

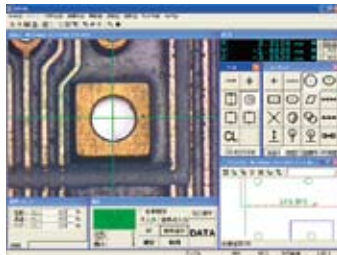
Vision Unit

SERIES 359 — Vision System Retrofit for Microscopes

FEATURES

- The automatic edge-detection tools and various macro icons allow measurement in one easy step.
- The graphics and measurement navigation functions facilitate operation.
- Image data input/storage function.
- Measurement results are output to MS-Excel®. This lets the user generate an inspection table on the same computer.
- Allows the tolerance zone measurement of measurement results and various types of statistical processing for each item.
- Combined use with the focus pilot provides high-accuracy in height measurements. (Patent pending)
- A series of measuring operations can be performed using just one screen display.
- The auto-brightness control function faithfully reproduces the type and degree of illumination used. (This function is limited to the MF/MF-U series.)

QSPAK Measurement Window



Technical Data

Projected image:	Inverted image
Camera unit	
• Image sensor:	1/2" color CMOS camera
• Resolution:	0.0001mm
• Dimensions:	100 x 58 x 89mm (W x D x H)
• Mass:	0.4kg
Adapter unit	
• Operating software:	QSPAK VUE (optional)
• Dimensions:	45 x 123mm
• Magnification:	0.5X
• Mass:	0.3kg
Magnifications:	21X - 210X on 19" monitor
Standard accessory:	Foot switch (12AAJ088)

QSPAK, optional software

For observation/comparison of form

- Template matching function
- Manual pattern matching function

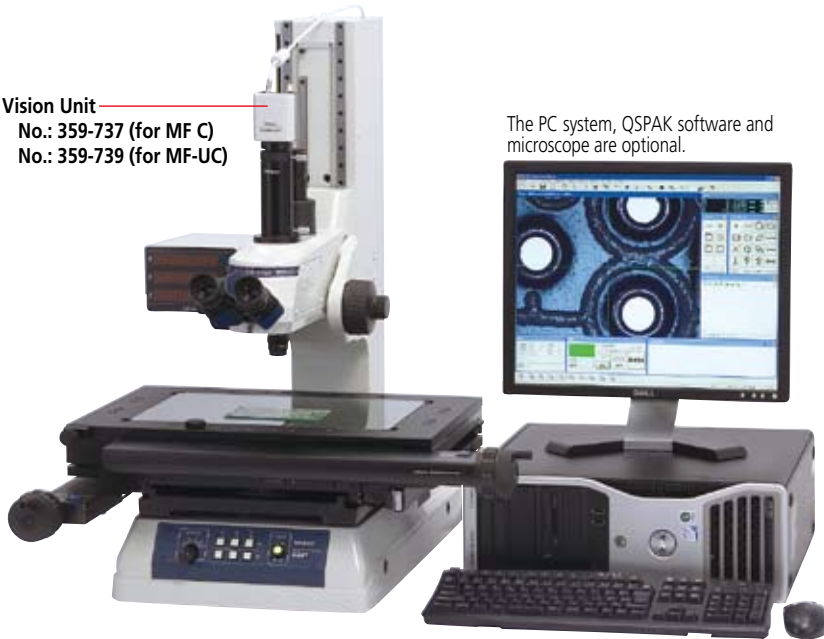
For simple measurement

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

For repeated measurement/auto-measurement

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

Vision Unit
No.: 359-737 (for MF C)
No.: 359-739 (for MF-UC)



The PC system, QSPAK software and microscope are optional.

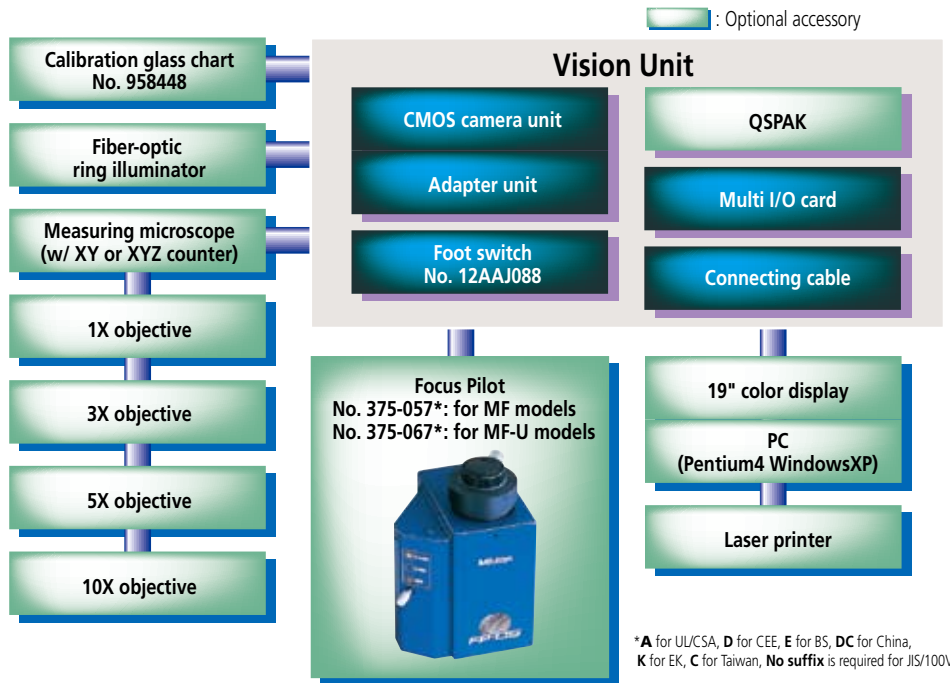
One-click Edge Detection

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



Graphic Window

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



*A for UL/CSA, D for CEE, E for BS, DC for China, K for EK, C for Taiwan, No suffix is required for JIS/100V

