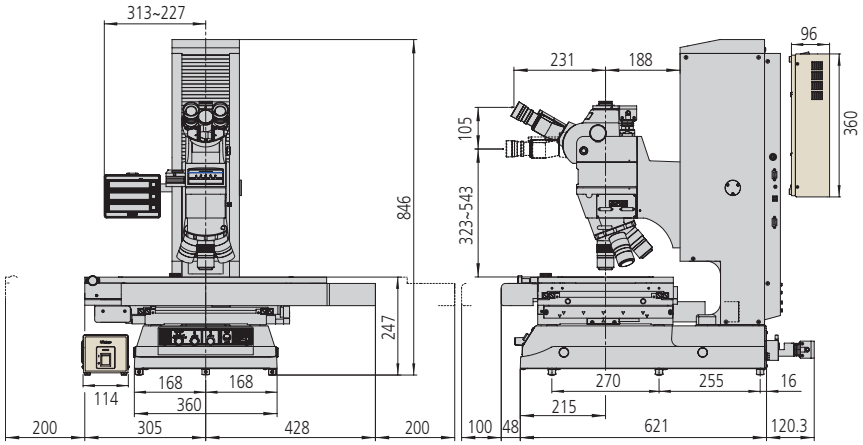
MF-UF2017D



MF-UF3017D



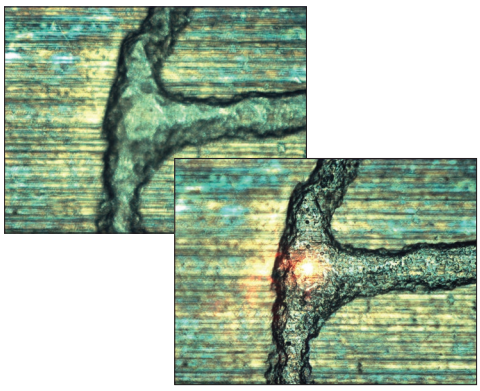
MF-UF4020D



Laser Auto Focus (LAF)

Laser auto focus (LAF) can be performed by the power LAF product. By employing AF that uses the TTL (Through The Lens) method, in which a semiconductor laser beam with a wavelength of 690 nm passes through the lens, these microscopes can perform AF even on minute areas.

Laser auto focus has better repeatability than focusing with the naked eye and can be used to measure heights. Furthermore, the following two types of focus functions are equipped as standard: JF (Just Focus), which can be used to target the laser on the point where you want to focus in order to detect the height, and TF (Tracking Focus), which always tracks the focus position.



Mitutoyo

Hyper MF/Hyper MF-U Microscope

SERIES 176 – High-Accuracy Measuring Microscopes

- The world's highest measuring accuracy of ±(0.9+0.3L/100) µm in the XY plane.
- Selectable LAF (Laser Auto Focus) function.
- High operability and repeatability.
- Three-axis motorized control.
- Power-drive auto focus unit is a standard feature.

Hyper MF
(The optical tube, turret and objective lens are optional accessories)

Hyper MF-U
(The optical tube, turret and objective lens are optional accessories)

Specifications

Without LAF function	**Model**	**Hyper MF-B2515B**	**Hyper MF-UB2515B**	**Hyper MF-UD2515B**
	Code No.	**176-430E**	**176-431E**	**176-432E**
Observation type		BF (brightfield)		BD (brightfield/darkfield)

With LAF function	**Model**	**Hyper MF-UE2515B**	**Hyper MF-UF2515B**
	Code No.	**176-433E**	**176-434E**
Observation type		BF (brightfield)	BD (brightfield/darkfield)

XY stage travel range	250 x 150 mm
Z-axis travel range	150 mm
Measurement method	Linear encoder
Resolution	0.01 µm
Measuring accuracy (at 20°C)	±(0.9+0.3L/100) µm, L = measured length in XY plane (mm)
Drive system (X, Y and Z axes)	Motor-driver control with the joystick
XY stage size	460 x 350 mm
Effective glass size	300 x 200 mm
Swivel function	±3°
Max. stage loading	30 kg
Max. workpiece height	150 mm
Price	**POA**

Technical Data: Hyper MF

Image type:	Erect
Optical tube:	Monocular or binocular tube (optional, inclination: 0-25°), reticle projection method, with TV mount, optical path ratio (eyepiece/TV mount: 50/50)
Eyepiece (optional):	10X, 15X, 20X
Objective:	3X (**375-037-1**), W.D.: 77.0 mm
Optional objectives:	1X, 5X 10X, 20X, 50X, 100X
Transmitted illumination	
Light source:	Halogen bulb (12V, 100W) (fibre-optic cold light illumination)
Optical system:	Telecentric illumination with adjustable aperture diaphragms
Functions:	Light intensity adjustable, 100 step brightness adjustment
Surface illumination	
Light source:	Halogen bulb (12V, 50W)
Optical system:	Koehler illumination with adjustable aperture diaphragms
Functions:	Light intensity adjustable, 100 step brightness adjustment
Data output:	Via RS-232C interface
Power supply:	240VAC ±10%, 50/60Hz
Dimensions:	880 x 913 x 730 mm (main unit), 160 x 476 x 381 mm (power unit)
Mass:	250 kg (main unit), 14 kg (power unit)

Technical Data: Hyper MF-U

Image type:	Erect
Optical tube:	Siedentoph type (pupil distance adjustment: 51-76 mm), 1X tube lens, binocular tube (inclination: 0-25°), reticle projection method, with TV mount, optical path ratio (eyepiece/TV mount: 50/50)
Eyepiece:	10X (field number 24 mm)
Optional:	15X, 20X
Turret (optional):	Power
Objective (optional):	M/BD Plan Apo objective from 1X to 200X
Transmitted illumination	
Light source:	Halogen bulb (12V, 100W)
Optical system:	Telecentric illumination with adjustable aperture diaphragms
Functions:	Light intensity adjustable, 100 step brightness adjustment
Surface illumination	
Light source:	Halogen bulb (12V, 50W)
Optical system:	Koehler illumination with adjustable aperture diaphragms
Functions:	Light intensity adjustable, 100 step brightness adjustment
Data output:	Via RS-232C interface
Power supply:	240VAC ±10%, 50/60Hz
Dimensions:	880 x 913 x 770 mm (main unit), 160 x 476 x 381 mm (power unit)
Mass:	255 kg (main unit), 14 kg (power unit)

J

Optional Accessories

Code No.	Description	Price
176-308	Vibration damping stand	**£2610.00**
375-056	Stage micrometer	**£263.00**
517181	Halogen bulb (12V, 100W)	**£60.00**
970441	C-mount adapter	**£51.90**
12AAJ088	Footswitch	**£244.00**
12BAD602	Halogen bulb (high intensity type, 12V, 100W)	**£41.40**
DIC units		
378-076	DIC unit for 100X, SL80X, SL50X objective	**£1830.00**
378-078	DIC unit for 50X, SL20X objective	**£1830.00**
378-079	DIC unit for 20X objective	**£1830.00**
378-080	DIC unit for 10X, 5X objective	**£1830.00**
Filters		
12AAA643	ND2 colour filter	**£68.00**
12AAA644	ND8 colour filter	**£68.00**
12AAA645	GIF filter	**£72.20**
12AAA646	LB80 filter	**£68.00**
12AAG806	GIF filter	**£132.00**
12AAG807	LB80 filter	**£113.00**

Turrets refer to page J-33.
Eyepieces and objective lenses refer to pages J-24 to J-29.
Fixture and stage accessories refer to page J-34.
Illumination units refer to page J-30.

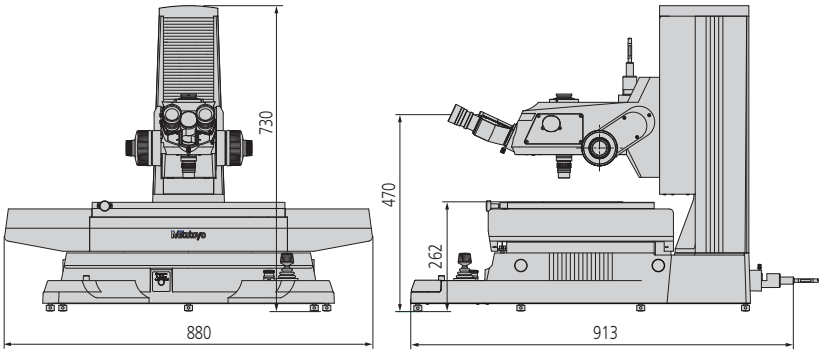
QM-Data200 2D data processing unit (optional accessory) refer to page J-31 for more details.

Vision Unit PC-based vision measuring system (optional accessory) refer to page J-32 for more details.

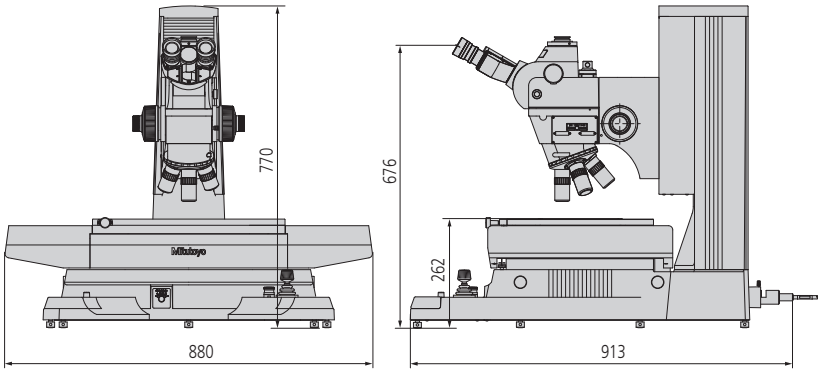
Focus Pilot FP-05 Focus assisting system (optional accessory) refer to page J-33 for more details.

Dimensions

Unit: mm



Hyper MF



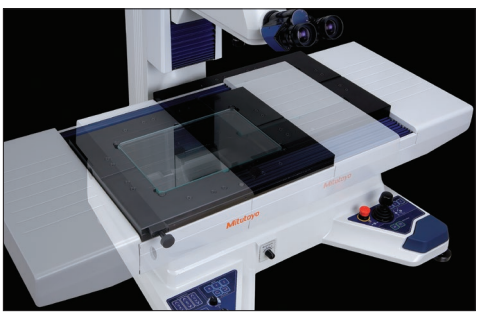
Hyper MF-U

Three-axis joystick

The X, Y, and Z axes are driven and controlled with one joystick that serves as the nerve centre of operation. Speed control is possible from high-speed traverse of the stage to ultra low-speed, precise positioning of a workpiece.

Large, highly accurate XY stage

The XY stage is a massive, highly stable design created using mechanical techniques developed over Mitutoyo's long years of experience in manufacturing precision measuring microscopes. Maximum stage loading is 30 kg and a range of useful fixtures is available that includes a wafer holder and swivel-centre support.



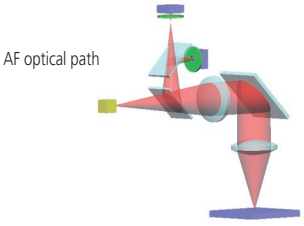
Highly accurate digital scales

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

LAF optical tube

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

*Available for model MF-U only



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

J

Microscope Video Unit VMU

SERIES 378 – Microscope Video Unit

- The VMU is a compact, lightweight and easy-to-install microscope unit for CCD camera monitoring in semiconductor fabrication facilities.
- An optical system featuring ultra-long working-distance objectives and correction for the wide range of wavelengths in current use.
- Reflected illumination keeps the workpiece free from thermal expansion (the fibre-optic illuminator is required).
- Also available with a laser mount or turret (objective mount).

VMU-V

VMU-H

VMU-LB

VMU-L4B

Technical Data

Magnification of tube: 1X
Reflected illumination: Telecentric system with aperture stop system; fibre-optic illuminator (optional) is required
Light source: Halogen bulb 12V, 150W (optional)
Objective lenses for bright field observation: M Plan Apo, M Plan Apo SL, G Plan Apo (optional accessories)
Objective lenses for laser cutting: M Plan Apo NIR, LCD Plan Apo NIR, M Plan Apo NUV and LCD Plan Apo NUV (optional accessories)
Objective lenses for laser machining: M Plan UV for 378-514 only (optional accessories)

Specifications

Model	VMU-V	VMU-H	VMU-LB	VMU-L4B
Code No.	**378-505**	**378-506**	**378-513**	**378-514**
Applicable wavelengths	Near infrared,visible		Near infrared, visible, near ultraviolet	Near infrared, visible, near ultraviolet, ultraviolet
Vertical CCD camera mount	✓	—	✓	✓
Horizontal CCD camera mount	—	✓	—	—
YAG laser mount	—	—	✓	✓
Fibre optic illumination unit mount	✓	✓	✓	✓
Mass	0.57 kg	0.59 kg	1.27 kg	1.3 kg
Price	**POA**	**POA**	**POA**	**POA**

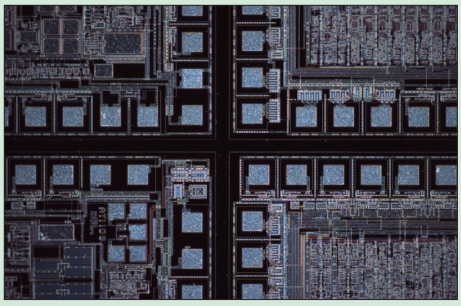
J

Technical Data

Magnification of tube: 1X

Reflected illumination:	Telecentric system with aperture stop system; fibre-optic illuminator (optional) is required
Light source:	Fibre-optic 12V, 100W (optional)
Objective lenses for bright field observation:	M Plan Apo, M Plan Apo HR, M Plan Apo SL, G Plan Apo (optional accessories)
Objective lenses for bright-/dark-field observation:	BD Plan Apo, BD Plan Apo HR, BD Plan Apo SL (optional accessories)

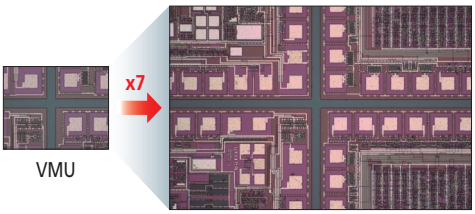
Highly compact configuration of 4 WIDE VMU units.



