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Industrial Instruments General Catalogue



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Optical Flat / Optical Parallel / Standard 300 mm Scale 15

The highly cost-effective SMZ series offer outstanding optical performance, flexible system expandability, and superb operability.

Parallel Optics Type				
				
	SMZ25	SMZ18	SMZ1270 SMZ1270i	SMZ800N
Zoom Ratio	25 : 1	18 : 1	12.7 : 1	8 : 1
Zoom Range	0.63–15.75×	0.75–13.5×	0.63–8×	1–8×
Total Magnification*1 (Standard combination*2)	3.15–945× (6.3–157.5×)	3.75–810× (7.5–135×)	3.15–480× (6.3–80×)	5–480× (10–80×)
WD *3	60 mm	60 mm	70 mm	78 mm
Camera	✓	✓	✓	✓

✓ : Available / — : Not available

Greenough Type			
			
	SMZ745 SMZ745T	SMZ445 SMZ460	SMZ-2
Zoom Ratio	7.5 : 1	4.4 : 1 4.3 : 1	5 : 1
Zoom Range	0.67–5×	0.8–3.5× 0.7–3×	0.8–4×
Total Magnification*1 (Standard combination*2)	3.35–300× (6.7–50×)	4–70× (8–35×) 3.5–60× (7–30×)	4–120× (8–40×)
WD *3	115 mm	100 mm	77.5 mm
Camera	✓ (SMZ745T only)	—	—

✓ : Available / — : Not available

*1: Depending on combination of Eyepiece and Objective lens. *2: Combination of Eyepiece 10× and Objective lens 10×. *3: Objective lens 1× or no Auxiliary lens.

The lineup allows you to select a suitable camera for each sample and observation method.

Microscope Camera

DS-Fi3

Three main features of the previous models, high-resolution, high sensitivity and low noise, and high-speed live display are offered in 1 camera.



5.9 megapixel **Color** High-resolution

Frame Rate	30 fps (1440×1024)
Max Recordable Pixels	2880×2048

DS-Ri2

Capable of expressing images as is, this microscope digital camera offers high resolution, color reproduction, and frame rate.



16.25 megapixel **Color** High-resolution

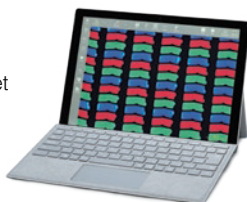
Frame Rate	45 fps (1636×1088)
Max Recordable Pixels	4908×3264

Imaging software NIS-Elements

Using a tablet PC



Simply installing NIS-Elements L on a tablet PC enables setting and control of DS-Fi3/ DS-Ri2 microscope cameras, live image display, and image acquisition.



Using a desktop PC



A wide variety of tools

NIS-Elements L enables the conducting of simple measurements on images, with input of lines and comments. These can also be written onto and saved with the image, and measurement data can be output.

Measurement function

- Line distance
- Area
- Circle
- Circle distance
- Pitch distance
- Angle



Annotate function

- Line
- Arrow
- Text
- Marker
- Polyline



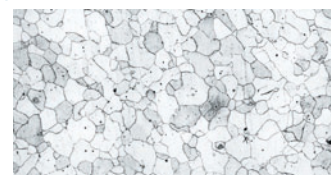
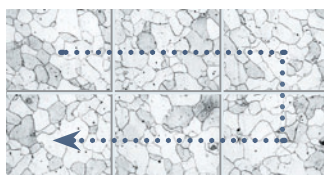
Scene Mode

Ten camera setting patterns for optimal color reproduction and contrast for each microscope light source, observation method and type of sample, as well as custom settings, can be selected.

- Wafer/IC
- Metal, Ceramic/Plastic
- Circuit board
- Flat Panel Display

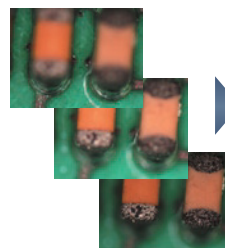
Image Stitching

Stitches together images acquired from multiple fields of view to create one image.