FS-300

SERIES 378 — High Power Inspection Microscope

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

FEATURES

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



FS-300 with optional accessories

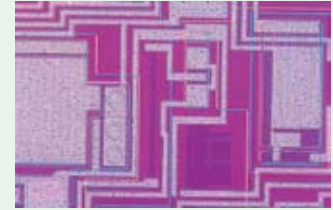
SPECIFICATIONS

Main unit	Observation system	Bright field (BF): 378-320, 378-322, 378-324, 378-326 Bright/dark field (BF/DF): 378-321, 378-323, 378-325, 378-327	
	Reflected illumination	Koehler illumination with aperture diaphragm (centering mechanism) and field stop 12V/100W halogen lamp (non-stepped brightness adjustment) With filter mounting slot (2-slot) with BF/DF switching slide (378-321, 378-323, 378-325, 378-327 only)	
	Transmitted illumination	12V/100W fiber illumination (non-stepped brightness adjustment) with aperture diaphragm (378-323, 378-324, 378-326, 378-327 only)	
	Focus adjustment	With concentric coarse and fine focusing wheels (right and left) Fine adjustment: 0.1mm/rev. for 32mm travel range Coarse adjustment: 3.8mm/rev. for 32mm travel range	
Power turret	Inward type with 4 lens mounts		
Workstage	Travel stroke: 356 x 306mm with X-Y-axis fine feed knobs and coarse travel handle		
Optical tube	Type	Trinocular tube (erect image)	
	Field number	24	
	Depression angle	Fixed 20°: 378-320, 378-321, 378-322, 378-323 Adjustable 0° to 20°: 378-324, 378-325, 378-326, 378-327	
	Intermediate image mag.	1X	
	Optical pass ratio	Siedentopf type, adjustment range: 51 - 76mm	
	Pupil distance	Siedentopf type, adjustment range: 51 - 76mm	
Eyepiece	Field of view	10X/ø30: 378-320, 378-321, 378-322, 378-323 10X/ø24: 378-324, 378-325, 378-326, 378-327	
		Applicable objective (optional)	M Plan Apo, M Plan Apo SL, G Plan Apo: 378-320, 378-322, 378-324, 378-326 BD Plan Apo, BD Plan Apo SL: 378-321, 378-323, 378-325, 378-327
Dimensions	Main unit	360 x 803 x 568.5mm	
	Workstage	700 x 400mm	
Power supply	100 to 240VAC, 50/60Hz		
Power consumption	Approx. 150W: 378-320, 378-321, 378-324, 378-325		
	Approx. 300W: 378-322, 378-323, 378-326, 378-327		
Mass	Approx. 50kg including workstage		



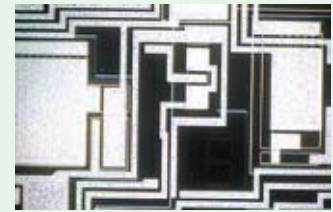
Polarized light observation:

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



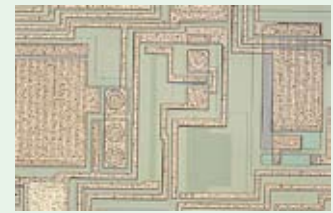
Differential interference observation:

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



Dark field observation:

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



Bright field observation:

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



Refer to the FS300 leaflet (E4197) for more details.

FS-70

SERIES 378 — Microscope Unit for Semiconductor Inspection

Technical Data

Focus adjustment	With concentric coarse and fine focusing wheels (right and left)
• Method:	50mm travel range
• Range:	0.1mm/rev. for fine adjustment, 3.8mm/rev. for coarse adjustment
Trinocular tube Image:	Erect image
Pupil distance:	Siedentopf type, adjustment range: 51 - 76mm
Field number:	24
Tilt angle:	0° - 20° (only -TH, -THS models)
Illumination system:	Reflective illumination for bright field (Koehler illumination, with aperture diaphragm)
Light source:	12V100W fiber-optics, non-stepped adjustment, light guide length 1.5m, power consumption 150W
Objectives (optional):	M Plan Apo, M Plan Apo SL, G Plan Apo

FEATURES

- The optical system that was originally developed for the best-selling FS60 models was further enhanced for the FS70 models. It is ideal as the microscope unit of a prober station for semiconductors. (All models CE marked.)
- The FS70L supports three types of YAG laser wavelength ranges (1064nm, 532nm and 355nm), while the FS70L4 supports two types of wavelength ranges (532nm and 266nm), thus expanding the scope of laser applications, allowing laser-cutting of thin-films used in semiconductors and liquid crystal substrates. However, Mitutoyo assumes no responsibility whatever for the performance and/or safety of the laser system used with Mitutoyo microscopes. A careful examination is recommended in selecting a laser-emission unit.
- Bright field, Differential Interference Contrast (DIC) and polarized observations are standard with the FS70Z. The FS70L and FS70L4 do not support the DIC method.
- By employing an inward turret, the long working distance objectives provide excellent operability.
- An ergonomic design with superb operability: the FS70 employs the erect-image optical system (the image in the field of view has the same orientation as the specimen) and enlarged fine focus adjustment wheel with rubber grip coarse-adjustment knob.