Highly compact configuration of 4 WIDE VMU units.

SERIES 378 – Wide-Field Microscope Video Unit

- Incorporates a wide-field image sensor (APS-C format or smaller size) providing seven times greater viewing area than the VMU Series for greatly enhanced inspection efficiency.



WIDE VMU

- In addition to normal bright-field observation, this series supports dark-field observation for scratch inspection, etc., and polarized light observation for increased contrast when viewing certain specimens.
- Bulk inspections covering a wide area can be performed with multiple units in a high density configuration.
- Supported sensor size of 2" equivalent, APS-C format.
- Image field of ø30 mm with 1X tube lens.
- Both F-mount and C-mount cameras can be mounted.
- BF observations are supported by the WIDE VMU-V and -H models.
- 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.

WIDE VMU-V

WIDE VMU-BDV

WIDE VMU-H

WIDE VMU-BDH

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Specifications

Model	WIDE VMU-V	WIDE VMU-H	WIDE VMU-BDV	WIDE VMU-BDH
Code No.	**378-515**	**378-516**	**378-517**	**378-518**
Image type	BF (brightfield)/erect	BF (brightfield)/inverted	BD (bright-/dark-field)/erect	BD (bright-/dark-field)/inverted
Vertical CCD camera mount	✓	—	✓	—
Horizontal CCD camera mount	—	✓	—	✓
Fibre optic illumination unit mount	✓	✓	✓	✓
Mass	1.8 kg	1.95 kg	2 kg	2.15 kg
Price	**POA**	**POA**	**POA**	**POA**

Mitutoyo

Microscope Head FS70

SERIES 378 – Microscope Head for Semiconductor Inspection and Repair

- A versatile microscope head typically used as an OEM product suitable for fitting to specialist machines, such as those designed for inspection and repair of semiconductor wafers.
- Excellent operability is provided by the inwardly rotating turret and high quality, long working-distance objectives.
- Ideal as the microscope unit of a prober station for semiconductors.
- Ergonomic design with combined knob for coarse- and fine-focus adjustment.
- The FS70L supports three YAG laser wavelengths (1064 nm, 532 nm and 355 nm), while the FS70L4 supports two wavelengths (532 nm and 266 nm), thus expanding the scope of laser applications, allowing laser-cutting of thin-films used in semiconductors and liquid crystal substrates. However, please note that Mitutoyo assumes no responsibility whatever for the performance and/or safety of the laser system used with Mitutoyo microscopes. Careful examination and testing is recommended when selecting a laser source.
- Bright field, Differential Interference Contrast (DIC) and polarized light observation capabilities are standard with the FS70Z. The FS70L and FS70L4 do not support the DIC method.

FS70L
(The turret, eyepieces and objectives are optional accessories)

Technical Data

Focus adjustment
- Method: With concentric coarse and fine focussing wheels (right and left)
- Range: 50 mm travel range, 0.1 mm/rev. for fine adjustment, 3.8 mm/rev. for coarse adjustment
- Functions: Light intensity adjustable, 100 steps brightness adjustment

Trinocular tube image: Erect
Interpupillary distance: Siedentopf type, adjustment range: 51-76 mm
Field number: 24
Inclination: 0-20° (only - TH, - THS models)
Illumination system: Reflective illumination for bright field (Koehler illumination, with aperture diaphragm)
Light source: 12V / 100W fibre-optic, non-stopped adjustment, light guide length 1.5 m, power consumption 150W
Objective lenses: M Plan Apo, M Plan Apo SL, G Plan Apo (optional accessories)

FS70L4 (The turret, eyepieces and objectives are optional accessories).

FS70Z (The turret, eyepieces and objectives are optional accessories).

Specifications

Standard type	**Model**	**FS70**	**FS70-TH**	**FS70Z**	**FS70Z-TH**
	Code No.	**378-184-1**	**378-184-3**	**378-185-1**	**378-185-3**
Short-base type	**Model**	**FS70-S**	**FS70-THS**	**FS70Z-S**	**FS70Z-THS**
	Code No.	**378-184-2**	**378-184-4**	**378-185-2**	**378-185-4**
Optical pass ratio		50/50			
Tube lens		1X		1X, 2X zoom	
Camera mount		C-mount (using optional adapter B)			
Loading*[1]		14.5 kgf	13.6 kgf	14.1 kgf	13.2 kgf
Mass		6.1 kg	7.1 kg	6.6 kg	7.5 kg
Price		**POA**	**POA**	**POA**	**POA**

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

*[1] Allowable loading on optical tube excluding weight of objective lenses and eyepieces.

Optional Accessories

Eyepieces and Objectives for Measuring Microscopes

Optional Reticles

Code No.	Description	Price
516576	Broken cross hairs (90° and 60°)	**£89.70**
516577	20 mm scale (min. reading: 0.1 mm) with cross-hair	**£89.70**
516578	Concentric circle (diametral increment: 1.2 mm)	**£89.70**
516848	Cross hair	**£89.70**
516849	10 mm scale (min. reading: 0.1 mm)	**£89.70**
516850	5 mm scale (min. reading: 0.05 mm)	**£89.70**

SERIES 378 – Eyepieces

- The field of view is extra wide.
- Optional reticles are available.

378-866-5

378-857-5

378-858-5

Code No.	Magnification	Field number	Mass	Price
Individual				
378-866-5	10X	24	150 g	**£310.00**
378-857-5	15X	16	40 g	**£360.00**
378-858-5	20X	12	55 g	**£375.00**
2 piece set				
378-866	10X	24	150 g	**£620.00**
378-857	15X	16	40 g	**£863.00**
378-858	20X	12	55 g	**£886.00**

SERIES 378 – Objectives

- The Mitutoyo 378 Series objectives have the world's longest working distance and an infinity correction optical system.
- These objectives provide flexible observation at high magnifications and independent correction of chromatic aberration.
- Long working distance objectives provide excellent clearance between the lens surface and the workpiece surface in focus, making it possible to observe features which are usually hard to bring to focus because of awkward projections.
- The metallurgical plan apochromatic (M Plan Apo) objective is an excellent optical system. This objective provides a flat, chromatic aberration-free image throughout the field of view, making it suitable for any type of microscope.
- Specially designed objectives are also available with correction for near infrared, near ultraviolet, and ultraviolet, or for observing through LCD screen glasses.
- The mounting screw threads of objectives are designed to conform to JIS B-7141-1988.

Note: Focal length and focal depth for objectives are specified at a reference wavelength of 0.55 µm irrespective of working wavelength.

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-infrared corrected M Plan Apo NIR objectives.

Near-ultraviolet corrected M Plan Apo NUV objectives.

Ultraviolet corrected M Plan UV objectives.

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Optional Accessories

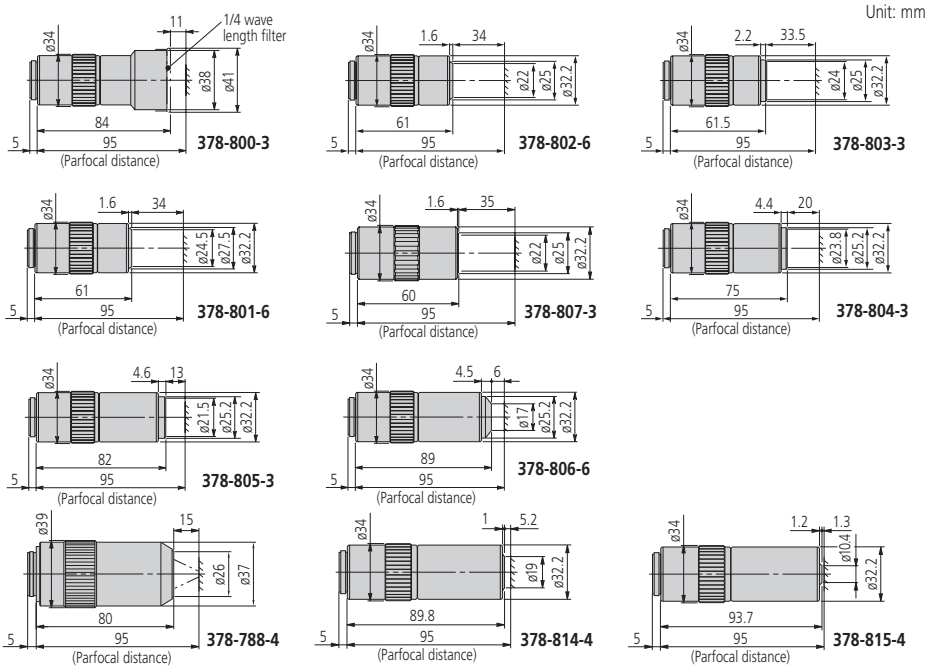
Objectives for Measuring Microscopes

M Plan Apo/M Plan Apo HR for Bright Field Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1*[1] (mm)	View field 2*[2] (mm)	Mass (g)	Price
M Plan Apo										
378-800-3	1X	0.025	11.0	200	11.0	440	ø24	4.8x6.4	300	**£1800.00**
378-801-6	2X	0.055	34.0	100	5.0	91	ø12	2.4x3.2	220	**£549.00**
378-802-6	5X	0.14	34.0	40	2.0	14	ø4.8	0.96x1.28	240	**£586.00**
378-807-3	7.5X	0.21	35.0	26.67	1.3	6.2	ø3.6	0.64x0.85	240	**£1110.00**
378-803-3	10X	0.28	33.5	20	1.0	3.5	ø2.4	0.48x0.64	230	**£627.00**
378-804-3	20X	0.42	20.0	10	0.7	1.6	ø1.2	0.24x0.32	270	**£1330.00**
378-805-3	50X	0.55	13.0	4	0.5	0.9	ø0.48	0.10x0.13	290	**£1790.00**
378-806-3	100X	0.70	6.0	2	0.4	0.6	ø0.24	0.05x0.06	320	**£2010.00**
M Plan Apo HR										
378-788-4	10X	0.42	15	20	0.7	1.6	ø2.4	0.48x0.64	460	**£6350.00**
378-814-4	50X	0.75	5.2	4	0.4	0.49	ø0.48	0.10x0.13	400	**£3480.00**
378-815-4	100X	0.90	1.3	2	0.3	0.34	ø0.24	0.05x0.06	410	**£3970.00**

*[1] Field of view when using a field number 24 mm eyepiece, *[2] Field of view when using 1/2" CCD camera.

Unit: mm

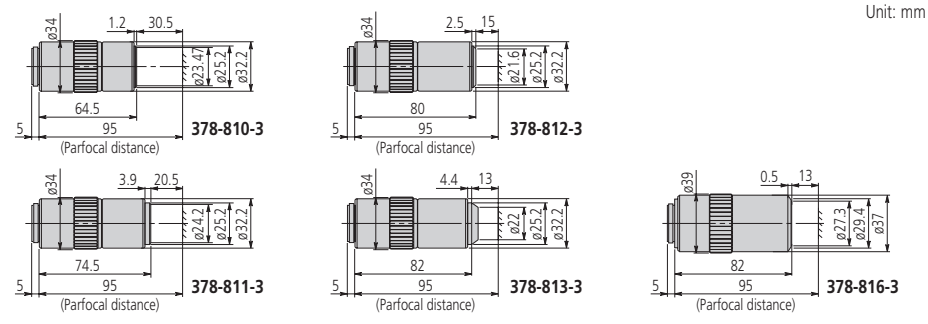


M Plan Apo SL for Bright Field Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1*[1] (mm)	View field 2*[2] (mm)	Mass (g)	Price
378-810-3	20X	0.28	30.5	10	1.0	3.5	ø1.2	0.24x0.32	240	**£1430.00**
378-811-3	50X	0.42	20.5	4	0.7	1.6	ø0.48	0.10x0.13	280	**£2130.00**
378-812-3	80X	0.50	15.0	2.5	0.6	1.1	ø0.3	0.06x0.08	280	**£2250.00**
378-813-3	100X	0.55	13.0	2	0.5	0.9	ø0.24	0.05x0.06	290	**£2430.00**
378-816-3	200X	0.62	13.0	1	0.4	0.7	ø0.12	0.025x0.03	490	**£6180.00**

*[1] Field of view when using a field number 24 mm eyepiece, *[2] Field of view when using 1/2" CCD camera.

Unit: mm



High resolution objectives

These objectives offer extra-high resolving power for observation or measurement in the most demanding applications. (Note that a Polarizing Unit (**378-074**) is required when using the 1X objective.)

Extra-long working distance objectives

These objectives offer extra-long working distances to enable easier working and provide better protection for the lens.

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Optimised for through-glass working

The G Plan Apo Series objectives are designed for observing a workpiece through glass (thickness = 3.5 mm).

Glass Thickness (t = 3.5 mm) Corrected G Plan Apo for Bright Field Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)*3	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1*1 (mm)	View field 2*2 (mm)	Mass (g)	Price
378-847	20X	0.28	29.42	10	1.0	3.5	ø1.2	0.24 x 0.32	270	**£2250.00**
378-848-3	50X	0.50	13.89	4	0.6	1.1	ø0.48	0.10 x 0.13	320	**£2560.00**

*1 Field of view when using a field number 24 mm eyepiece, *2 Field of view when using 1/2" CCD camera, *3 In air.