EDF (Extended Depth of Focus)

Create a single, all-in-focus image from images of differing focus.



Optical Interferometric Microscope Systems BW-S500/BW-D500 Series

Nikon's proprietary scanning-type optical interference measurement technology achieves 1 pm height resolution. Nikon offers variety application, lustrous surfaces, such as silicon wafer, glass and metallic deposition surfaces.



	High Speed Model BW-D500 Series	High Pixel Resolution Model BW-S500 Series	
Height Resolution (algorithm)	1 pm		
Step Height Measurement Reproducibility	σ : 8 nm (8 μ m Step height measurement)		
Number of Pixels	510×510	2,046×2,046	1,022×1,022
Height Measurement Time	2 s (10 μ m scan)	19 s (10 μ m scan)	8 s (10 μ m scan)
Field of view	< 2,015×2,015 μ m*	< 4,458×4,448 μ m*	

* The range can be extended by changing the relay lens or by stitching.



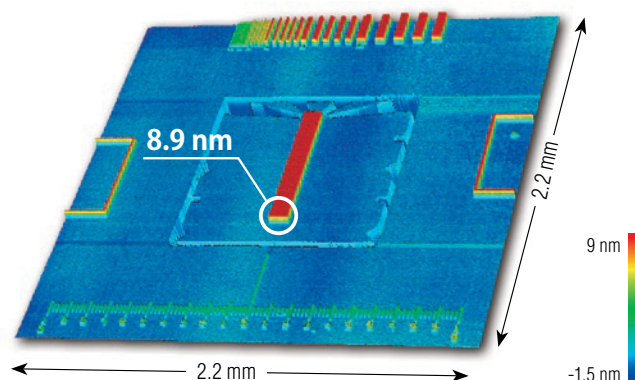
BW-S507

High Accuracy and Repeatability

The BW-S500/BW-D500 series is calibrated by an 8 nm or 8 μ m VLSI Step Height Standards sample, certified by the NIST. Achieves extremely high accuracy and repeatability as a height measurement system.

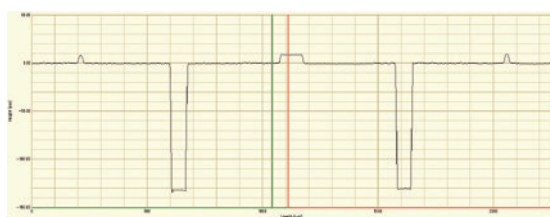
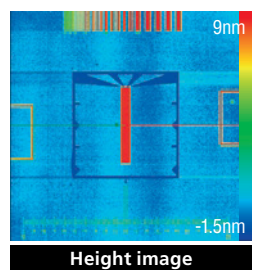


8 nm Step Height Sample

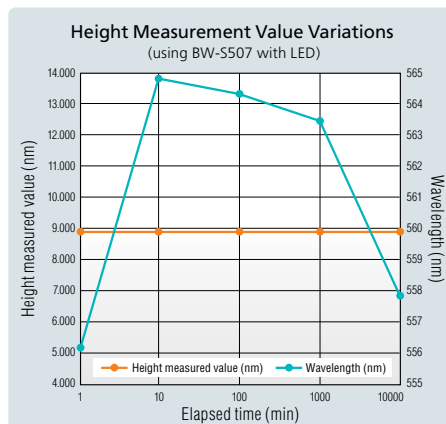


Measured value unsusceptible to variation of central wavelength of light source

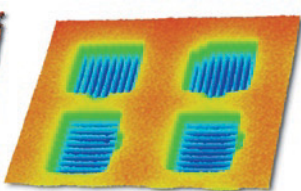
With Nikon's proprietary technology, measurement values with the BW-S500/BW-D500 series are independent of central wavelength of light source. Measurements can be done immediately after switching on illumination source.