SPECIFICATIONS

Model No.	FS70	FS70-TH	FS70Z	FS70Z-TH	FS70L	FS70L-TH	FS70L4	FS70L4-TH
Order No.	378-184-1	378-184-3	378-185-1	378-185-3	378-186-1	378-186-3	378-187-1	378-187-3
Short base model No.	FS70-S	FS70-THS	FS70Z-S	FS70Z-THS	FS70L-S	FS70L-THS	FS70L4-S	FS70L4-THS
Order No.	378-184-2	378-184-4	378-185-2	378-185-4	378-186-2	378-186-4	378-187-2	378-187-4
Focus adjustment	50mm travel range with concentric coarse (3.8mm/rev) and fine (0.1mm/rev) focusing wheels (right / left)							
Image	Erect image							
Pupil distance	Siedentopf type, adjustment range: 51 - 76mm							
Field number	24							
Tilt angle	—	0° - 20°	—	0° - 20°	—	0° - 20°	—	0° - 20°
Optical pass ratio	50/50	100/0 or 0/100	50/50	100/0 or 0/100	100/0 or 0/100		100/0 or 0/100	
Protective filter	—		—		Built-in laser beam filter		Built-in laser beam filter	
Tube lens	1X		1X - 2X zoom		1X		1X	
Applicable laser	—		—		1064/532/355nm		532/266nm	
Camera mount	C-mount (using optional adapter B)				Use a laser with TV port.		C-mount receptacle (with green filter switch)	
Illumination system, optional	Reflective illumination for bright field (Koehler illumination, with aperture diaphragm) 12V 100W fiber-optics, non-stepped adjustment, light guide length: 1.5m, power consumption 150W							
Objective, optional (for observation)	M Plan Apo, M Plan Apo SL, G Plan Apo							
Objective, optional (for laser-cutting)	—				M/LCD Plan NIR, M/LCD Plan NUV		M Plan UV	
Loading*	14.5kg	13.6kg	14.1kg	13.2kg	14.2kg	13.5kg	13.9kg	13.1kg
Mass (main unit)	6.1kg	7.1kg	6.6kg	7.5kg	6.4kg	7.2kg	6.7kg	7.5kg

*Loading on optical tube excluding weight of objective lenses and eyepieces



Refer to the Microscope Units leaflet (E4191) for more details.

VMU

SERIES 378 — Video Microscope Unit

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

FEATURES

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



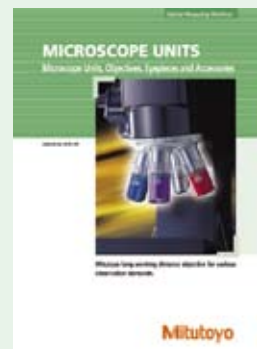
SPECIFICATIONS

Magnification of tube	1X
Applicable wavelength	378-505, 378-506 378-513 378-514
	Near-infrared and visible radiation Near-infrared—visible—near-ultraviolet radiation Visible and ultraviolet radiation
Objective	(Optional)
Reflected illumination	<ul style="list-style-type: none"> • Telecentric system with aperture stop system • Fiber-optic illuminator (optional) is required.
Light source	Halogen bulb (21V, 150W) (optional)
Mass	378-505: 570g 378-506: 590g 378-513: 1270g 378-514: 1300g

Selection Guide to System Configuration

Order No. (Depends on each system configuration)	378-505	378-506	378-513	378-514
Vertical CCD camera mount	●	●	●	●
Horizontal CCD camera mount (Optional)		●		
YAG laser mount			●	●
Fiber-optic illumination unit			●	●
M Plan Apo, M Plan Apo SL, G Plan Apo objectives for bright field observation	▲	▲	▲	▲
M Plan Apo NIR, LCD Plan Apo NIR, M Plan Apo NUV and LCD Plan Apo NUV objectives for laser cutting				▲
M Plan UV objectives for laser machining				▲

●: Provided, ▲: Available as optional accessory



Refer to the Microscope Units leaflet (E4191) for more details.

Eyepieces

SERIES 378

FEATURES

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

Reticles (optional)

- 516848:** Cross-hair
- 516576:** Broken cross hair (90° and 60°)
- 516578:** Concentric circle
(Diametric increment: 1.2mm)
- 516577:** 20mm scale
(Minimum reading: 0.1mm) with cross hair
- 516849:** 10mm scale (Minimum reading: 0.1mm)
- 516850:** 5mm scale (Minimum reading: 0.05mm)
- 516851:** 10x10mm section
(Minimum section: 1x1mm)



SPECIFICATIONS

Order No. (2pcs. set)	Magnification	Field number	Mass	Individual order No.
378-856	10X	24	85g	378-856-5
378-857	15X	16	40g	378-857-5
378-858	20X	12	55g	378-858-8

Objectives

SERIES 378

The Mitutoyo 378 Series objectives have the world's longest working distance and an infinity correction optical system. These objectives provide flexible observation at high magnifications and independent correction of chromatic aberration.

FEATURES

- The long working distance type objectives provide excellent clearance between the lens surface and the workpiece surface in focus, making it possible to observe workpieces which are usually hard-to-focus because of awkward projections.

- The metallurgical plan apochromatic (M Plan Apo) objective is an excellent optical system. This objective provides a flat, chromatic aberration-free image throughout the field of view, making it is suitable for any type of microscope.
- Specially designed objectives are also available with correction for near-infrared radiation, near-ultraviolet radiation, and ultraviolet radiation, or various thicknesses of LCD screen glasses.
- The mounting screw threads of objectives are designed to conform to JIS B-7141-1988.



Refer to the Microscope Units leaflet (E4191) for more details.