Unit: mm

High resolution objectives

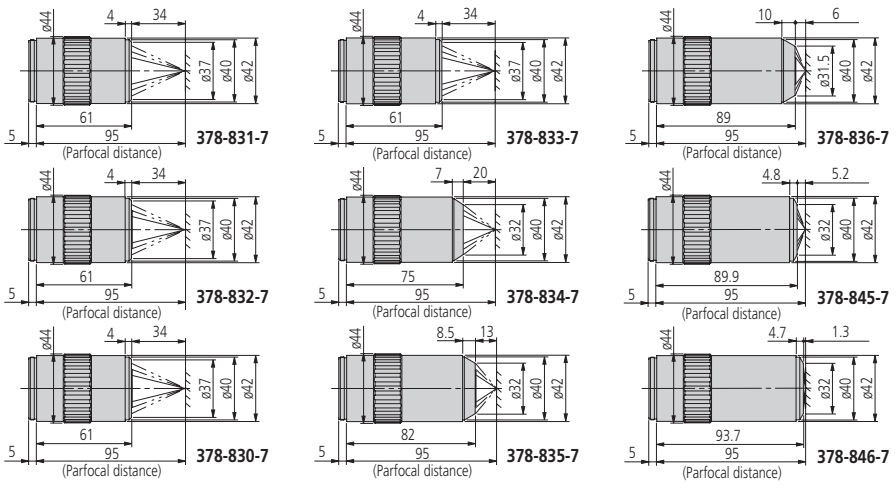
These objectives offer extra-high resolving power for observation or measurement in the most demanding applications.

BD Plan Apo/BD Plan Apo HR for Bright/Dark Field Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1*1 (mm)	View field 2*2 (mm)	Mass (g)	Price
BD Plan Apo										
378-831-7	2X	0.055	34	100	5.0	91	ø12	2.4 x 3.2	340	**£626.00**
378-832-7	5X	0.14	34	40	2.0	14	ø4.8	0.96 x 1.28	350	**£832.00**
378-830-7	7.5X	0.21	34	26.67	1.3	6.2	ø3.6	0.64 x 0.85	350	**£1110.00**
378-833-7	10X	0.28	34	20	1.0	3.5	ø2.4	0.48 x 0.64	350	**£727.00**
378-834-7	20X	0.42	20	10	0.7	1.6	ø1.2	0.24 x 0.32	400	**£1710.00**
378-835-7	50X	0.55	13	4	0.5	0.9	ø0.48	0.10 x 0.13	440	**£2250.00**
378-836-7	100X	0.70	6	2	0.4	0.6	ø0.24	0.05 x 0.06	460	**£2530.00**
BD Plan Apo HR										
378-845-7	50X	0.75	5.2	4	0.4	0.49	ø0.48	0.10 x 0.13	530	**£2870.00**
378-846-7	100X	0.90	1.3	2	0.3	0.34	ø0.24	0.05 x 0.06	545	**£3270.00**

*1 Field of view when using a field number 24 mm eyepiece, *2 Field of view when using 1/2" CCD camera.

Unit: mm



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Optional Accessories

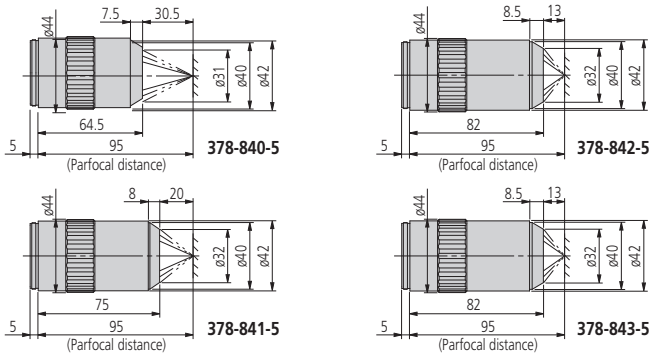
Objectives for Measuring Microscopes

BD Plan Apo SL for Bright/Dark Field Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1*[1] (mm)	View field 2*[2] (mm)	Mass (g)	Price
378-840-7	20X	0.28	30.5	10	1.0	3.5	ø1.2	0.24 x 0.32	350	**£1790.00**
378-841-7	50X	0.42	20	4	0.7	1.6	ø0.48	0.10 x 0.13	410	**£1890.00**
378-842-7	80X	0.50	13	2.5	0.6	1.1	ø0.3	0.06 x 0.08	430	**£2420.00**
378-843-7	100X	0.55	13	2	0.5	0.9	ø0.24	0.05 x 0.06	440	**£2550.00**

*[1] Field of view when using a field number 24 mm eyepiece, *[2] Field of view when using 1/2" CCD camera.

Unit: mm



Extra-long working distance objectives

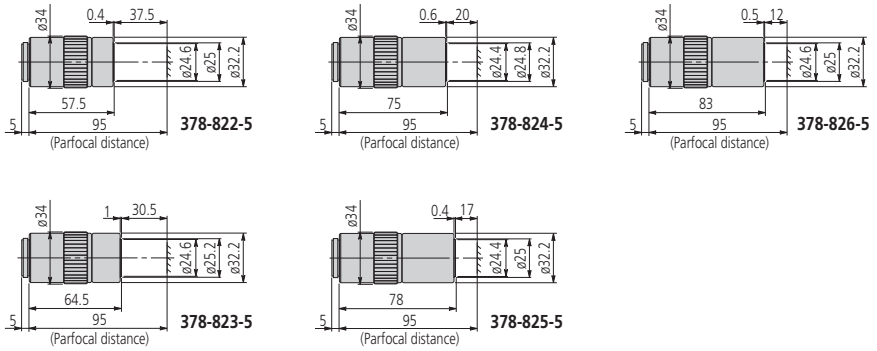
These objectives offer extra-long working distances to enable easier working and provide better protection for the lens.

Near-Infrared Corrected
M Plan Apo NIR/M Plan Apo NIR HR for Bright Field Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1*[1] (mm)	View field 2*[2] (mm)	Mass (g)	Price
M Plan Apo NIR										
378-822-5	5X	0.14	37.5	40	2.0	14	ø4.8	0.96 x 1.28	220	**£656.00**
378-823-5	10X	0.26	30.5	20	1.1	4.1	ø2.4	0.48 x 0.64	250	**£1100.00**
378-824-5	20X	0.40	20	10	0.7	1.7	ø1.2	0.24 x 0.32	300	**£2190.00**
378-825-5	50X	0.42	17	4	0.7	1.6	ø0.48	0.10 x 0.13	315	**£2190.00**
378-826-5	100X	0.50	12	2	0.6	1.1	ø0.24	0.05 x 0.06	335	**£2740.00**
M Plan Apo NIR HR										
378-863-5	50X	0.65	10	4	0.42	0.65	ø0.48	0.10 x 0.13	450	**£6260.00**
378-864-5	100X	0.70	10	2	0.39	0.56	ø0.24	0.05 x 0.06	450	**£6500.00**

*[1] Field of view when using a field number 24 mm eyepiece, *[2] Field of view when using 1/2" CCD camera.

Unit: mm



Stable parfocal distance with operating wavelength

These objectives are designed so that a workpiece's image remains substantially in focus even when the wavelength used is changed anywhere from the visible range (λ = 480 nm) up to near-infrared (λ = 1800 nm). Therefore the M Plan APO NIR Series is suitable for laser repair. However, when the wavelength used exceeds 1100 nm, the focussing position may slightly deviate from that in the visible range due to changes in glass dispersion and refractive index.

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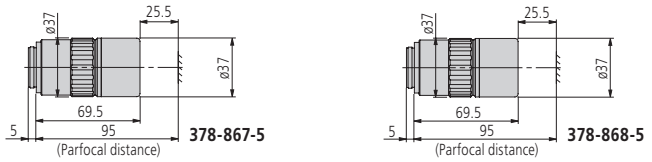
Near-Infrared Corrected
M Plan Apo NIR B for Bright Field Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1*[1] (mm)	View field 2*[2] (mm)	Mass (g)	Price
378-867-5	20X	0.40	25.5	10	0.7	1.7	ø1.2	0.24 x 0.32	350	**£1430.00**
378-868-5	50X	0.42	25.5	4	0.7	1.6	ø0.48	0.10 x 0.13	375	**£1900.00**

*[1] Field of view when using a field number 24 mm eyepiece, *[2] Field of view when using 1/2" CCD camera.

Unit: mm



Optimised for through-glass working

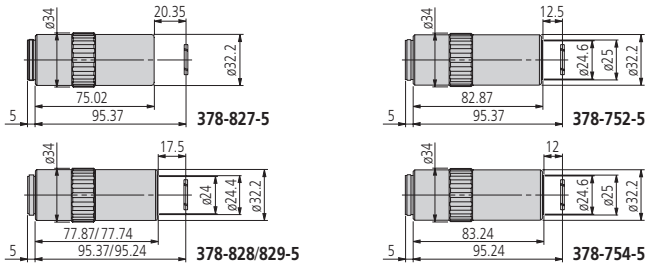
These near-infrared (λ = 1800 nm) corrected objectives are designed for observing a workpiece through LCD glass (thickness = 1.1 mm (**378-827-5**, **378-828-5**, **378-752-5**) or 0.7 mm (**378-829-5**, **378-754-5**) and for laser repair.

Near-Infrared and LCD Glass Thickness (t = 1.1 mm or 0.7 mm) Corrected
LCD Plan Apo NIR for Bright Field Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1*[1] (mm)	View field 2*[2] (mm)	Mass (g)	Price
378-827-5	20X	0.40	19.98	10	0.7	1.7	ø1.2	0.24 x 0.32	305	**£2110.00**
378-828-5	50X	0.42	17.13	3.9	0.7	1.6	ø0.48	0.10 x 0.13	320	**£2630.00**
378-829-5	50X	0.42	17.26	3.9	0.7	1.6	ø0.48	0.10 x 0.13	320	**£4140.00**
378-752-5*[3]	100X	0.50	12.13	2	0.6	1.1	ø0.24	0.05 x 0.06	335	**£4550.00**
378-754-5	100X	0.50	11.76	2	0.6	1.1	ø0.24	0.05 x 0.06	335	**£4550.00**

*[1] Field of view when using a field number 24 mm eyepiece, *[2] Field of view when using 1/2" CCD camera, *[3] Made to order.

Unit: mm



Stable parfocal distance with operating wavelength

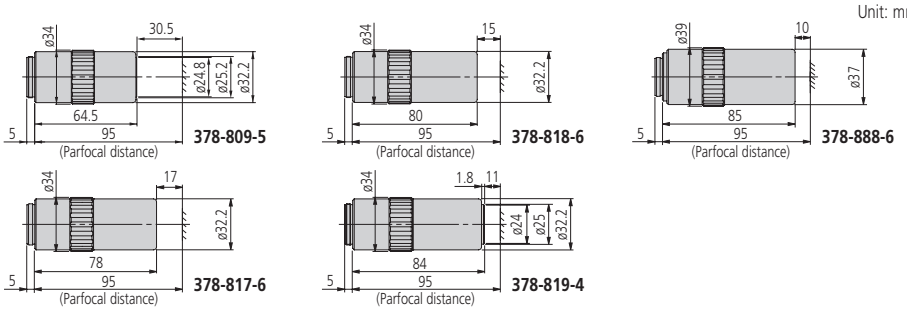
These objectives are designed so that a workpiece's image remains substantially in focus even when the wavelength used is changed anywhere from the visible range (λ = 620 nm) to the near-ultraviolet range (λ = 355 nm). Therefore the M Plan APO NUV Series is suitable for laser repair applications.

Near-Ultraviolet Corrected
M Plan Apo NUV/M Plan Apo NUV HR for Bright Field Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1*[1] (mm)	View field 2*[2] (mm)	Mass (g)	Price
M Plan Apo NUV										
378-809-5	10X	0.28	30.5	20	1.0	3.5	ø2.4	0.48 x 0.64	255	**£3140.00**
378-817-6	20X	0.40	17	10	0.7	1.7	ø1.2	0.24 x 0.32	340	**£3490.00**
378-818-6	50X	0.42	15	4	0.7	1.6	ø0.48	0.10 x 0.13	350	**£3490.00**
378-819-4	100X	0.50	11	2	0.6	1.1	ø0.24	0.05 x 0.06	380	**£5050.00**
M Plan Apo NUV HR										
378-888-6	50X	0.65	10	4	0.42	0.65	ø0.48	0.10 x 0.13	500	**£11150.00**

*[1] Field of view when using a field number 24 mm eyepiece, *[2] Field of view when using 1/2" CCD camera.

Unit: mm



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Optional Accessories

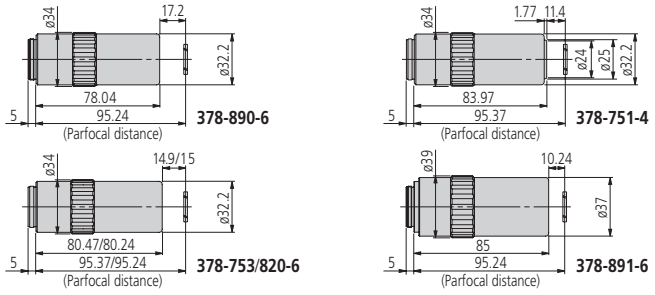
Objectives for Measuring Microscopes

Near-Ultraviolet and LCD Glass Thickness (t = 1.1 mm or 0.7 mm) Corrected LCD Plan Apo NUV/LCD Plan Apo NUV HR for Bright Field Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1*[1] (mm)	View field 2*[2] (mm)	Mass (g)	Price
LCD Plan Apo NUV										
378-890-6	20X	0.40	16.96	10	0.7	1.7	ø1.2	0.24 x 0.32	340	**£3610.00**
378-753-6	50X	0.42	14.53	4	0.7	1.6	ø0.48	0.10 x 0.13	350	**£4430.00**
378-820-6	50X	0.42	14.76	4	0.7	1.6	ø0.48	0.10 x 0.13	350	**£3320.00**
378-751-4	100X	0.50	11.03	2	0.6	1.1	ø0.24	0.05 x 0.06	380	**£6870.00**
LCD Plan Apo NUV HR										
378-891-6	50X	0.65	9.76	4	0.4	0.7	ø0.48	0.10 x 0.13	500	**£8140.00**

*[1] Field of view when using a field number 24 mm eyepiece, *[2] Field of view when using 1/2" CCD camera.