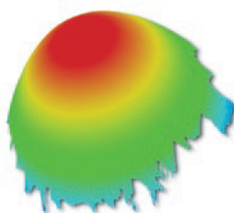
Calibrated Value (NIST): 8.9 nm \pm 0.6 nm
Average Value by BW-S507: 8.906 nm (10 times/ σ 0.031 nm)



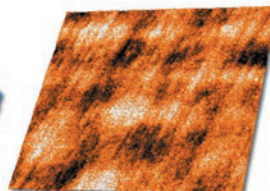
Polished ceramic surface



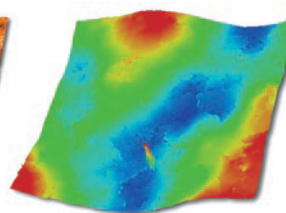
Metal Etching Surface



Lens



Glass



Glossy paper

Objective Lenses

CFI60-2 / CFI60

Nikon's CFI60-2/CFI60 optical systems are highly evaluated for its unique concept of high NA combined with long working distance. These lenses have further evolved to achieve the apex in long working distance, correct chromatic aberration, and optimized lens weight.



BF: Brightfield DF: Darkfield POL: Polarizing S-POL: Simple Polarizing DIC: Differential Interference Contrast UV-FL: UV Fluorescence FL: EPI Fluorescence

	Model	Magnification	NA	WD (mm)	BF	DF	POL	S-POL	DIC	UV-FL	FL
CFI60-2	T Plan EPI Plan (Semi-apochromat)	1x	0.03	3.8	✓	—	—	—	—	—	—
		2.5x	0.075	6.5	✓	—	—	—	—	—	—
	TU Plan Fluor EPI Universal Plan Fluor (Semi-apochromat)	5x	0.15	23.5	✓	—	—	✓	✓ A	✓	✓
		10x	0.3	17.5	✓	—	—	✓	✓ A	✓	✓
		20x	0.45	4.5	✓	—	—	✓	✓ A	✓	✓
		50x	0.8	1.0	✓	—	—	✓	✓ A	✓	✓
		100x	0.9	1.0	✓	—	—	✓	✓ A	✓	✓
	TU Plan Apo EPI Universal Plan Apo (Apochromat)	50x	0.8	2.0	✓	—	—	✓	✓ A	—	✓
		100x	0.9	2.0	✓	—	—	✓	✓ A	—	✓
		150x	0.9	1.5	✓	—	—	✓	✓ A	—	✓
	TU Plan Fluor EPI P Polarizing Universal Plan Fluor (Semi-apochromat)	5x	0.15	23.5	✓	—	✓	✓	✓ A	✓	✓
		10x	0.3	17.5	✓	—	✓	✓	✓ A	✓	✓
		20x	0.45	4.5	✓	—	✓	✓	✓ A	✓	✓
		50x	0.8	1.0	✓	—	✓	✓	✓ A	✓	✓
		100x	0.9	1.0	✓	—	✓	✓	✓ A	✓	✓
	TU Plan EPI ELWD Long Working Distance Universal Plan (Semi-apochromat)	20x	0.4	19.0	✓	—	—	✓	✓ B	—	✓
		50x	0.6	11.0	✓	—	—	✓	✓ B	—	✓
		100x	0.8	4.5	✓	—	—	✓	✓ B	—	✓
	T Plan EPI SLWD Super Long Working Distance Plan (Semi-apochromat)	10x	0.2	37.0	✓	—	—	—	—	—	✓
		20x	0.3	30.0	✓	—	—	—	—	—	✓
		50x	0.4	22.0	✓	—	—	—	—	—	✓
		100x	0.6	10.0	✓	—	—	—	—	—	✓
	TU Plan Fluor BD Universal Plan Fluor (Semi-apochromat)	5x	0.15	18.0	✓	✓	—	✓	✓ A	✓	✓
		10x	0.3	15.0	✓	✓	—	✓	✓ A	✓	✓
20x		0.45	4.5	✓	✓	—	✓	✓ A	✓	✓	
50x		0.8	1.0	✓	✓	—	✓	✓ A	✓	✓	
100x		0.9	1.0	✓	✓	—	✓	✓ A	✓	✓	
TU Plan Apo BD Universal Plan Apo (Apochromat)	50x	0.8	2.0	✓	✓	—	✓	✓ A	—	✓	
	100x	0.9	2.0	✓	✓	—	✓	✓ A	—	✓	
	150x	0.9	1.5	✓	✓	—	✓	✓ A	—	✓	
TU Plan BD ELWD Long Working Distance Universal plan (Semi-apochromat)	20x	0.4	19.0	✓	✓	—	✓	✓ B	—	✓	
	50x	0.6	11.0	✓	✓	—	✓	✓ B	—	✓	
	100x	0.8	4.5	✓	✓	—	✓	✓ B	—	✓	
CFI60	L Plan EPI (Achromat)	40x	0.65	1.0	✓	—	—	—	—	—	✓
	LU Plan Apo EPI / Universal Plan Apo (Apochromat)	150x	0.95	0.3	✓	—	—	✓	✓ A	—	✓
	L Plan EPI CR LCD Substrate Inspection Plan (Achromat) <small>*Offers valid while supplies last</small>	20x	0.45	10.9–10.0	✓	—	—	—	—	—	✓
		50x	0.7	3.9–3.0	✓	—	—	—	—	—	✓
		100x	0.85	1.2–0.85	✓	—	—	—	—	—	✓
		100x	0.85	1.3–0.95	✓	—	—	—	—	—	✓
	LE Plan EPI (Achromat)	5x	0.1	31	✓	—	—	—	—	—	✓
		10x	0.25	13	✓	—	—	—	—	—	✓
		20x	0.4	3.6	✓	—	—	—	—	—	✓
		50x	0.75	0.5	✓	—	—	—	—	—	✓
		100x	0.9	0.31	✓	—	—	—	—	—	✓
	LE Plan BD (Achromat)	5x	0.1	18	✓	✓	—	—	—	—	✓
10x		0.25	13	✓	✓	—	—	—	—	✓	
20x		0.4	3.6	✓	✓	—	—	—	—	✓	
50x		0.75	0.5	✓	✓	—	—	—	—	✓	

