

## Digital Imaging & Metrology

### Next-Generation Measuring Microscopes

# MM Series

Nikon is proud to present the MM series of Measuring Microscopes, which incorporate key performance features expected in an advanced next generation measuring microscope:

- Greater Accuracy
- Digital Imaging and Vision Processing Metrology
- Larger Stage for Increased Workpiece Handling
- Non Contact Z-height Measurements
- Coordination with Data Processing Systems



MM-200 E-MAX set with 8-Segment LED Ring Light CYN-E1



- The Nikon measuring microscope can be equipped with a TTL Laser AF (universal type) and a Focusing Aid mechanism that provides sharper and more accurate focusing. High precision Z-axis measurement is simpler than ever.
- Digital image capture using a Nikon digital camera and E-Max metrology software allows rapid measurement with precise auto edge detection.
- A fully motorized high power microscopy model is also available for digital imaging.
- By offering many options in illuminators and light sources, an expanded observation range has been achieved. These include a high-intensity white LED illuminator for brightfield observation, a universal epi-illuminator to respond to various observation needs, and a 12V-50W halogen light source.
- A motorized Z-axis movement mechanism (LM models) simplifies accurate vertical motion through the use of a dedicated controller.
- Added body strength enables the use of larger stages, such as the PS 12x8C stage, allowing for larger workpieces.
- Ease of operation has been greatly improved by use of various motorized controls and ergonomic design. Even the PS 12x8C stage is easy to manipulate despite its large size.
- Stands with the integrated MM Controller interface and the DP-E1A Data Processor or SC counters and PC-based E-Max data processing software provide excellent geometric data processing and storage.
- The compact and lightweight MM-200 ensures precise and easy usage, and offers the basic functions of the MM-400/800 series.

#### Function Icons

- AF** **Autofocus (Universal Type)**  
TTL Laser AF (Autofocus) enables quick perfect focusing.
- FA** **Focusing Aid**  
The Focusing Aid (FA) ensures accurate Z-axis focusing.
- UFA** **Universal Epi-illuminator Focusing Aid**  
A universal epi-illuminator with Focusing Aid (FA) mechanism.
- V** **Variable Magnification**  
Two objective lenses can be attached, making magnification changeover easy.
- Z** **Z-axis Motorized Motion**  
A dedicated controller provides easy and accurate up/down movements.
- 2** **Dual Side Coarse/Fine Focus Knob**  
Coarse/fine focus knobs are on both sides.
- L** **Built-in Z-axis Linear Scale**  
Z-axis reading is possible for noncontact height measurement.
- T** **Trinocular Optical Head**  
Ideal for configuration with photomicrography equipment.
- M** **Monocular Optical Head**  
For applications where cost performance is priority.
- U-EPI** **Universal Epi-illuminator**  
Supports a wide range of applications.
- LED** **LED Illuminator**  
A high-intensity white LED illuminator for brightfield use.
- V** **Video Head**  
Video head is available.
- LED** **LED Ring Light**  
8-segment LED ring lighting source.
- DUAL** **Dual Knob**  
Knob on both sides.

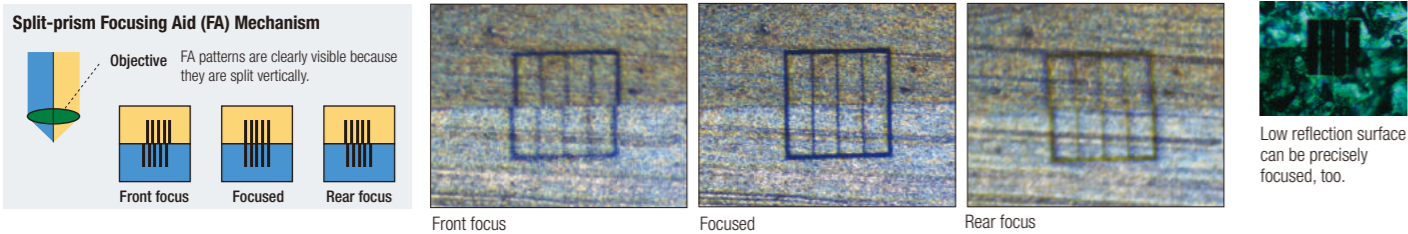
Stellar Features Enhance Z-axis Measurement Accuracy

TTL Laser AF (Universal Type)

These are the first measuring microscopes to offer an optional TTL Laser Auto-Focus. This Laser AF system features a 0.5 second focusing speed with a repeatability as high as 0.5μm (2θ).