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 radiation corrected M Plan Apo NIR objectives



Near-ultraviolet radiation corrected M Plan Apo NUV objectives



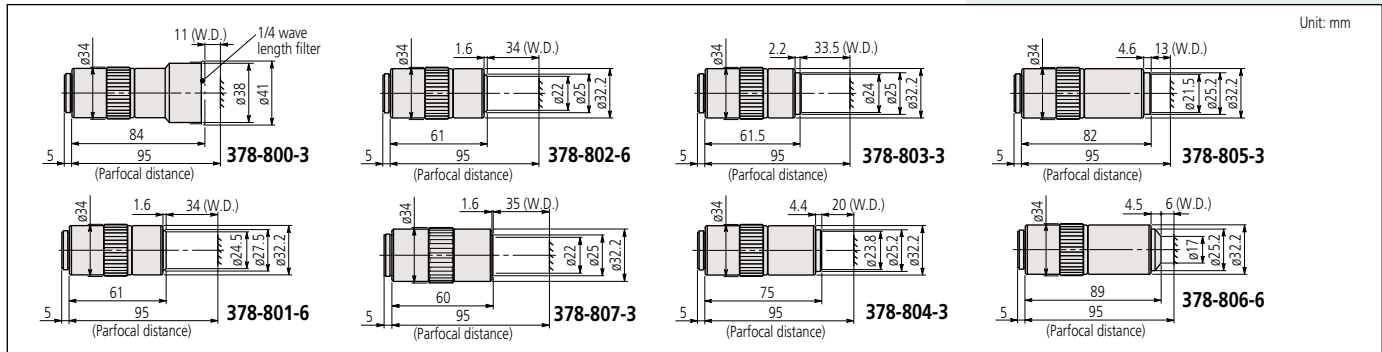
Ultraviolet radiation corrected M Plan UV objectives

M Plan Apo for Bright Field Observation

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

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

DIMENSIONS

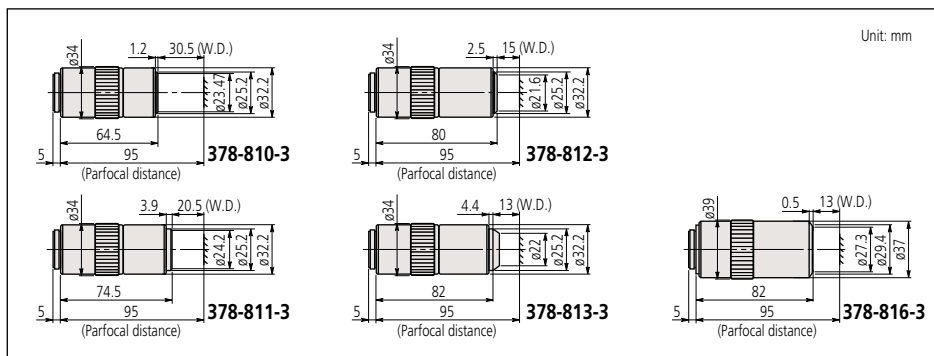


M Plan Apo SL for Bright Field Observation

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

Note:
These objectives offer extra-long working distance.

DIMENSIONS

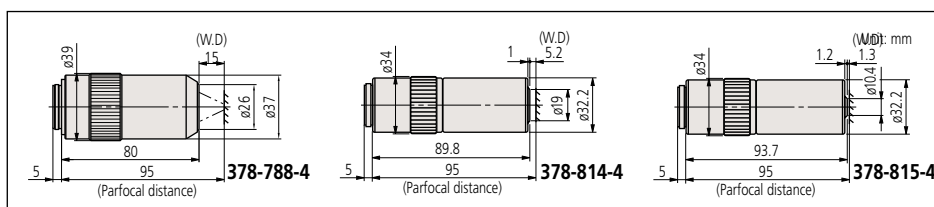


M Plan Apo HR for Bright Field Observation

Order No.	Mag.	N.A.	W.D.	f	R	D.F.	View field 1	View field 2	Mass
378-788-4	10X	0.42	15mm	20mm	0.7 μ m	1.6 μ m	\varnothing 2.4mm	0.48x0.64mm	460g
378-814-4	50X	0.75	5.2mm	4mm	0.4 μ m	0.49 μ m	\varnothing 0.48mm	0.10x0.13mm	400g
378-815-4	100X	0.90	1.3mm	2mm	0.3 μ m	0.34 μ m	\varnothing 0.24mm	0.05x0.06mm	410g

Note:
These objectives offer extra-high resolving power.

DIMENSIONS



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

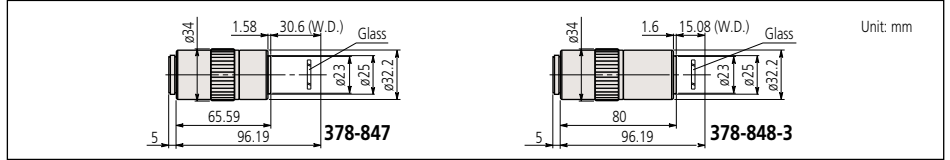
Note:
The G Plan Apo Series are designed for observing a
workpiece through glass (thickness = 3.5mm).