✓ : Available / — : Not available *A: Set prism position at A / B: Set prism position at B

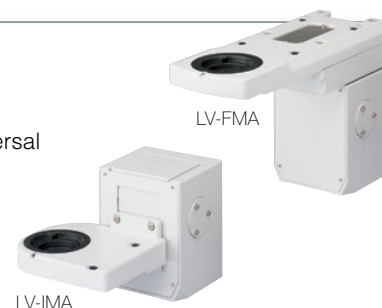
For Incorporation into Microscopes

Modular Focusing Units

IM-4, LV-IM/LV-IMA, LV-FM/LV-FMA

Suitable for incorporating into systems, these focusing units enable the mounting of a universal illuminator and a motorized nosepiece.

	IM-4	LV-IM/LV-IMA	LV-FM/LV-FMA
Type	Manual	Manual / Motorized	Manual / Motorized
Vertical Stroke	30 mm	30/20 mm	30/20 mm



Dynamic Auto-Focus Unit

LV-DAF

Hybrid Auto-focus features a wide focus range and fast tracking ability. A wide range of observation methods are supported, including brightfield, darkfield, and DIC. Reflective and transparent samples can both be observed.

*Not compatible with NIS-Elements imaging software

Detection System	Split Projection System/ Contrast Detection System
AF Light Source	Near Infrared LED ($\lambda=770$ nm)
Focal Time	within 0.7 sec (Obj. lens: 20 \times , Distance from focal position: 200 μ m)
Observation	Brightfield, Darkfield, Polarizing, DIC



Compact Reflected Microscopes

CM Series

Ultra-compact reflected microscopes designed for integration into production lines to observe on monitors.



	CM-5A	CM-10A/CM-10L	CM-20A/CM-20L	CM-30A2/CM-30L2
Camera Mount	C-mount (ENG-mount possible with option)			
Tube Lens Magnification	—	1 \times	0.5 \times	1 \times
Compatible Objectives	A series: CF IC EPI Plan objectives / L series: CF160-2/ CF160 EPI Plan objectives			
Illumination Optical System	Koehler illumination (high-quality telecentric illumination)			
Attachment Surfaces	3			4

Wafer Loaders

Nikon's proprietary technology ensures reliable loading of ultra-thin 100 μ m wafers. The NWL 200 series achieve highly reliable loading, suitable for inspection of next-generation semiconductors.