Unit: mm



Optimised for through-glass working

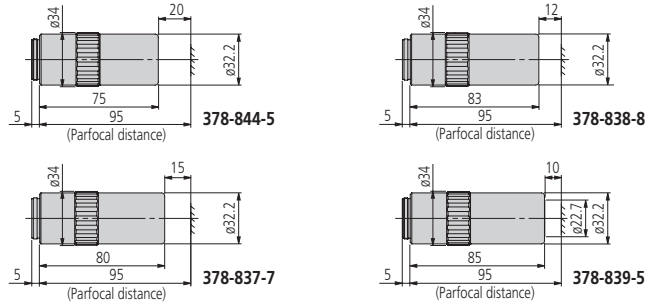
These near-infrared (λ = 355 nm) corrected objectives are designed for observing a workpiece through LCD glass (thickness = 1.1 mm (**378-753-6**, **378-751-4**) or 0.7 mm (**378-890-6**, **378-820-6**, **378-891-6**) and for laser repair.

Ultraviolet Corrected M Plan UV for Bright Field Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1*[1] (mm)	View field 2*[2] (mm)	Mass (g)	Price
378-844-5	10X	0.25	20	20	1.1	4.4	ø2.4	0.48 x 0.64	310	**£7720.00**
378-837-7	20X	0.36	15	10	0.8	2.1	ø1.2	0.24 x 0.32	330	**£8150.00**
378-838-8	50X	0.40	12	4	0.7	1.7	ø0.48	0.10 x 0.13	400	**£7960.00**
378-839-5	80X	0.55	10	2.5	0.5	0.9	ø0.3	0.06 x 0.08	380	**£12540.00**

*[1] Field of view when using a field number 24 mm eyepiece, *[2] Field of view when using 1/2" CCD camera.

Unit: mm



Stable parfocal distance with operating wavelength

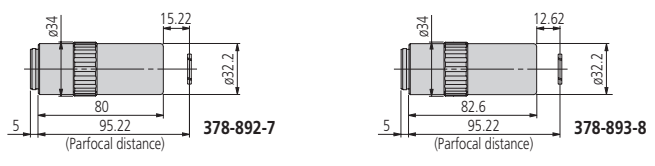
These ultraviolet corrected objectives are designed so that a workpiece's image remains substantially in focus even when the wavelength used is changed anywhere from the visible range (λ = 550 nm) to the ultraviolet (λ = 266 nm). Therefore the M Plan UV Series is suitable for laser repair applications.

Ultraviolet Corrected LCD Plan UV for Bright Field Observation

Code No.	Magnification	Numerical aperture	Working distance (mm)	Focal length (mm)	Resolving power (μm)	Focal depth (μm)	View field 1*[1] (mm)	View field 2*[2] (mm)	Mass (g)	Price
378-892-7	20X	0.36	15	10	0.8	2.1	ø1.2	0.24 x 0.32	330	**£9560.00**
378-893-8	50X	0.41	12.4	4	0.7	1.6	ø0.48	0.10 x 0.13	400	**POA**

*[1] Field of view when using a field number 24 mm eyepiece, *[2] Field of view when using 1/2" CCD camera.

Unit: mm



Optimised for through-glass working

These ultraviolet (λ = 266 nm) corrected objectives are designed for observing a workpiece through LCD glass (thickness = 0.7 mm).

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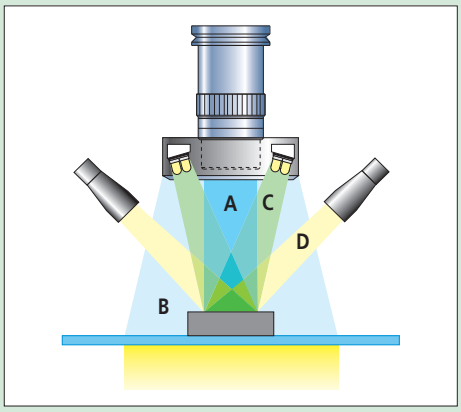
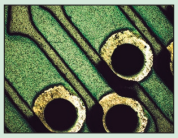
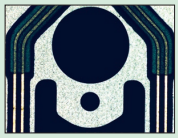
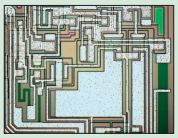


A: Vertical surface illumination (Halogen)

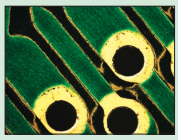

PCB.

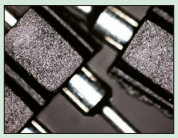

HDD suspension.


IC circuit.

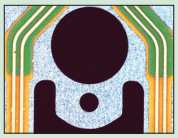
B: Ring fibre-optic illumination

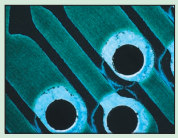

Flexible PCB.


PCB.


Electrical parts.

C: LED ring illumination

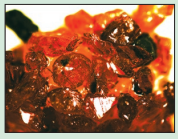

HDD suspension.


PCB.


Black resin moulded parts.

D: Twin fibre-optic illumination

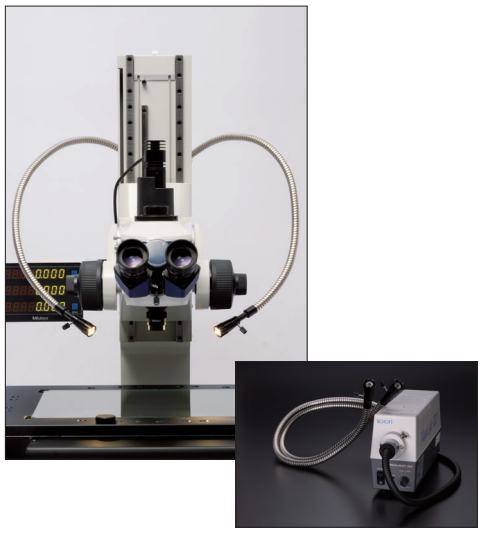
IC package.


Garnet.


PCB.

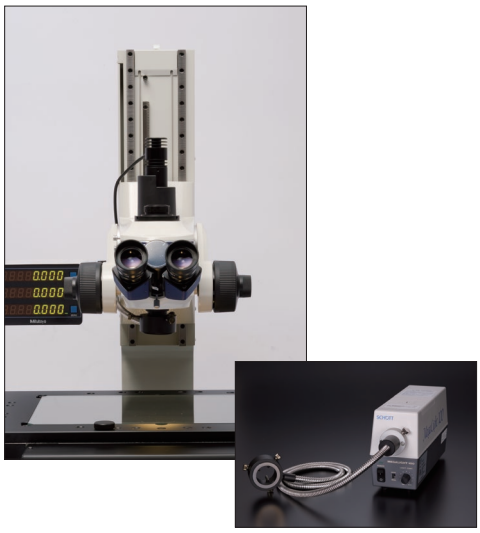
Illumination Units for Measuring Microscopes

Twin Fibre-Optic Illuminator



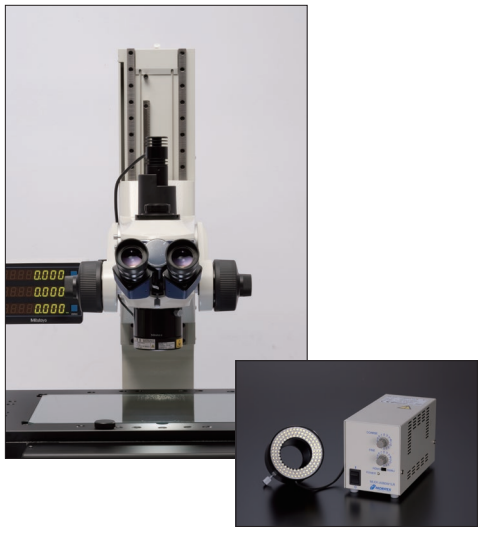
Code No.	176-343E
Applicable microscopes	MF, MF-U models
Length of fibre cable	700 mm
Light source	Halogen bulb (12V, 100W) (517181: halogen bulb)
Dimensions (W x D x H)	Light unit: 235 x 76 x 120 mm
Price	**£1110.00**

Ring Fibre-Optic Illuminator



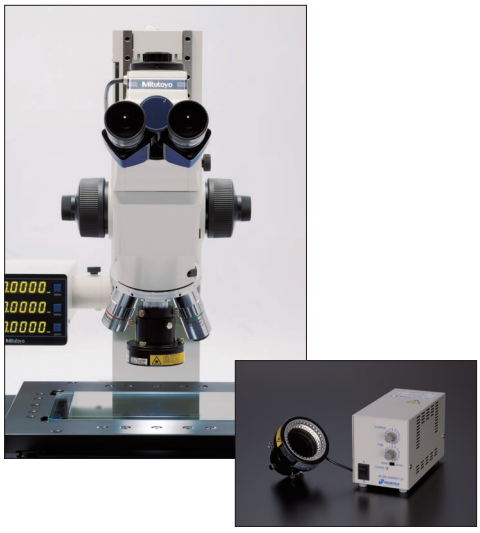
Code No.	176-366E
Applicable microscopes	MF models
Length of fibre cable	1000 mm
Light source	Halogen bulb (12V, 100W) (517181: halogen bulb)
Dimensions (W x D x H)	Light unit: 235 x 76 x 120 mm
Price	**£1650.00**

LED Ring Illuminator



Code No.	176-367-2E
Applicable microscopes	MF models (ML objective 10X or lower)
Length of LED cable	1500 mm
Light source	White LED
Dimensions (W x D x H)	Light unit: 75 x 150 x 90 mm
Price	**£1930.00**

LED Ring Light (for FS Objectives)



Code No.	Please contact us
Applicable microscopes	MF-U models (FS objective M plan Pro 10X or lower)
Length of LED cable	1500 mm
Light source	Supplied from microscope (surface illumination)
Dimensions (W x D x H)	Light unit: 75 x 150 x 90 mm
Price	**POA**

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Mitutoyo

Optional Accessories

SERIES 264 – QM-DATA200 2D Data Processing Unit for Measuring Microscopes

- The QM-Data200 is a geometric readout/analysis unit for optical instruments such as measuring microscopes and profile projectors.
- This unit features powerful 2D coordinate measurement capabilities with easy-to-use key operation.
- The QM-Data200 improves operator productivity, minimizes errors and saves total measurement time and production cost.
- Informative graphic displays on the large LCD screen make for easy measurement operations.
- One-key operation for combined measurements that are often used (circle-circle distance, etc.).
- The AI measurement function (Automatic Identification of measuring item) eliminates switching between the measurement command keys.
- Equipped with a measurement procedure teaching function and measuring position navigation in Repeat mode.
- The user-menu function allows the user to store measurement commands or part programs to create custom menus.
- Tolerance zone measurement of data processing results and various statistical processing routines for each item are available.
- Measurement result output in spreadsheet (CSV) format.

Technical Data

Program functions:	Part program creation, execution, editing
Statistical processing:	Number of data, maximum value, minimum value, mean value, standard deviation, range, histogram
Element memory:	Maximum of 1000 elements
Element recall:	Point, line, circle, distance, ellipse, rectangular hole, slotted hole, intersection and intersecting angle
Element key-in:	Point, line, circle
Display system:	Colour LCD (320 x 240 dots, with LED back light)
Measurement result file output:	RS-232C output (CSV format, MUX-10F format)
Display language:	Japanese/English/German/French/Italian/Spanish/Portuguese/Cheskey/Chinese (simplified/traditional), Korean
Data input:	RS-232C, X/Y/Z-axis signal, footswitch
Data output:	RS-232C, printer
Power supply:	240VAC ±10%, 50/60Hz

264-155E

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Specifications

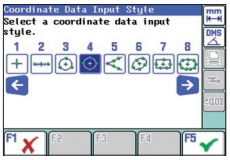
Model No.		QM-Data200	
Code No.		**264-155E**	**264-159E**
Applicable microscopes		MF/MF-U	Hyper MF/Hyper MF-U
Unit of measurement	Length	mm	
	Angle	Switchable between decimal degree and sexagesimal notation	
Resolution		0.1 µm	0.01 µm
Display unit		Colour graphic LCD (equipped with a backlight)	
External dimensions (W x H x D)		260 x 242 x 310 mm (including the stand section)	
Mass		Approx. 2.9 kg	
Price		**£1640.00**	**£1640.00**

Intuitive panel design

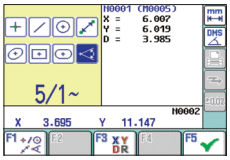
The QM-Data200 employs Geometry Keys to accelerate the measurement process. The routine of probing geometric features and combinations is implemented from these dedicated keys on the front panel. Simply clicking a key and then capturing the feature coordinates means you can complete the measurement quickly and accurately. This improves operator productivity, reduces error and saves operation time and cost.

Graphic display

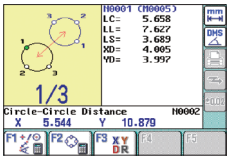
Measurement information and data are visualized on the back-lit LCD colour display with graphical interfaces. The geometric feature selected is displayed with the probing navigator. The measurements map and blink indication show the probing points and sequences. Simply probe points and click by following the blink indicator. Measurements can be easily completed even by a beginner. This improves operation accuracy and reduces errors and measurement time.



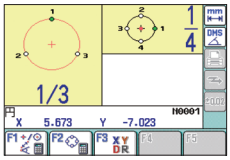
Clear function icons.



Coloured LCD display with backlight.



One-key operation for combined measurements.



Measurement procedure teaching function.