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

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

*In air

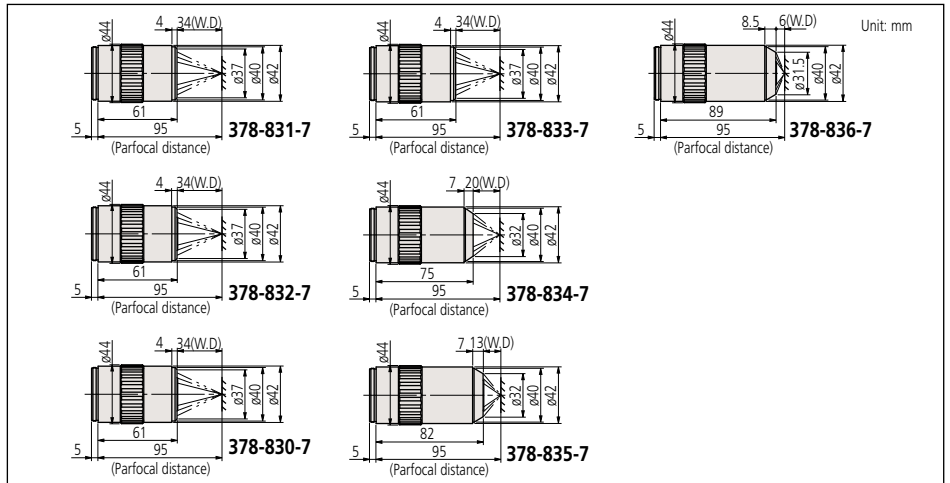
DIMENSIONS



BD Plan Apo for Bright/Dark Field Observation

Order No.	Mag.	N.A.	W.D.	f	R	D.F.	View field 1	View field 2	Mass
378-831-7	2X	0.055	34.0mm	100mm	5.0μm	91μm	ø12mm	2.4x3.2mm	340g
378-832-7	5X	0.14	34.0mm	40mm	2.0μm	14.0μm	ø4.8mm	0.96x1.28mm	350g
378-830-7	7.5X	0.21	34.0mm	26.67mm	1.3μm	6.2μm	ø3.6mm	0.64x0.85mm	350g
378-833-7	10X	0.28	34.0mm	20mm	1.0μm	3.5μm	ø2.4mm	0.48x0.64mm	350g
378-834-7	20X	0.42	20.0mm	10mm	0.7μm	1.6μm	ø1.2mm	0.24x0.32mm	400g
378-835-7	50X	0.55	13.0mm	4mm	0.5μm	0.9μm	ø0.48mm	0.10x0.13mm	440g
378-836-7	100X	0.70	6.0mm	2mm	0.4μm	0.6μm	ø0.24mm	0.05x0.06mm	460g

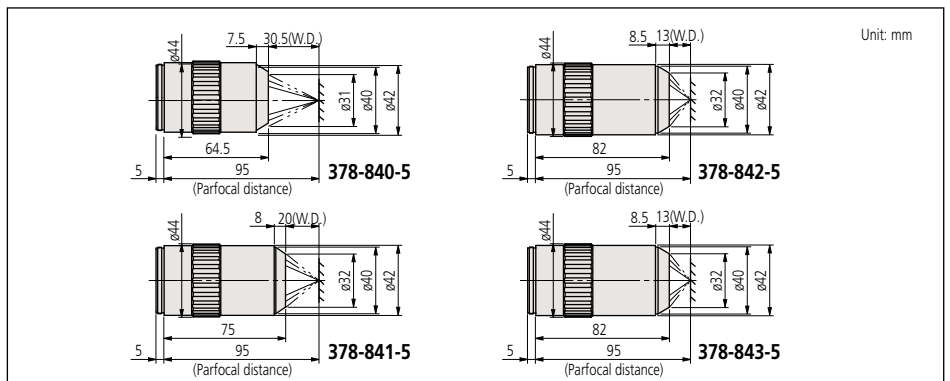
DIMENSIONS



BD Plan Apo SL for Bright/Dark Field Observation

Order No.	Mag.	N.A.	W.D.	f	R	D.F.	View field 1	View field 2	Mass
378-840-7	20X	0.28	30.5mm	10mm	1.0μm	3.5μm	ø1.2mm	0.24x0.32mm	350g
378-841-7	50X	0.42	20.0mm	4mm	0.7μm	1.6μm	ø0.48mm	0.10x0.13mm	410g
378-842-7	80X	0.50	13.0mm	2.5mm	0.6μm	1.1μm	ø0.3mm	0.06x0.08mm	430g
378-843-7	100X	0.55	13.0mm	2mm	0.5μm	0.9μm	ø0.24mm	0.05x0.06mm	440g

DIMENSIONS



Note:
These objectives offer extra-long working distance.

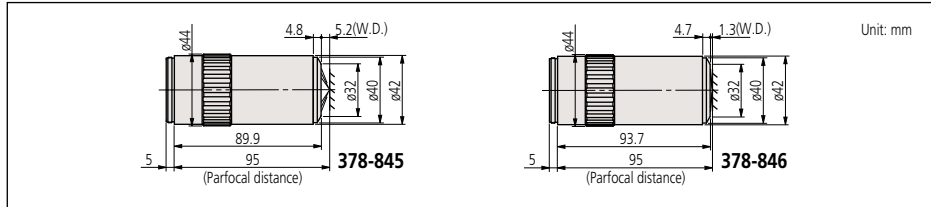
Mag.: Magnification
N.A.: Numerical aperture
W.D.: Working distance
f: Focal distance
R: Resolving power
D.F.: Focal depth
View field 1: Field of view when using ø24mm eyepiece
View field 2: Field of view when using 1/2" CCD camera

BD Plan Apo HR for Bright/Dark Field Observation

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

Note:
These objectives offer extra-high resolving power.