Wafer	Diameter	\varnothing 200 mm / \varnothing 150 mm
	Thickness (standard)	300 μ m
	Thickness (option)	300–100 μ m
Surface, back side macro inspection		✓

NWL200 Series



CNC Video Measuring Systems iNEXIV Series / NEXIV Series

Wide variety of stage strokes and magnifications are available for various customer requirements.

Main Body (Type / Stage Stroke)

Wide FOV Model

VMA

Model VMA-2520
VMA-4540
VMA-6555



iNEXIV VMA-4540

Standard Model

VMZ-R

Model VMZ-R3020/VMZ-R4540/VMZ-R6555



NEXIV VMZ-R3020

NEXIV VMZ-R4540

High-precision Model

VMZ-H

Model VMZ-H3030



NEXIV VMZ-H3030

Model	Wide FOV			Standard			High-precision
	250×200 mm	450×400 mm	650×550 mm	300×200 mm	450×400 mm	650×550 mm	300×300 mm
Wide FOV Head	✓	✓	✓	✓	✓	✓	
Standard Head				✓	✓	✓	✓
High-Magnification Head				✓	✓	✓	✓
Z-axis Stroke	200 mm	200 mm	200 mm	200 mm	200 mm	200 mm	150 mm
Max. guaranteed loading capacity	15 kg	20 kg	30 kg	20 kg	40 kg	50 kg	30 kg
Maximum permissible error (EU, MPE EU, MPE)	2+8L/1000 μm	2+6L/1000 μm		1.2+4L/1000 μm			0.6+2L/1000 μm
Maximum permissible error (EUZ, MPE)	3+L/50 μm	3+L/100 μm		1.2+5L/1000 μm			0.9+L/150 μm

L = Length in mm

Zoom Heads

Type A

Wide FOV and long working distance enables comfortable operation. Laser AF and Touch Probe can be attached as optional accessories.

*Touch Probe is an option only for VMA series.



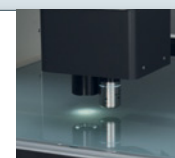
Type 1-4

Equipped with top, bottom, and oblique ring lights with adjustable angles. TTL (Through the Lens) Laser AF is a standard tool that can scan surfaces at 1000 points/second.



Type TZ

Equipped with 1-120x ultra high zoom ratio with 8 steps. Suitable for measurements of small targets up to several micrometers.



FOV	W(mm)×D(mm)	13.3 10.0	9.33 7.01	7.8 5.8	4.7 3.5	2.6 1.9	2.33 1.75	1.33 1.00	1.165 0.875	0.622 0.467	0.582 0.437	0.311 0.233	0.291 0.218	0.155 0.117	0.146 0.109	0.070 0.068	0.073 0.055	0.039 0.029	0.039 0.029	WD
Wide FOV Head	Type A	●																	73.5 mm	
Standard Head	Type 1	●																	50 mm	
	Type 2	●																		
	Type 3	●																		
High-Magnification Head	Type 4	●																	30 mm	
	Type TZ	●																	9.8 mm	

Confocal NEXIV Series

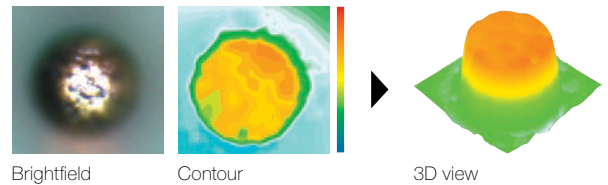
Simultaneous wide-area height measurements with confocal optics and 2D measurement with 15x brightfield zoom optics.