Technical Data

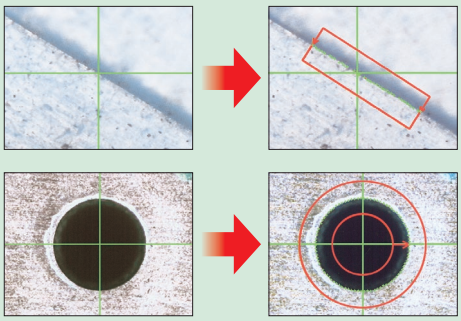
Projected image:	Inverted
Camera	
Image sensor:	1/2" colour CMOS camera
Dimensions:	100 x 58 x 89 mm (W x D x H)
Mass:	0.4 kg
TV adapter (supplied)	
Dimensions:	ø45 x 123 mm
Magnification:	0.5X
Mass:	0.3 kg
Magnification:	19X - 1900X on 22" monitor (image resizable)

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.

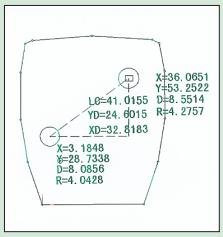


One-click edge detection

Just by clicking the mouse near the edge of a workpiece, QSPAK automatically scans the edge and detects it, displaying the coordinates of the closest point on the edge to the crosshair intersection. 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.

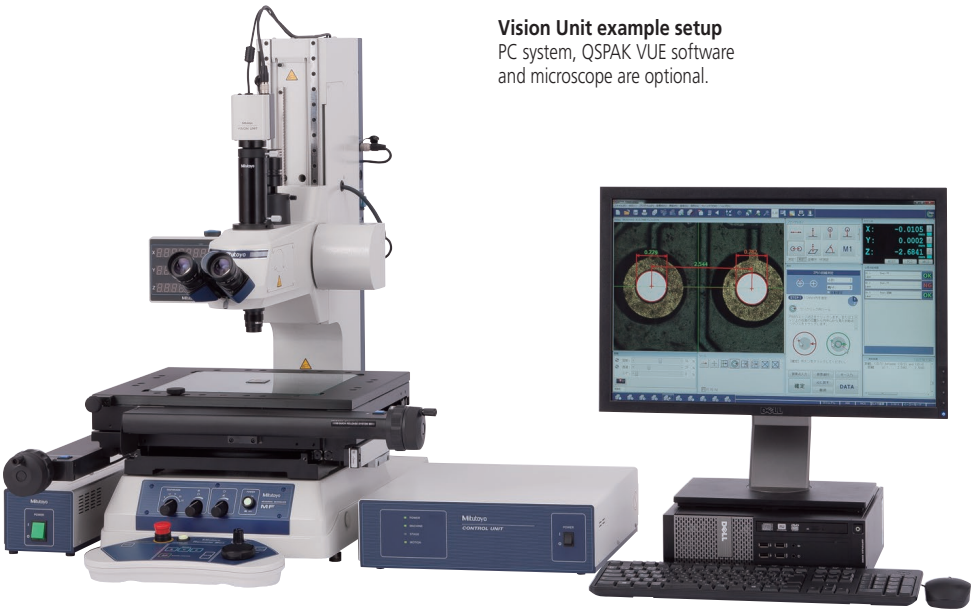


Optional Accessory

Code No.	Description	Price
12AAJ088	Footswitch	£244.00

SERIES 359 – Vision Unit for Measuring Microscopes

- Installation of this unit upgrades a standard measuring microscope to match the performance of a vision measuring machine when used with the optional software QSPAK VUE.
- QSPAK VUE enables judgement of measurement results relative to tolerance zones and implementation of various types of statistical processing for each item.
- Informative graphics and measurement navigation functions promote ease of use with measurement tools and macro icons enabling common measurement tasks to be performed in one easy step.
- A series of measuring operations can be performed using just one screen display.
- Measurement results can be output to Microsoft Excel for easy local generation of an inspection report.
- The auto-brightness control function reproduces type and degree of illumination used.
- The image AF (Auto Focus) function is realized when this unit is installed in the MF/MF-U Series (Motor-driven and Motor-driven Z-axis types).
- Highly accurate height measurements are possible when used with the focus pilot (patent pending).



Vision Unit example setup
PC system, QSPAK VUE software and microscope are optional.

Specifications

Model No.	Vision Unit 6D	Vision Unit 6UD	Vision Unit 8D	Vision Unit 8UD
Code No.	359-707	359-709	359-717	359-719
Applicable microscope	MF-A	MF-UA	MF-B	MF-UB

Model No.	Vision Unit 9D	Vision Unit 9UD	Vision Unit 10D	Vision Unit 7D
Code No.	359-727	359-729	359-763	359-779
Applicable microscope	MF-C	MF-UC	MF-D/MF-UD	Hyper MF-B/ Hyper MF-UB

Relay magnification of the optical system	When installed on the microscope 0.5X (using the 0.5X TV adapter)
Image detection	High-sensitivity 1/2" colour CMOS camera, 3 megapixel
Resolution	0.1 µm
Measuring accuracy	Depends on measuring microscope
Software (optional)	QSPAK Vision Unit Edition
Price	**POA**

Note: QSPAK VUE and a PC are required separately.

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Optional Accessories

For Measuring Microscopes

Focus Pilot FP-05

- By installing this system on the camera mount of an MF series measuring microscope and projecting a target pattern onto the workpiece surface, the focal plane can be detected with high accuracy and repeatability.
- The brightness of the target pattern can be adjusted according to the reflectivity of the workpiece surface.
- A wide view field observation on the monitor is made possible with the use of a CCD camera (C-mount adapter is included).
- Two target patterns (concentric circle, slit) projected in red or green are available for matching to the workpiece surface texture.

Concentric circle target

Slit target

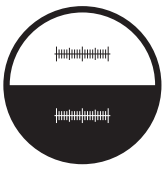
Code No.	375-057E	375-058E	375-067E	375-068E
Applicable microscopes	MF models		MF-U models	
Light source	Green LED	Red LED	Green LED	Red LED
Focussing reproducibility	Approximately 1.5 µm (when using a 20X lens)*			
Camera adapter	C-mount (provided)			
Applicable CCD camera	Up to 2/3"			
Mass	1.8 kg			
Price	**£3390.00**	**£3300.00**	**£3990.00**	**£3990.00**

* This is a reference value based on an inspection performed using our standard sample.

Manual and Power Turrets for MF-U

Code No.	176-211	378-018	176-212E	378-016E	378-216E
Observation type	BD	BF	BD	BF	BF
No. of objective mounts	4				5
Driving method	Manual		Motor		
Power supply	—		240VAC ±10%, 50/60Hz		
Dimensions (W x D x H)	—		Turret: 164 x 65 x 137 mm Control box: 108 x 72 x 193 mm		
Price	**£615.00**	**£946.00**	**£5770.00**	**£3430.00**	**POA**

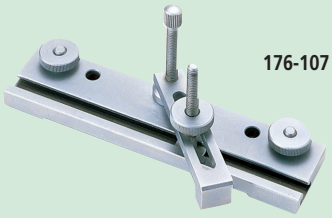
Stage Micrometer



Code No.	Scale length	Graduation	Accuracy*	Dimensions (W x D)	Mass	Price
375-056	1 mm	0.01 mm	±(1+L) µm	76 x 26 mm	16 g	**£263.00**

* At 20°C, L = measured length (mm).

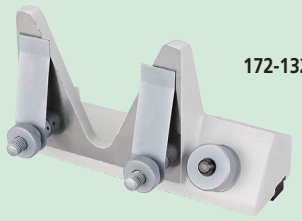
Holder with Clamp



176-107

Code No.	176-107
Max. workpiece height	35 mm
Mass	0.42 kg
Price	**£171.00**

Vertical Holder

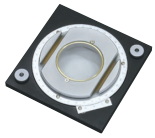


172-132

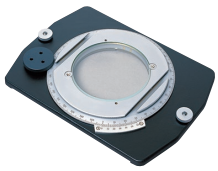
Code No.	172-132
Mass	1.3 kg
Price	**£214.00**

Workpiece Fixtures for Measuring Microscopes

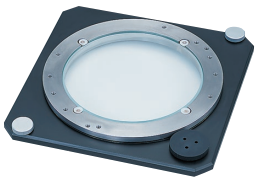
Rotary Tables



176-106



172-198

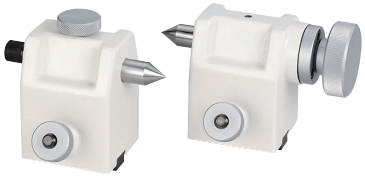


176-305

176-306

Code No.	176-106	172-198	176-305	176-306
Effective glass diameter	66 mm	96 mm	182 mm	238 mm
Angular resolution	6′	2′	—	
Fine feed	—	Available		
Mass	1.7 kg	2.4 kg	5.5 kg	6.5 kg
Price	**£380.00**	**£620.00**	**£1390.00**	**£1800.00**

Centre Support and Centre Support Riser



172-142

172-143

Code No.	172-142	172-143
Description	Centre support	Centre support riser
Max. workpiece height	120 mm (240 mm*)	60 mm
Mass	3.3 kg	2.2 kg
Price	**£586.00**	**£236.00**

* When using a centre support riser (172-143).

Swivel Centre Supports

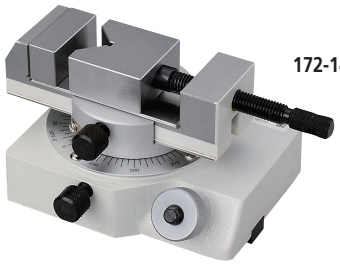
176-105

172-197

Code No.	176-105	172-197
Max. workpiece diameter	70 mm (45 mm*)	80 mm (65 mm*)
Max. workpiece length	140 mm	
Swivel range	±10°	
Mass	2.4 kg	2.5 kg
Price	**£564.00**	**£401.00**

* When swivelled 10°.

Rotary Vice



172-144

Code No.	172-144
Rotation range	360°
Maximum workpiece height	60 mm
Width of jaws	40 mm
Angle graduations	5°
Mass	2.8 kg
Price	**£613.00**

V-Block with Clamp

172-234

172-378

Code No.	172-234	172-378
Maximum workpiece diameter	50 mm	25 mm
Width of block	60 mm	41 mm
Mass	1.24 kg	0.8 kg
Price	**£298.00**	**£224.00**

J

Mitutoyo

PJ-A3000

SERIES 302 – Profile Projectors

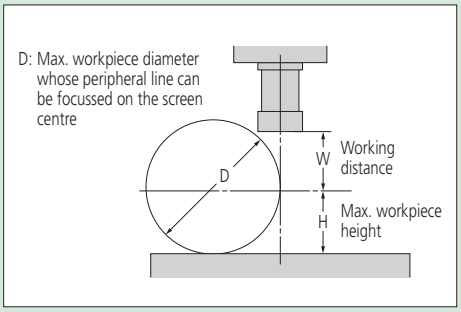
- The PJ-A3000 Series profile projectors comprises medium-size bench-top models that feature excellent versatility and easy operation.
- Easy-to-read digital XY counter is located near the projection screen to minimize eye movement.
- Digital readout protractor screen facilitates angle measurement.
- Combination use with the optional 2D Data Processor QM-Data200 facilitates a variety of dimensional measurement methods.

302-701-1E

Technical Data

Projected image:	Inverted
Protractor screen	
Effective diameter:	315 mm (12.4")
Screen material:	Fine-ground glass
Screen rotation:	±360°, fine feed and clamp
Angle reading:	Digital counter (LED) Resolution: 1′ or 0.01° (switchable) Range: ±370° ABS/INC mode switching, zero set
Reference lines:	Cross hairs
Projection lens:	10X (**172-202**) Optional: 20X, 50X, 100X
Magnification accuracy	
Contour illumination:	±0.1% or better
Surface illumination:	±0.15% or better
Maximum workpiece height:	Refer to the projection capacity (H) diagram below
Contour illumination	
Light source:	Halogen bulb (24V, 150W)
Optical system:	Telecentric
Functions:	2-step (high/low) brightness switch, heat-absorbing filter, cooling fan
Surface illumination	
Light source:	Halogen bulb (24V, 150W)
Optical system:	Vertical illumination with adjustable condenser lens
Functions:	Heat-absorbing filter, cooling fan
Focussing:	Manual
Resolution:	0.001 mm or .0001"/0.001 mm (.00005"/0.001 mm: digital head)
Power supply:	240VAC ±10%, 50/60Hz

Projection Capacity



Unit: mm

		Magnification			
		10X	20X	50X	100X
View field		ø31.5	ø15.7	ø6.3	ø3.1
W		66 (20)	32.5 (2)	12.6	5
H	-100 model	91			
	-200 model	92.5			
D	-100 model	182	87 (61)	27	10
	-200 model	185	87 (61)	27	10

( ): When using surface illumination

302-703-1E stage.

Specifications

Model	**PJ-A3010F-100**	**PJ-A3010F-200**
Code No.	**302-703-1E**	**302-701-1E**
XY stage travel range	100 x 100 mm	200 x 100 mm
Measurement method	Linear encoder	
Quick-release mechanism	X and Y axes	
XY stage size	250 x 250 mm	380 x 250 mm
Effective glass size	142 x 142 mm	266 x 170 mm
Swivel function	—	±3°
Maximum stage loading	10 kg	8 kg
Mass	112 kg	140 kg
Price	**POA**	**POA**

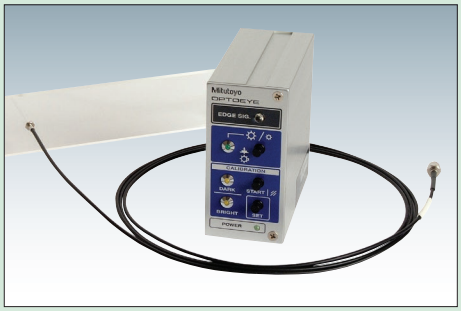
J

Optional Accessories

Code No.	Description	Price
172-116	Standard scale (50 mm)	**£88.40**
172-117	Standard scale (2")	**£88.40**
172-118	Reading scale (200 mm)	**£146.00**
172-119	Reading scale (8")	**£146.00**
172-160-2	Green filter	**£50.60**
172-161	Reading scale (300 mm)	**£202.00**
172-162	Reading scale (12")	**£202.00**
172-202	10X projection lens set	**£531.00**
172-203	20X projection lens set	**£473.00**
172-204	50X projection lens	**£592.00**
172-207	100X projection lens	**£605.00**
172-229	Oblique illumination mirror for 10X lens	**£57.50**
172-230	Oblique illumination mirror for 20X lens	**£46.00**
383876	Vinyl cover	**£26.70**
512305	Halogen bulb (24V, 150W)	**£16.50**
999678D	Fixture mount adapter	**£773.00**
12AAA807D	RS-232C cable	**£35.10**

Fixture and stage accessories refer to page J-46.