DIMENSIONS

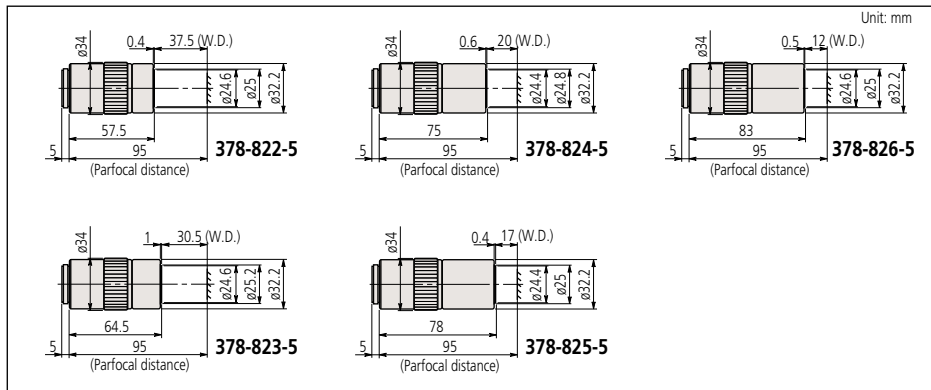


Near-infrared Radiation Corrected M Plan Apo NIR for Bright Field Observation

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

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

DIMENSIONS

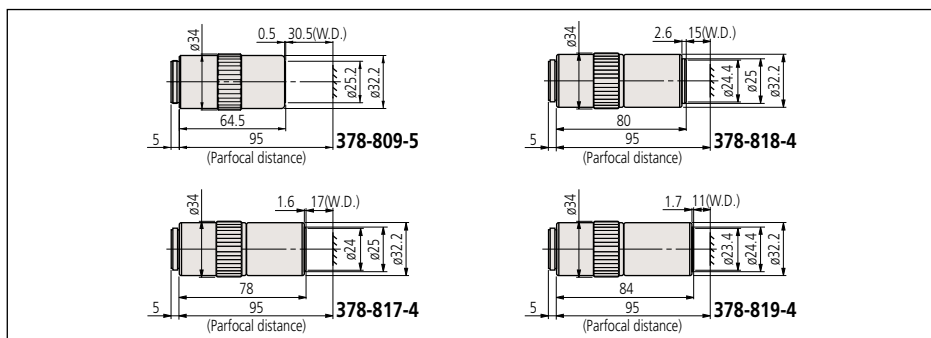


Near-ultraviolet Radiation Corrected M Plan Apo NUV for Bright Field Observation

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

Note:
These objectives are designed so that a workpiece's image can be focused within the focal depth even when the wavelength used is changed anywhere from the visible range ($\lambda = 620\text{nm}$) to the near-ultraviolet range ($\lambda = 355\text{nm}$). Therefore The M Plan NUV Series are suitable for laser repair using a high frequency laser beam.

DIMENSIONS



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

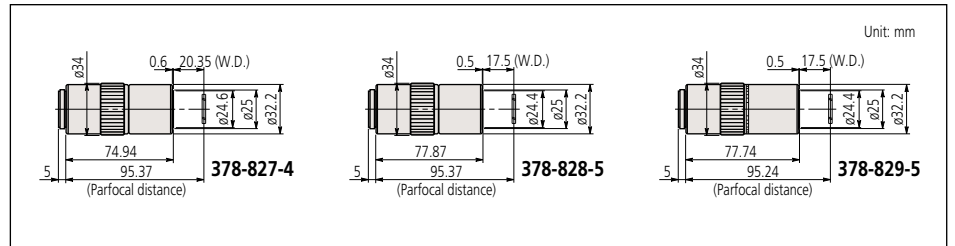
Note:
These near-infrared ($\lambda = 1800\text{nm}$) corrected objectives are designed for observing a workpiece through LCD glass (thickness = 1.1mm (378-827-4, 378-828-5) or 0.7mm (378-829-5, 378-754-5)) and for laser repair.

Near-Infrared Radiation and LCD Glass Thickness ($t = 1.1\text{mm}$ or 0.7mm) Corrected LCD Plan Apo NIR for Bright Field Observation

Order No.	Mag.	N.A.	W.D.	f	R	D.F.	View field 1	View field 2	Mass
378-827-5	20X	0.40	19.98mm*	10mm	0.7 μm	1.7 μm	$\varnothing 1.2\text{mm}$	0.24x0.32mm	305g
378-828-5	50X	0.42	17.13mm*	3.9mm	0.7 μm	1.6 μm	$\varnothing 0.48\text{mm}$	0.10x0.13mm	320g
378-829-5	50X	0.42	17.26mm*	3.9mm	0.7 μm	1.6 μm	$\varnothing 0.48\text{mm}$	0.10x0.13mm	320g
378-752-5	100X	0.50	12.13mm*	2mm	0.6 μm	1.1 μm	$\varnothing 0.24\text{mm}$	0.05x0.06mm	335g
378-754-5	100X	0.50	11.76mm*	2mm	0.6 μm	1.1 μm	$\varnothing 0.24\text{mm}$	0.05x0.06mm	335g

*In air

DIMENSIONS



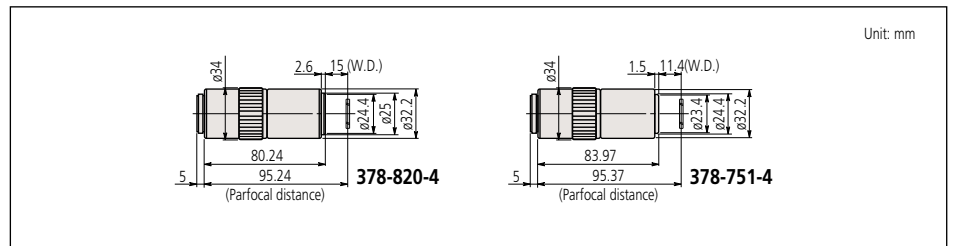
Note:
These near-infrared ($\lambda = 1800\text{nm}$) corrected objectives are designed for observing a workpiece through LCD glass (thickness = 1.1mm (378-827-4, 378-828-5) or 0.7mm (378-829-5, 378-754-5)) and for laser repair.