Main Body (Type /Stage Stroke)		
	VMZ-K3040	VMZ-K6555
XY Stroke	300x400 mm	650x550 mm
Magnification (Type S)	1.5x / 3x / 7.5x	1.5x / 3x / 7.5x
Magnification (Type H)	15x / 30x	15x / 30x
Z-axis Stroke	150 mm	150 mm
Max. guaranteed loading capacity	20 kg	30 kg
Maximum permissible error (EuX, MPE EUY, MPE)	1.5+4L/1000 μm	
Maximum permissible error (EuZ, MPE)	1+L/1000 μm	

Zoom Heads																	
FOV	W(mm)× D(mm)	8 6	4 3	2.0 1.5	1.6 1.2	1.26 0.95	1.00 0.75	0.8 0.6	0.63 0.47	0.53 0.40	0.4 0.3	0.27 0.20	0.20 0.15	0.11 0.08	0.100 0.074	0.05 0.04	WD
Type S	1.5x	●															24mm
	3x	●															24mm
	7.5x	●															5mm
Type H	15x	●															20mm
	30x	●															5mm

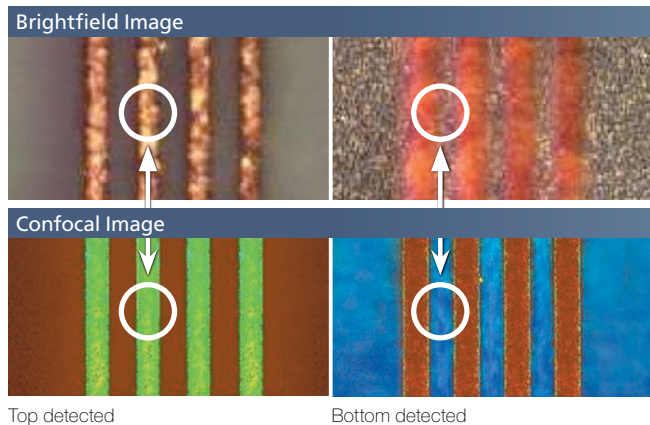
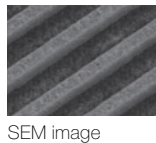
● Brightfield ● Confocal/Brightfield

Confocal NEXIV incorporates confocal optics for fast and accurate evaluation of fine three-dimensional geometries. Confocal Optics are designed for wide FOV height measurement.



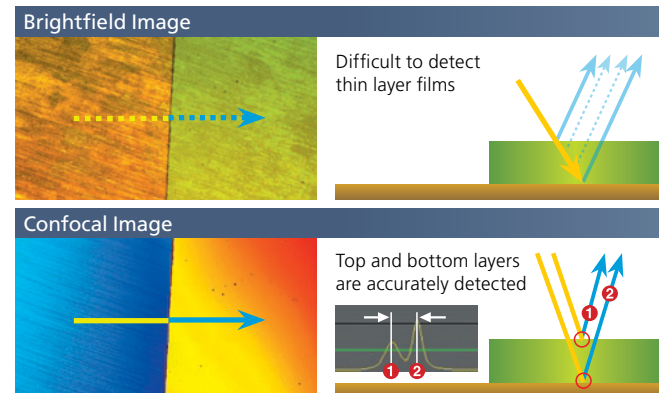
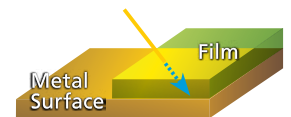
High Contrast and Multileveled Sample (PCBs)

Brightfield observation can sometimes be difficult due to blurred lines along sample structure. These lines can be clearly observed and measured using Confocal optics.



Thin Transparent Samples (Metal Surface Film / Semiconductor Resist)

Top layers of both thin transparent film and metal surface can be easily detected using Confocal optics.



Please refer to individual product brochures for further details.

Measuring Microscopes

Focused on high-precision and easy operability, a wide range of MM-products are available.