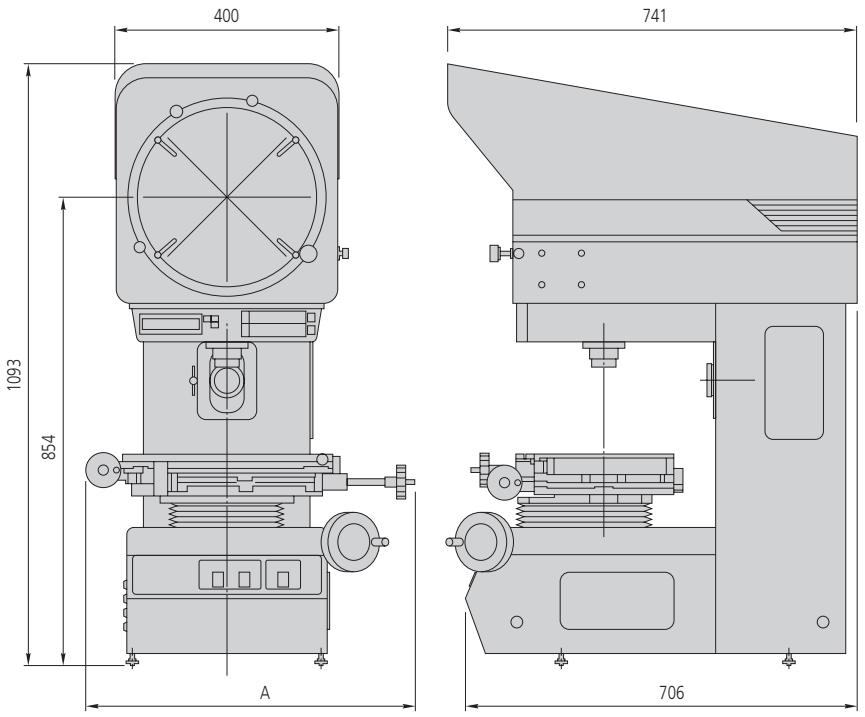
QM-Data200 2D data processing unit (optional accessory) refer to page J-47 for more details.



OPTOEYE-200 Edge detection system for QM-Data200 (optional accessory) refer to page J-48 for more details.

Dimensions

Unit: mm



Code No.	A
302-703-1E	427
302-701-1E	593

J

Mitutoyo

PJ-H30

SERIES 303 – Profile Projectors

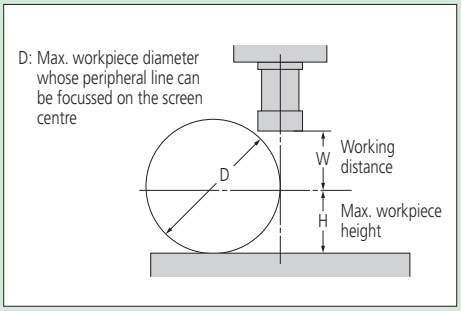
- The PH-30 Series of profile projectors comprises medium-size bench-top models featuring a ø306mm screen and erect, unreversed images.
- Newly developed transmitted-illumination optical system improves the illumination intensity for all types of projection lenses by 60%, on average, making edge definition sharper and so enhancing operability.
- High-level visibility of digital display for all models allows easy XY and angle readings.
- 3-lens turret type bayonet mount is parfocal.
- Quick-release mechanism useful for moving the stage rapidly between measuring points when measuring workpieces that are large in size or quantity.
- All models have a precision workstage to achieve the high measuring accuracy of ±(3+0.02L) µm in the X- and Y-axis directions.
- Models with a high-precision edge detector (OPTOEYE) built in are also available.

303-732-1E

Technical Data

Projected image:	Erect
Protractor screen	
Effective diameter:	306 mm (12")
Screen material:	Fine-ground glass
Screen rotation:	±360°, fine feed and clamp
Angle reading:	Digital counter (LED) Resolution: 1′ or 0.01° (switchable) Range: ±370° ABS/INC mode switching, zero set
Reference lines:	Cross hairs
Projection lens:	10X (**172-472**) Optional: 5X, 20X, 50X, 100X
Magnification accuracy	
Contour illumination:	±0.1% or better
Surface illumination:	±0.15% or better
Maximum workpiece height:	Refer to the projection capacity (H) diagram below
Contour illumination	
Light source:	Halogen bulb (24V, 150W)
Optical system:	Telecentric zoom
Functions:	Continuously variable brightness switch, heat-absorbing filter, cooling fan
Surface illumination	
Light source:	Halogen bulb (24V, 150W)
Optical system:	Vertical/oblique illumination with adjustable condenser lens
Functions:	Continuously variable brightness switch, heat-absorbing filter, cooling fan
Resolution:	0.001 mm
Power supply:	240VAC ±10%, 50/60Hz

Projection Capacity



Unit: mm

	Magnification				
	5X	10X	20X	50X	100X
View field	ø61.2	ø30.6	ø15.3	ø6.12	ø3.06
W	66	70.5	56.5	50	
H	105				
D	148	197	137	114	

Specifications

Model	**PJ-H30A1010B**	**PJ-H30D1010B**	**PJ-H30A2010B**	**PJ-H30D2010B**
Code No.	**303-712-1E**	**303-732-1E**	**303-713-1E**	**303-733-1E**
Focussing	Manual	Power focus	Manual	Power focus
Edge detector	Optional	Built-in	Optional	Built-in
Accuracy	±(3+0.02L) µm			
XY stage travel range	100 x 100 mm		200 x 100 mm	
Measurement method	Linear encoder			
Quick-release mechanism	X and Y axes			
XY stage size	300 x 240 mm		350 x 280 mm	
Effective glass size	180 x 150 mm		250 x 150 mm	
Swivel function	±3°			
Maximum stage loading	10 kg			
Mass	176 kg		178 kg	
Price	**POA**	**POA**	**POA**	**POA**

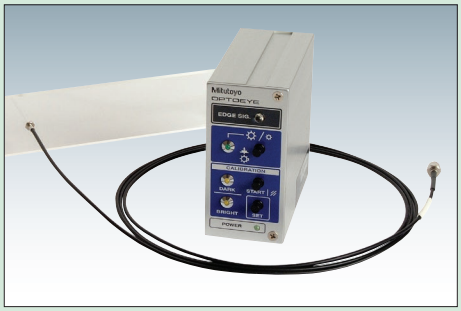
303-733-1E stage.

Optional Accessories

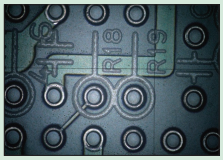
Code No.	Description	Price
172-116	Standard scale (50 mm)	£88.40
172-117	Standard scale (2")	£88.40
172-118	Reading scale (200 mm)	£146.00
172-119	Reading scale (8")	£146.00
172-161	Reading scale (300 mm)	£202.00
172-162	Reading scale (12")	£202.00
172-271	5X projection lens	£1270.00
172-473	20X projection lens	£1140.00
172-474	50X projection lens	£1180.00
172-475	100X projection lens	£1180.00
011534	MC special cleaner	£13.60
999678D	Fixture mount adapter	£773.00
12AAA807D	RS-232C cable	£35.10
12AAG981	Green filter	£174.00
12AAG982	Stand for QM-Data 200	£463.00

Fixture and stage accessories refer to page J-46.

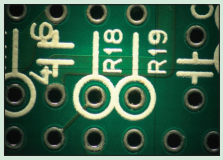
QM-Data200 2D data processing unit (optional accessory) refer to page J-47 for more details.



OPTOEYE-200 Edge detection system for QM-Data200 (optional accessory) refer to page J-48 for more details.



Vertical illumination.

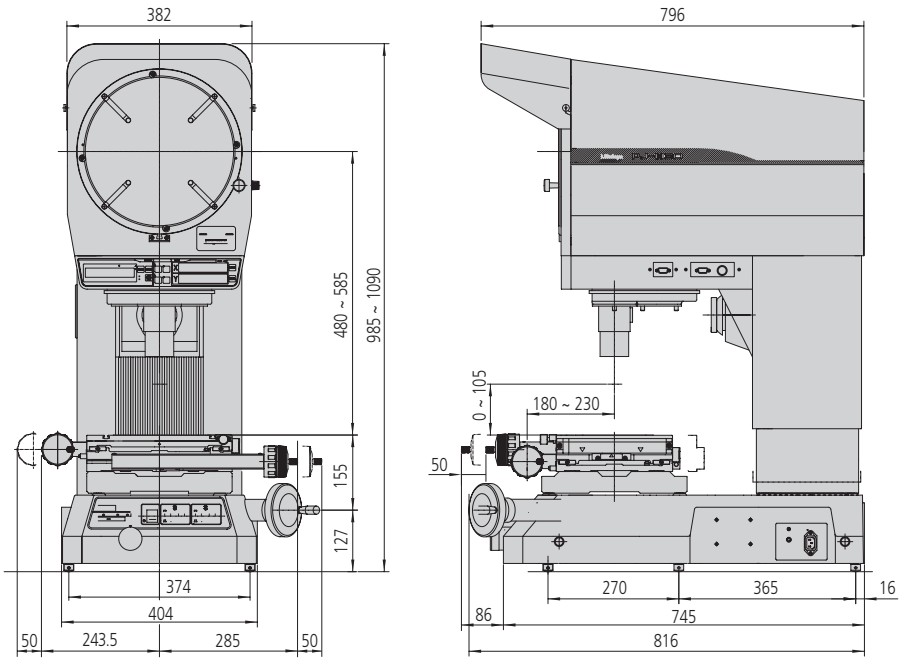


Oblique illumination.

Dimensions

Unit: mm

PJ-H30D1010B



J

Mitutoyo

PV-5110

SERIES 304 – Profile Projectors

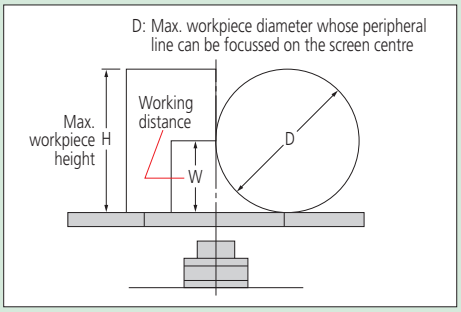
- Floor-standing model using overhead illumination which allows a large, conveniently positioned screen so that projected images can be easily traced or compared with a template.
- Digital readout protractor screen (including zero-setting, ABS/INC coordinate switching functions) for easy and error-free angle measurement.
- The optional oblique surface illumination unit (**172-422**) provides clear and bright images, allowing easy inspection of non-reflective workpieces such as plastic parts or printed materials.

304-919E

Technical Data

Projected image:	Inverted
Protractor screen	
Effective diameter:	508 mm (20")
Screen material:	Fine-ground glass
Screen rotation:	±360°, fine feed and clamp
Angle reading:	Digital counter (LED) Resolution: 1′ or 0.01° (switchable) Range: ±370° ABS/INC mode switching, zero set
Reference lines:	Cross hairs
Projection lens:	10X (**172-402**) Optional: 5X, 20X, 50X, 100X
Magnification accuracy	
Contour illumination:	±0.1% or better
Surface illumination:	±0.15% or better
Maximum workpiece height:	Refer to the projection capacity (H) diagram below
Contour illumination	
Light source:	Halogen bulb (24V, 150W)
Optical system:	Telecentric zoom
Functions:	2-step (high/low) brightness switch, heat-absorbing filter, cooling fan
Surface illumination	
Light source:	Halogen bulb (24V, 150W)
Optical system:	Vertical illumination
Functions:	Adjustable condenser lens, oblique illumination (for 5X, 10X and 20X), heat-absorbing filter, cooling fan
Focussing:	Manual
Resolution:	0.001 mm
Power supply:	240VAC ±10%, 50/60Hz

Projection Capacity



Unit: mm

	Magnification				
	5X	10X	20X	50X	100X
View field	ø101.6	ø50.8	ø25.4	ø10.16	ø5.08
W	60 (27)	60		32.4	22.5
H	125	181	206	87	
D	120			64.8	45

( ): When using surface illumination

Specifications

Model	**PV-5110**
Code No.	**304-919E**
XY stage travel range	200 x 100 mm
Measurement method	Linear encoder
Quick-release mechanism	X and Y axes
XY stage size	380 x 250 mm
Effective glass size	266 x 170 mm
Swivel function	±3°
Maximum stage loading	5 kg
Mass	210 kg
Price	**POA**

J

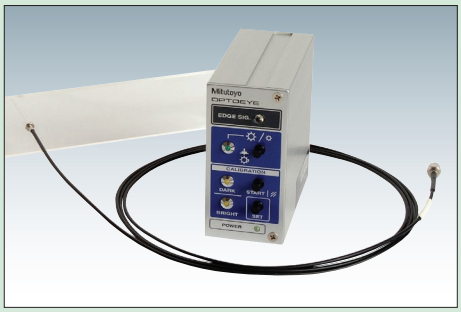
Optional Accessories

Code No.	Description	Price
172-116	Standard scale (50 mm)	£88.40
172-117	Standard scale (2")	£88.40
172-160-2	Green filter	£50.60
172-161	Reading scale (300 mm)	£202.00
172-162	Reading scale (12")	£202.00
172-319	Canopy	£679.00
172-329	Reading scale (600 mm)	£437.00
172-330	Standard scale (80 mm)	£173.00
172-401	5X projection lens set	£3940.00
172-402	10X projection lens set	£1580.00
172-403	20X projection lens set	£1130.00
172-404	50X projection lens set	£1130.00
172-405	100X projection lens set	£1390.00
011534	MC special cleaner	£13.60
510189	Vinyl cover	£68.70
512305	Halogen bulb (24V, 150W)	£16.50
12AAA807D	RS-232C cable	£35.10
12AAF182	Digital counter stand	£76.40

Fixture and stage accessories refer to page J-46.