Near-ultraviolet Radiation and LCD Glass Thickness ($t = 0.7\text{mm}$) Corrected LCD Plan Apo NUV for Bright Field Observation

Order No.	Mag.	N.A.	W.D.	f	R	D.F.	View field 1	View field 2	Mass
378-820-4	50X	0.42	14.76mm*	4mm	0.7 μm	1.6 μm	$\varnothing 0.48\text{mm}$	0.10x0.13mm	310g
378-753-4	50X	0.42	14.53mm	4mm	0.7 μm	1.6 μm	$\varnothing 0.48\text{mm}$	0.10x0.13mm	310g
378-751-4	100X	0.50	11.03mm	2mm	0.6 μm	1.1 μm	$\varnothing 0.24\text{mm}$	0.05x0.06mm	380g

*In air

DIMENSIONS

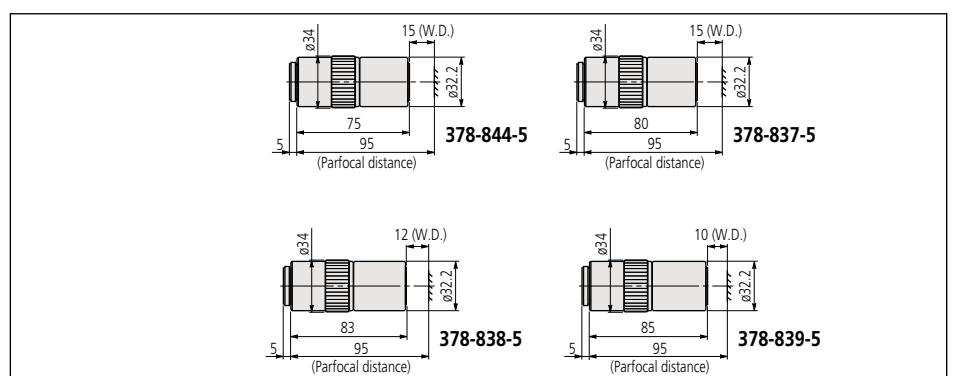


Note:
These ultraviolet corrected objectives are designed so that a workpiece's image can be focused within the focal depth even when the wavelength used is changed anywhere from the visible range ($\lambda = 550\text{nm}$) to the ultraviolet range ($\lambda = 266\text{nm}$). Therefore the M Plan UV Series are suitable for laser repair using a high frequency laser beam.

Ultraviolet Radiation Corrected M Plan UV for Bright Field Observation

Order No.	Mag.	N.A.	W.D.	f	R	D.F.	View field 1	View field 2	Mass
378-844-5	10X	0.25	20mm	20mm	1.1 μm	4.4 μm	$\varnothing 2.4\text{mm}$	0.48x0.64mm	310g
378-837-5	20X	0.36	15.0mm	10mm	0.8 μm	2.1 μm	$\varnothing 1.2\text{mm}$	0.24x0.32mm	330g
378-838-5	50X	0.40	12.0mm	4mm	0.7 μm	1.7 μm	$\varnothing 0.48\text{mm}$	0.10x0.13mm	400g
378-839-5	80X	0.55	10.0mm	2.5mm	0.5 μm	0.9 μm	$\varnothing 0.3\text{mm}$	0.06x0.08mm	380g

DIMENSIONS



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

MSM-400

SERIES 377 — Stereo Microscopes

FEATURES

- Bright, sharp images with real depth are produced with high resolution and excellent faithfulness to color, thus minimizing eye fatigue while increasing inspection efficiency and productivity.
- The MSM series provides a full range of advanced functions at an affordable price.
- User-friendly turret types (MSM-412, MSM-465) and a zoom type (MSM-Z414) are available.
- Continuous zooming, a standard feature, allows you to enlarge the object by 10 to 40 times in total magnification.
- MSM series can be connected to a digital camera or CCD camera to save captured images of the object or for simultaneous observation through different media.
- The extended depth of focus, long working distance and wide field of view increase work efficiency. The system is ideal for inspecting various objects such as electronic components, metal components, plants, mineral compositions and biological cells.
- Various attachments expand applications and use. Extended MSM units can be used for appearance inspections, on processing lines, inside inspection systems or in teaching environments.



MSM-412



MSM-Z414



MSM-Z475T



MSM-465

SPECIFICATIONS

Model No.	MSM-412	MSM-Z414	MSM-Z475	MSM-Z475T	MSM-465
Order No.	377-925	377-945*	377-975*	377-985*	377-965*
Optical system	Greenough's type				Galilean type
Total magnification	10X, 20X	10X to 40X	7.5X to 50X		6X, 12X, 25X, 50X
Optical tub	Binocular	Binocular	Binocular	Trinocular	Binocular
Pupil distance (adjustable)	54 - 76mm	54 - 76mm	52 - 79mm		54 - 76mm
Eyepiece (optional)	WF5X/22, WF10X/20 (standard), WF15X/13, WF20X/10	WF5X/22, WF10X/20 (standard), WF15X/13, WF20X/10	WF10X/23 (standard), WF5X/23, WF6.25X/23, WF15X/17, WF20X/13, WF32X/8		WF6.25X/23, WF10X/23 (standard), WF15X/17.6, WF20X/13.4, WF32X/10
Objective	1X, 2X (turret)	1X to 4X (zoom)	0.75X to 5X (zoom)		1.2X, 2.5X, 5X (turret)
Auxiliary objective (optional)	—	0.5X, 0.75X, 1.5X	0.5X, 0.63X, 1.5X, 2X		0.6X, 1.2X, 2.5X, 5X
Total magnification	2.5X to 60X	2.5X to 120X	1.87X to 320X		3.75X to 320X
Working distance of objective	95mm	80mm	113mm		89mm
Focusing travel	44mm	44mm	50mm		50mm
Maximum workpiece height	93mm	95mm	130mm		95mm*
Workstage size	ø95mm	ø95mm	ø95mm		ø95mm
Dimensions	151x285x343mm	151x285x343mm	151x285x343mm		151x285x343mm
Mass	4.9kg (377-925B) 4.7kg	5.3kg (377-945B) 5.1kg	5.3kg	5.4kg	4.8kg (377-965B) 6.3kg

* To denote your AC power cable add the following suffixes to the order No.: **A** for UL/CSA, **C** for Taiwan, **D** for CEE, **DC** for CCC, **E** for BS, **K** for EK, **No suffix** is required for JIS/100V