Compact Model MM-200



Basic Model MM-400



Large-Stage Model MM-800



Stage Size/ Loading Capacity	50×50 mm / 5 kg	✓	✓	✓
	100×100 mm / 15 kg	—	✓	✓
	150×100 mm / 15 kg	—	✓	✓
	200×150 mm / 20 kg	—	—	✓
	250×150 mm / 20 kg	—	—	✓
	300×200 mm / 20 kg	—	—	✓
Max. Sample Height		110 mm	150 mm	200 mm
Optical Head	Monocular	✓	✓	—
	Binocular	—	✓	✓
X-Y-Z	2-axis	✓	✓	✓
	3-axis	—	✓	✓
CCD		✓*	✓	✓
Obj. Magnification		1×/3×/5×/10×	1×/3×/5×/10×/20×/50×/100×	

*For simple video head only

✓ : Available / — : Not available

MM Type

With Nikon's optical technology and highly precise stages, high-precision measurement can be achieved.



Universal Type

Offers a line-up compatible with dimensional measurement and various observation methods.



High-Precision Stages

The coarse/fine changeover lever and the RESET and SEND buttons are located near the X- and Y-axis knobs.



X-axis Knob

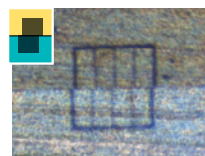
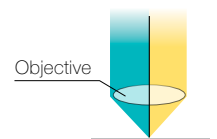


Y-axis Knob

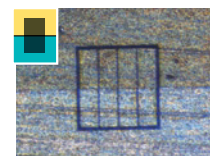
Focusing Aid (FA)

The Split-Prism FA delivers sharp patterns to allow accurate focusing during Z-axis measurements.

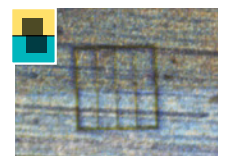
FA patterns are clearly visible because they are split vertically.



Front Focus



Focused



Rear Focus



Profile Projectors

Nikon's profile projectors apply the principles of optics to the inspection of manufactured parts by projecting magnified silhouettes on a screen.

Desktop Model

V-12B



Large-Screen Model

V-20B



Stage Size/ Loading Capacity	50×50 mm / 5 kg	✓	✓
	100×100 mm / 15 kg	✓	✓
	150×100 mm / 15 kg	✓	✓
	200×150 mm / 20 kg	✓	✓
	250×150 mm / 20 kg	✓	✓
	225×100 mm / 30 kg	—	—
Max. Sample Height		100 mm*2	150 mm
Screen		305 mm	500 mm
Image		Erect	Inverted
Projection Lens	Magnification	5×/10×/20×/25×/50×/100×/200×	5×/10×/20×/50×/100×
	FOV (with 10× lens)*1	30.5 mm	50 mm
Digital Protractor		✓	✓
Digital Counter		✓	✓

*1: Actual FOV = Effective diameter of screen / Lens magnification

*2: Maximum sample height is 70 mm when 200×150 mm stage is installed.

✓ : Available / — : Not available

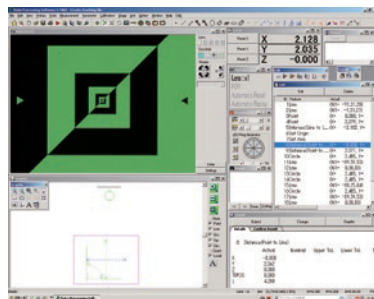
Data Processing Systems for Measuring Microscopes and Profile Projectors

Data Processing Software

E-MAX



Provides the user with various advanced measurements and processing functions. Automated edge detection with sub-pixel processing enables more precise and repeatable measurements.



Connected with profile projector, data processing functions only

Data Processor

DP-E1A




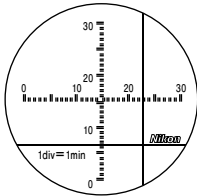
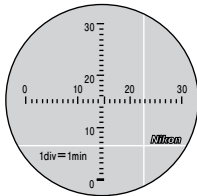
Effectively used with a measuring microscope / profile projector, it quickly calculates and processes measurement data. Feature Oriented Operation of the DP-E1A allows the user to conduct measurements with the graphics, providing a seamless measuring environment.