QM-Data200 2D data processing unit (optional accessory) refer to page J-47 for more details.

172-319 Canopy for PV-5110 (optional accessory).

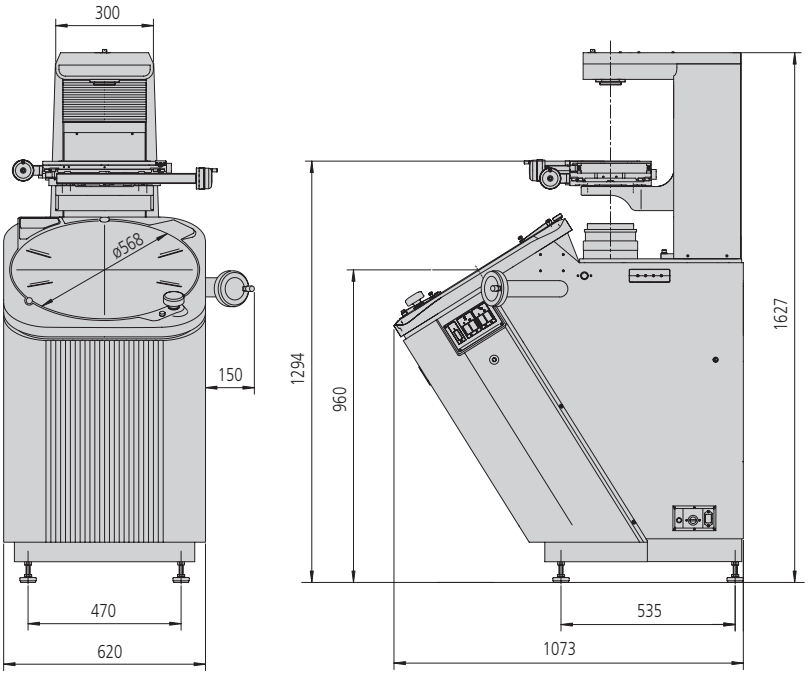


OPTOEYE-200 Edge detection system for QM-Data200 (optional accessory) refer to page J-48 for more details.

KA Counter Digital counter (optional accessory) refer to page H-12 for more details.

Dimensions

Unit: mm



J

Mitutoyo

PH-3515F

SERIES 172 – Profile Projector

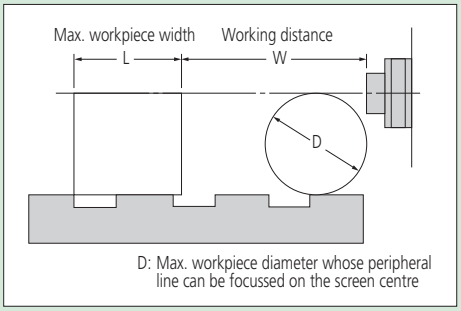
- Bench-top model based on a horizontal optical system.
- Suitable for thread pitch measurements – blurred or distorted images will not be produced when workpiece is angled.
- Erect image on the day-bright screen.
- 353 mm diameter protractor screen with cross hairs and staggered lines for easy alignment.
- Digital angle measurement to 1' or 0.01°.
- Heavy-duty workpiece table incorporates linear scales for fast, accurate measurement.

172-868E

Technical Data

Projected image:	Erect
Protractor screen	
Effective diameter:	353 mm (13.9")
Screen material:	Fine-ground glass
Screen rotation:	±360°, fine feed and clamp
Angle reading:	Digital counter (LED) Resolution: 1′ or 0.01° (switchable) Range: ±370° ABS/INC mode switching, Zero Set
Reference lines:	Cross hairs
Projection lens:	10X (**172-184**) Optional: 5X, 20X, 50X, 100X
Magnification accuracy	
Contour illumination:	±0.1% or better
Surface illumination:	±0.15% or better
Maximum workpiece height:	Refer to the projection capacity (H) diagram below
Contour illumination	
Light source:	Halogen bulb (24V, 150W)
Optical system:	Telecentric
Functions:	2-step (High/Low) brightness switch, Heat-absorbing filter, Cooling fan
Surface illumination	
Light source:	Halogen bulb (24V, 200W)
Optical system:	Vertical illumination
Functions:	Adjustable condenser lens, vertical/oblique surface illumination selectable, heat-absorbing filter, cooling fan
Focussing:	Manual
Resolution:	0.001 mm or .0001"/0.001 mm (using optional KA counter)
Power supply:	240VAC ±10%, 50/60Hz

Projection Capacity



D: Max. workpiece diameter whose peripheral line can be focussed on the screen centre

Unit: mm

	Magnification				
	5X	10X	20X	50X	100X
View field	ø70.6	ø35.3	ø17.65	ø7.06	ø3.5
W	160 (64)	93 (35)	40	14.6	9.5
H	175	235		80	109
D	152.4		116	30.4	19

( ): When using surface illumination

Specifications

Model	**PH-3515F**
Code No.	**172-868E**
XY stage travel range	254 x 152 mm
Measurement method	Linear encoder
Quick-release mechanism	X axis
XY stage top size	450 x 146 mm
Swivel function	±10°
Maximum stage loading	45 kg
Mass	150 kg
Price	**POA**

J

Optional Accessories

Code No.	Description	Price
172-116	Standard scale (50 mm)	**£88.40**
172-117	Standard scale (2")	**£88.40**
172-118	Reading scale (200 mm)	**£146.00**
172-119	Reading scale (8")	**£146.00**
172-145	5X projection lens set	**£1740.00**
172-161	Reading scale (300 mm)	**£202.00**
172-162	Reading scale (12")	**£202.00**
172-165	50X projection lens set	**£550.00**
172-166	100X projection lens set	**£1030.00**
172-173	20X projection lens set	**£424.00**
172-184	10X projection lens set	**£557.00**
172-286	Green filter	**£179.00**
172-423	Illumination unit	**£449.00**
011534	MC special cleaner	**£13.60**
383228	Vinyl cover	**£26.70**
512305	Halogen bulb (24V, 150W)	**£16.50**
12AAA807D	RS-232C cable	**£35.10**
12AAF182	Digital counter stand	**£76.40**
12BAA637	Halogen bulb (24V, 200W)	**£54.90**

Fixture and stage accessories refer to page J-46.

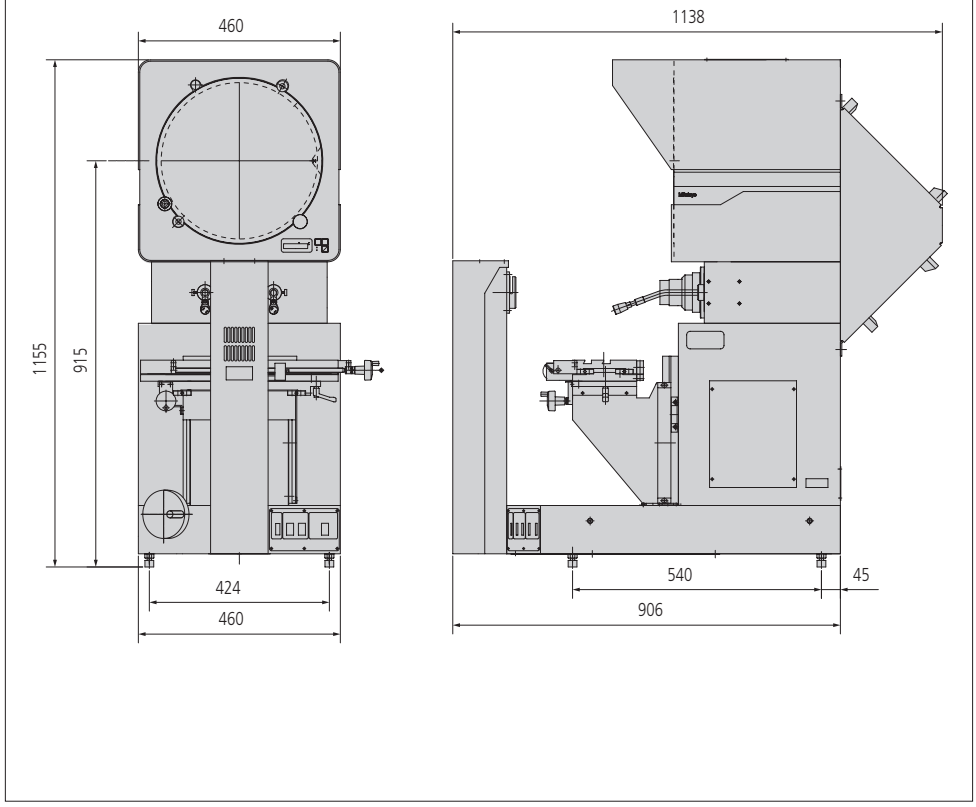
QM-Data200 2D data processing unit (optional accessory) refer to page J-47 for more details.

OPTOEYE-200 Edge detection system for QM-Data200 (optional accessory) refer to page J-48 for more details.

KA Counter Digital counter (optional accessory) refer to page H-12 for more details.

Dimensions

Unit: mm



J

Mitutoyo

PH-A14

SERIES 172 – Profile Projector

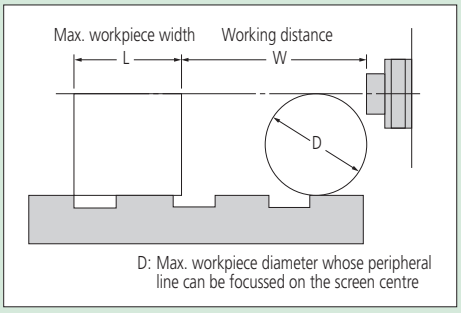
- Bench-top model that uses a horizontal optical system.
- Suitable for thread pitch measurements – blurred or distorted images will not be produced when workpiece is angled.
- Inverted image on the day-bright screen.
- 356 mm diameter inclined protractor screen with cross hairs and staggered lines for easy alignment.
- Heavy-duty workpiece table incorporates linear scales for fast, accurate measurement.

172-810-20E

Technical Data

Projected image:	Inverted
Protractor screen	
Effective diameter:	356 mm (14")
Screen material:	Fine-ground glass
Screen rotation:	±360°, fine feed and clamp
Angle reading:	Vernier (graduation: 1')
Reference lines:	Cross hairs
Projection lens:	10X (**172-011**) Optional: 20X, 50X, 100X
Magnification accuracy	
Contour illumination:	±0.1% or better
Surface illumination:	±0.15% or better
Maximum workpiece height:	Refer to the projection capacity (H) diagram below
Contour illumination	
Light source:	Halogen bulb (24V, 150W)
Optical system:	Telecentric
Functions:	2-step (high/low) brightness switch linked to main power switch, heat-absorbing filter, cooling fan
Surface illumination	
Light source:	Halogen bulb (24V, 150W)
Optical system:	Vertical illumination
Functions:	Adjustable condenser lens, vertical/oblique surface illumination selectable linked to main power switch, heat-absorbing filter, cooling fan
Focussing:	Manual
Resolution:	0.001 mm or .0001"/0.001 mm (using optional KA counter)
Power supply:	240VAC ±10%, 50/60Hz

Projection Capacity



D: Max. workpiece diameter whose peripheral line can be focussed on the screen centre

Unit: mm

	Magnification			
	10X	20X	50X	100X
View field	ø35.6	ø17.3	ø7.12	ø3.56
W	93	40	14.6	9.5
H	235		80	109
D	130	116	30.4	19

Specifications

Model	**PH-A14**
Code No.	**172-810-20E**
XY stage travel range	203 x 102 mm
Measurement method	Linear encoder
XY stage top size	407 x 153 mm
Maximum stage loading	45 kg
Mass	140 kg
Price	**POA**

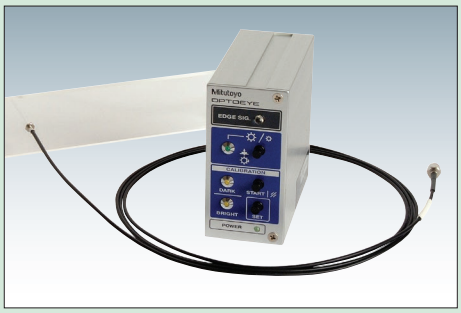
J

Optional Accessories

Code No.	Description	Price
172-000-108	Stand for PH-A14	**£590.00**
172-011	10X projection lens set	**£482.00**
172-012	20X projection lens set	**£424.00**
172-013	50X projection lens set	**£618.00**
172-014	100X projection lens set	**£891.00**
172-116	Standard scale (50 mm)	**£88.40**
172-117	Standard scale (2")	**£88.40**
172-118	Reading scale (200 mm)	**£146.00**
172-119	Reading scale (8")	**£146.00**
172-161	Reading scale (300 mm)	**£202.00**
172-162	Reading scale (12")	**£202.00**
172-286	Green filter	**£179.00**
011534	MC special cleaner	**£13.60**
512305	Halogen bulb (24V, 150W)	**£16.50**
12AAA807D	RS-232C cable	**£35.10**
12AAF182	Digital counter stand	**£76.40**

Fixture and stage accessories refer to page J-46.