Optional Lenses
For MSM-412, Z414



5X/22 eyepiece:
377-026



15X/13 eyepiece:
377-028



20X/10 eyepiece:
377-029



0.5X Auxiliary
objective
377-045



0.75X Auxiliary
objective
377-046



1.5X Auxiliary
objective
377-047

For MSM-465



6.25X/23 eyepiece:
377-066



15X/17.6 eyepiece:
377-067



20X/13.4 eyepiece:
377-068



32X/10 eyepiece:
377-069



0.5X Auxiliary
objective
377-076

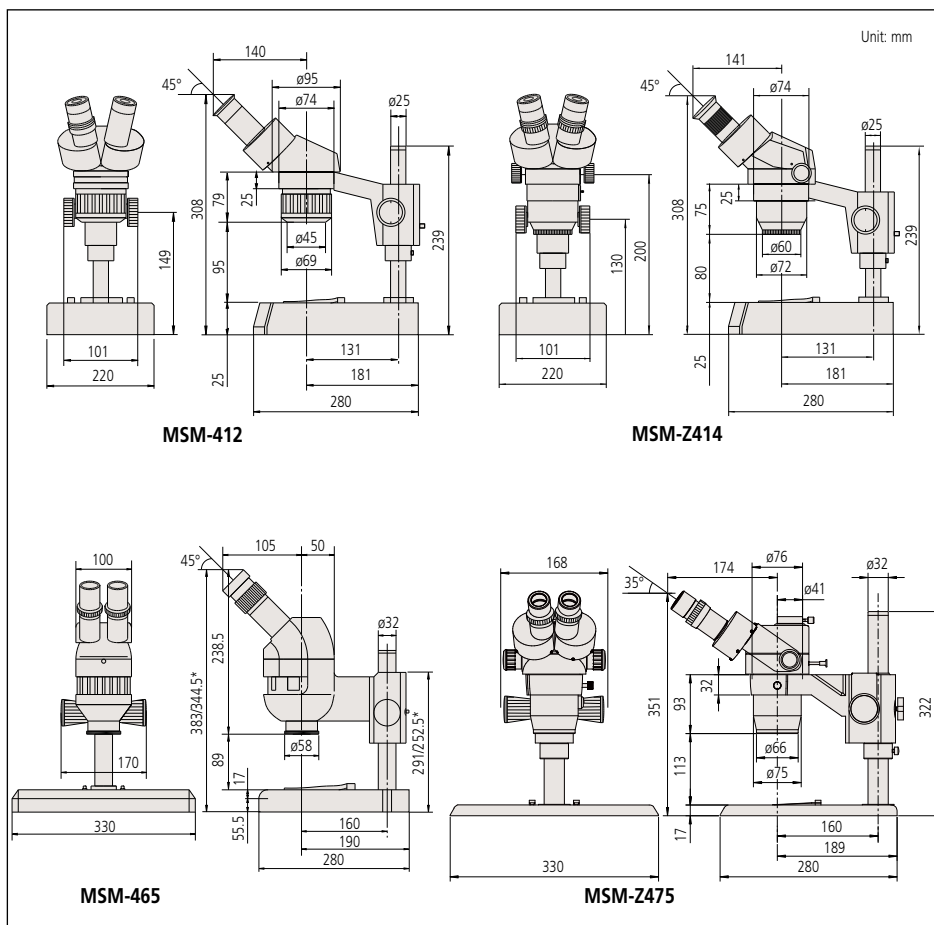


1.5X Auxiliary
objective
377-077



2X Auxiliary
objective
377-078

DIMENSIONS



MSM-465



MSM-Z414



Pocket Magnifiers

SERIES 183

FEATURES

- Suitable for inspecting metal surfaces.

SPECIFICATIONS

Magnification	Order No.	Remarks
25X	183-201	Pen type
	183-202	With stand
50X	183-203	With stand



183-201



183-202



183-203

Pocket Comparators

SERIES 183

FEATURES

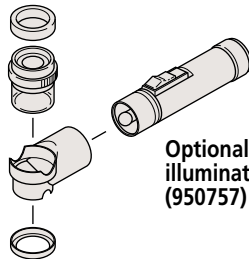
- By replacing optional reticles, dimensional, angle, and other types of measurement can be performed.
- An optional illuminator (950757) is available.

SPECIFICATIONS

Magnification	Order No.	Remarks
8X	183-101	Optional reticles available
9X	183-121	Optional reticles available
10X	183-131	Optional reticles available



183-101



Optional illuminator (950757)

Optional Reticles for pocket comparators



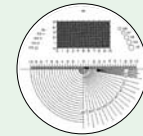
183-102



183-103



183-104



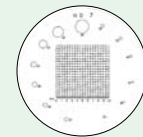
183-105



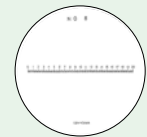
183-106



183-107



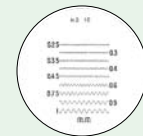
183-108



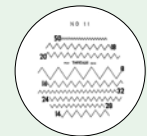
183-109



183-110



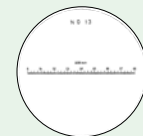
183-111



183-112



183-113



183-114



183-115

Zoom loupe

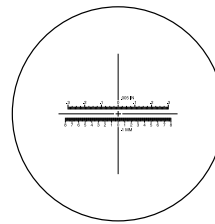
SERIES 183

FEATURES

- 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.
- Comes with a carrying case.



183-304



Reticle provided

SPECIFICATIONS

Magnification	Order No.	Remarks
8X	183-304	With reticles (Scale graduation: 0.1mm, .005")

Clear Loupe

SERIES 183



183-301



183-302



183-303

SPECIFICATIONS

Magnification	Order No.	Remarks
7X	183-301	Drawtube removable
10X	183-302	Drawtube removable
15X	183-303	Drawtube removable