001-P	Coord::Mecha[mm]	
002-P	X	9.8813
003-LPP	Y	-1.2534
004-L	Z	-0.0026
005-L		
006-ILL		
007-C	Is.0007	
	Circle 3/3	
	X = 6.8005	
	Y = -23.2831	
	D = 8.0353	
	R = 4.0177	
	Polar-XY	Tolerance

Connected with profile projector, retrofit counter and DP units are required.


Autocollimators

Autocollimator is an easy-to-use but precise metrology instrument for angularity, parallelism, perpendicularity, straightness of precision components machine guide-way and many other applications.

Brightfield Type	Darkfield Type	
6B-LED  Utilizes hallmark Nikon optics to illuminate surface details.	6D-LED  Optimal for measuring small, flat mirrors.	
Observation Method	6B-LED: Brightfield, 6D-LED: Darkfield	
Readout System	Adjustment in viewfield and reading on micrometer	
Measuring Range	30 minutes of arc (both vertical and horizontal axes)	
Minimum Range	0.5 seconds of arc	

Plane Mirror C

Both sides are perfectly parallel, permitting its use as a reference for non-reflective surface. Also useful for measuring extremely small angles where a smaller mirror is desirable.
 *Wooden case provided.



Outer Diameter	30 mm
Thickness	12 mm
Parallelism	2 seconds of arc

LED Illuminator AC-L1

LED illumination unit for retrofitting onto Autocollimator 6B/6D illumination unit.



Power Source	AA batteries×2, AC adaptor
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DIGIMICRO

With built-in photoelectric digital length measuring systems, DIGIMICRO offers flawless contact measurements of dimension, thickness, and depth.

Main unit MF-1001 + Counter MFC-101A + Stand MS-21



Main unit MF-501 + Counter TC-101A + Stand MS-11C



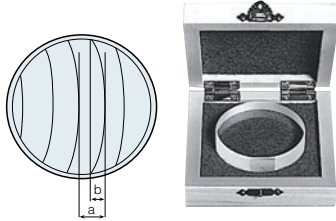
Main Unit	MF-1001	MF-501	MH-15M
Measuring Range	0–100 mm	0–50 mm	0–15 mm
Accuracy (20°C)	3 μm	1 μm	0.7 μm
Measuring Force	Downward direction 1.225 to 1.813N (variable to about 0.441N), lateral 0.637 to 1.225N	Downward direction 1.127 to 1.617N (variable to about 0.294N), lateral 0.637 to 1.225N	Upward direction 0.245N, downward 0.637N, lateral 0.441N *With lifting release
Operating Temperature	0 to 40°C		

Optical Flat / Optical Parallel / Standard 300 mm Scale

Optical Flat

The optical flat is used to check the flatness level of a surface provided with mirror-smooth finish.

Flatness level can be measured by observing interference fringes by placing the optical flat in contact with the sample.



Diameter	Glass (ø60 mm)	Glass (ø130 mm)
Thickness	15 mm	27 mm
Flatness	0.1 µm	0.1 µm

Optical Parallel

Both planes of the optical parallel have been precisely finished flat and parallel.

It is used to check the flatness and parallel levels of a sample by observing interference fringes by placing the optical parallel in contact with the sample.



Diameter	30 mm
Thickness	12 mm / 12.12 mm / 12.25 mm / 12.37 mm
Flatness	within 0.1 µm
Parallelism	within 0.2 µm

*Optical flats and parallels with greater precision are available by custom orders.

Standard 300mm Scale

Gauges stage travel accuracy up to 300 mm. Both 10 mm-interval sensor patterns and calibrations are provided.

Made of the glass with low coefficient of thermal expansion, for minimizing thermal influence.

*Within 1 µm against compensation values.





Wir machen Qualität sichtbar
Nous rendons la qualité visible
Making quality visible

ryfag.ch

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*Products: Hardware and its technical information (including software)



WARNING TO ENSURE CORRECT USAGE, READ THE CORRESPONDING MANUALS CAREFULLY BEFORE USING THE EQUIPMENT.



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