QM-Data200 2D data processing unit (optional accessory) refer to page J-47 for more details.

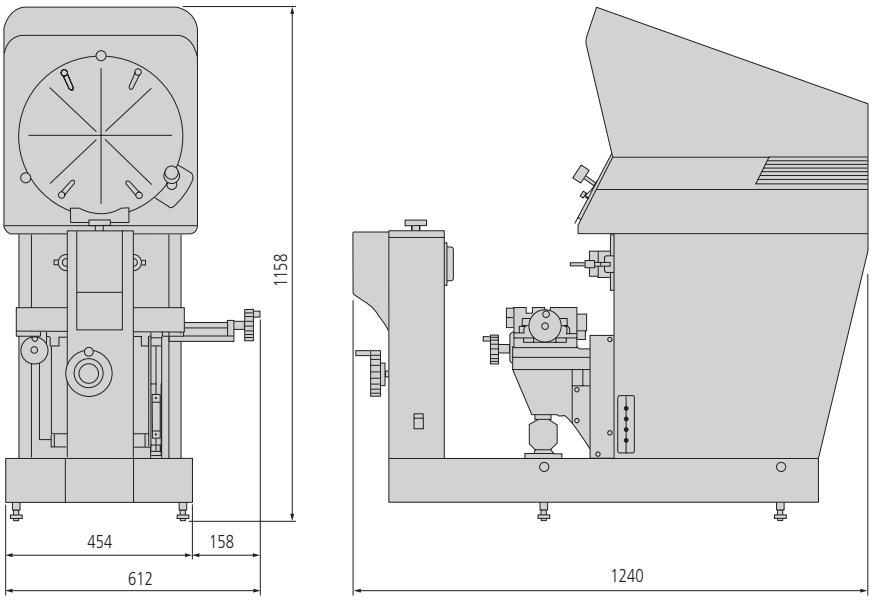


OPTOEYE-200 Edge detection system for QM-Data200 (optional accessory) refer to page J-48 for more details.

KA Counter Digital counter (optional accessory) refer to page H-12 for more details.

Dimensions

Unit: mm



J

Mitutoyo

Optional Accessories

Scales for Profile Projectors

Standard Scales

Used for checking magnification accuracy.

172-116

Metric

Graduation	Range	Code No.	Accuracy (20°C)*	Price
0.1 mm	50 mm	**172-116**	±(3+5L/1000) µm	**£88.40**
0.1 mm	80 mm	**172-330**	±(3+5L/1000) µm	**£173.00**

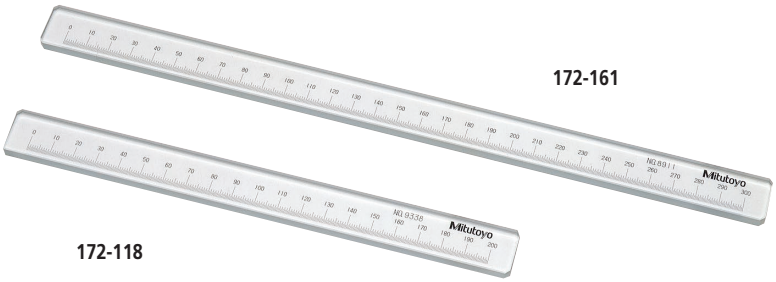
* L = measured length (mm).

Inch

Graduation	Range	Code No.	Accuracy (20°C)	Price
.01"	2"	**172-117**	±.00013"	**£88.40**

Reading Scales

Specially designed for inspecting the magnified image of a standard scale on the projection screen.



172-161

172-118

Metric

Graduation	Range	Code No.	Accuracy (20°C)*	Price
0.5 mm	200 mm	**172-118**	±(15+15L/1000) µm	**£146.00**
0.5 mm	300 mm	**172-161**	±(15+15L/1000) µm	**£202.00**
0.5 mm	600 mm	**172-329**	±(15+15L/1000) µm	**£437.00**

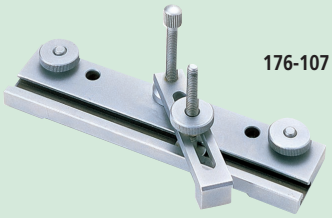
* L = measured length (mm).

Inch

Graduation	Range	Code No.	Accuracy (20°C)	Price
.02"	8"	**172-119**	±.00071"	**£146.00**
.02"	12"	**172-162**	±.00077"	**£202.00**

Workpiece Fixtures for Profile Projectors

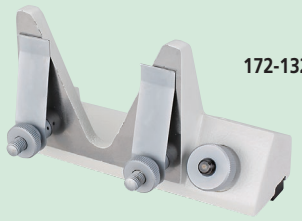
Holder with Clamp



176-107

Code No.	176-107
Max. workpiece height	35 mm
Mass	0.42 kg
Price	**£171.00**

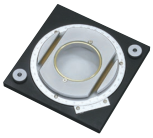
Vertical Holder



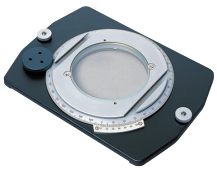
172-132

Code No.	172-132
Mass	1.3 kg
Price	**£214.00**

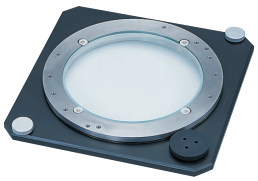
Rotary Tables



176-106



172-198

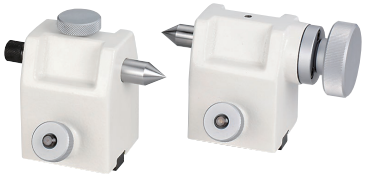


176-305

176-306

Code No.	176-106	172-198	176-305	176-306
Effective glass diameter	66 mm	96 mm	182 mm	238 mm
Angular resolution	6′	2′	—	
Fine feed	—	Available		
Mass	1.7 kg	2.4 kg	5.5 kg	6.5 kg
Price	**£380.00**	**£620.00**	**£1390.00**	**£1800.00**

Centre Support and Centre Support Riser



172-142

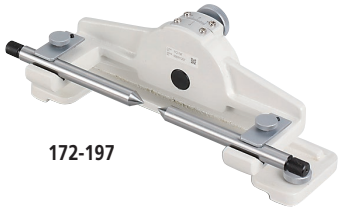
172-143

Code No.	172-142	172-143
Description	Centre support	Centre support riser
Max. workpiece height	120 mm (240 mm*)	60 mm
Mass	3.3 kg	2.2 kg
Price	**£586.00**	**£236.00**

* When using a centre support riser (172-143).

Swivel Centre Supports

176-105

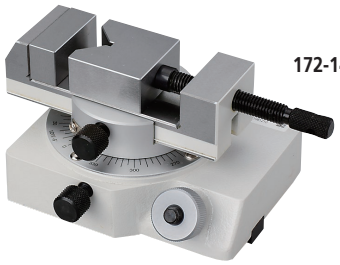


172-197

Code No.	176-105	172-197
Max. workpiece diameter	70 mm (45 mm*)	80 mm (65 mm*)
Max. workpiece length	140 mm	
Swivel range	±10°	
Mass	2.4 kg	2.5 kg
Price	**£564.00**	**£401.00**

* When swivelled 10°.

Rotary Vice



172-144

Code No.	172-144
Rotation range	360°
Maximum workpiece height	60 mm
Width of jaws	40 mm
Angle graduations	5°
Mass	2.8 kg
Price	**£613.00**

V-Block with Clamp

172-234

172-378

Code No.	172-234	172-378
Maximum workpiece diameter	50 mm	25 mm
Width of block	60 mm	41 mm
Mass	1.24 kg	0.8 kg
Price	**£298.00**	**£224.00**

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Mitutoyo

Optional Accessories

SERIES 264 – QM-Data200 2D Data Processing Unit for Profile Projectors

- The QM-Data200 is a geometric readout/analysis unit for optical instruments such as profile projectors and measuring microscopes.
- This unit features powerful 2D coordinate measurement capabilities with easy-to-use key operation.
- The QM-Data200 improves operator productivity, minimizes errors and saves total measurement time and production cost.
- Informative graphic displays on the large LCD screen make for easy measurement operations.
- One-key operation for combined measurements that are often used (circle-circle distance, etc.).
- The AI measurement function (Automatic Identification of measuring item) eliminates switching between the measurement command keys.
- Equipped with a measurement procedure teaching function and measuring position navigation in Repeat mode.
- The user-menu function allows the user to store measurement commands or part programs to create custom menus.
- Tolerance zone measurement of data processing results and various statistical processing routines for each item are available.
- Measurement result output in spreadsheet (CSV) format.
- Two models are available for profile projectors: a stand-alone type with a tilt system and a flexible arm type that can be mounted on a Profile Projector.

Technical Data

Program functions:	Part program creation, execution, editing
Statistical processing:	Number of data, maximum value, minimum value, mean value, standard deviation, range, histogram
Element memory:	Maximum of 1000 elements
Element recall:	Point, line, circle, distance, ellipse, rectangular hole, slotted hole, intersection and intersecting angle
Element key-in:	Point, line, circle
Display system:	Colour graphic TFT LCD
Measurement result file output:	RS-232C output (CSV format, MUX-10F format)
Display language:	Japanese/English/German/French/ Italian/Spanish/Portuguese/Cheskey/ Chinese (simplified/traditional), Korean
Data input:	RS-232C, X/Y/Z-axis signal, footswitch
Data output:	RS-232C, printer
Power supply:	240VAC ±10%, 50/60Hz

264-155E Stand-mount type

264-156E Flexible-arm type.

Specifications

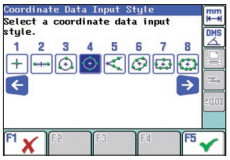
Model No.		QM-Data200	
Code No.		**264-155E**	**264-156E**
Type		Stand mount	Flexible arm
Unit of measurement	Length	mm	
	Angle	Switchable between decimal degree and sexagesimal notation	
Resolution		0.1 µm	
Display unit		Colour graphic LCD (equipped with a backlight)	
External dimensions (W x H x D)		260 x 242 x 310 mm (including the stand section)	318 x 153 x 275 mm (when the arm is horizontal)
Mass		Approx. 2.9 kg	Approx. 2.8 kg
Price		**£1640.00**	**£1640.00**

Intuitive panel design

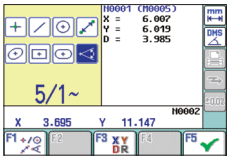
The QM-Data200 employs Geometry Keys to accelerate the measurement process. The routine of probing geometric features and combinations is implemented from these dedicated keys on the front panel. Simply clicking a key and then capturing the feature coordinates means you can complete the measurement quickly and accurately. This improves operator productivity, reduces errors and saves operation time and cost.

Graphic display

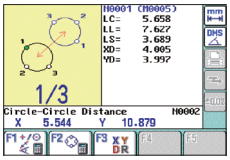
Measurement information and data are visualized on the back-lit LCD colour display with graphical interfaces. The geometric feature selected is displayed with the probing navigator. The measurements map and blink indication show the probing points and sequences. Simply probe points and click by following the blink indicator. Measurements can be easily completed even by a beginner. This improves operation accuracy and reduces errors and measurement time.



Clear function icons.



Coloured LCD display with backlight.



Guided measurements.

Technical Data

Image detection
- Directivity: Non-directional
- Min. diameter: ø2 mm on the screen
- Min. width: 1 mm on the screen
- Max. capture speed: 1000 mm/s

Illumination
- Type: Surface/Contour
- Range: 30 to 1500 Lux on the screen

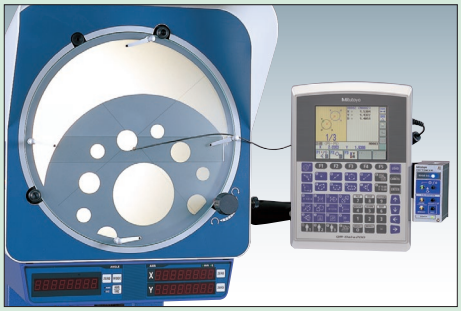
Bright/Dark field difference: 20 Lux

Repeatability: 1 µm in contour illumination mode

Function: Creating, performing, and editing measuring procedures

Optional Accessories

Code No.	Description	Price
12AAE671	Detector attachment A (for ø250 to ø350 mm screen of PJ-A3000 and PH-3515)	**£26.80**
12AAE672	Detector attachment B (for ø500 to ø600 mm screen of PV-5110)	**£39.40**



Application example.

SERIES 332 – OPTOEYE-200 Image Edge Sensor for Profile Projectors

- The OPTOEYE-200 Image Edge Sensor eliminates the human error that can occur with visual alignment, thus ensuring speedy, accurate, and consistent measurements, regardless of the operator's skill level.
- Bright and dark buttons allow easy calibration.
- A thin fibre-optic cable for the detector connection allows easy set-up and use without obstructing the operator's vision.
- OPTOEYE is conveniently powered from the QM-Data200 via the connecting cable.

332-151

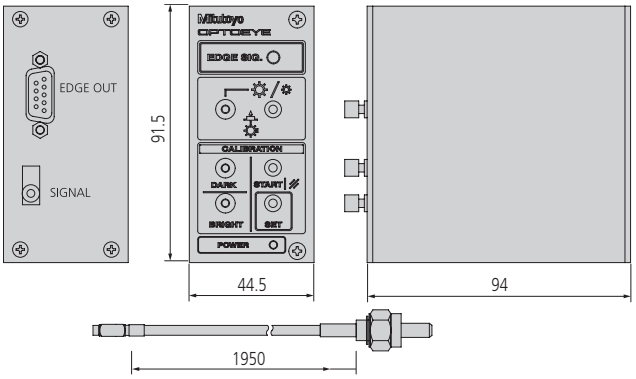
Detector attachment (optional)

Specifications

Code No.	332-151
Description	OPTOEYE-200
Price	**£946.00**

Dimensions

Unit: mm



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