Focusing Aid (FA)

The split-prism Focusing Aid (FA) delivers sharp patterns to allow accurate focusing during Z-axis measurements. Measurement errors due to differences in the depth of focus of different objectives are minimized.



**Motorized Z-Axis Movement (LM Model Stands)**  
A motorized vertical movement mechanism with a 10mm/sec. speed has been incorporated. Up/down control is accurately provided with a dedicated controller.

Illuminators Broaden Observation Ranges

A high-intensity white LED illuminator is provided as standard for brightfield use. This illuminator features no bulb replacement and constant color temperature, enabling measurement with high-precision and efficiency. For the universal type (except FA), a 12V-50W halogen light is included. Brightness has been substantially improved, particularly at high magnifications.

Built-in Continuous Light Control

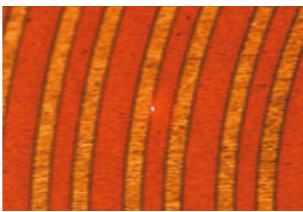
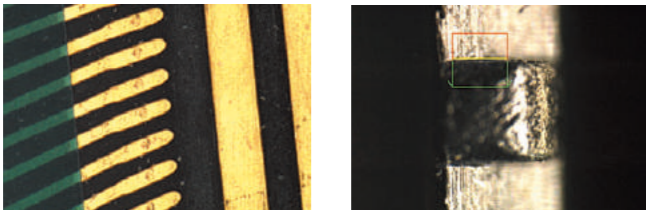
A continuous light control is built into the system, enabling light control from the PC without touching the dial on the main body. Measurements can now be made under the same conditions, assuring precise video edge detection for repeatable measurements.

LED Illuminator

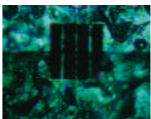
This high-intensity illuminator uses white LED and comes with a quick light intensity control.

8-Segment LED Ring Light CYN-E1

This ring light enables illumination control from eight directions, eliminating the need to pull out and adjust the fiber illuminator each time a measurement is made.



Laser AF Tracking on FPC



Low reflection surface can be precisely focused, too.

Digital Imaging & Vision Processing

The use of a Nikon microscope digital camera and E-Max software will streamline your workflow from observation and capture, to the storage of high-definition digital images of your workpieces.

MM Controller Backpack Interface

Illumination, X/Y stage and Z data can be connected to the MM Controller as an interface to an external computer running E-Max software for data processing and system control.

PS 12x8C Stage for Large Workpieces (MM-800 only)

An enhanced body design using Computer Aided Engineering (CAE) for stress analysis enables the mounting of a larger stage to accommodate larger workpieces. A 300 x 200mm (12" x 8") stroke stage can be mounted to the MM-800.

Improved Interface with Data Processor and Software

Interfacing to data processors and PC software has been greatly improved to include comprehensive support throughout the entire measurement process, from image capture and measurements, to analysis and data storage.

Data Processor DP-E1A

The DP-E1A Data Processor is compact, yet easy to use. For quick measurements and data processing you can place the read-out display near the eyepiece while the control pad is placed at your fingertips. The DP-E1A's seamless interface to a PC platform makes it easy to perform computations and management of your measurement results.

Data Processing Software E-MAX Series

Digital image measuring performance of the E-MAX software has been upgraded. Combined with Nikon's digital camera and measuring microscope, the system achieves digital image measurements with precision never before possible.

3rd-party DRO Connectable (S Models)

The MM-400S, SL and MM-800S, SL models were created for use with HEIDENHAIN QUADRA-CHEK and other 3rd-party digital read-outs. They offer an economical alternative if non-Nikon data processors are used.

\* QUADRA-CHEK is a trademark of HEIDENHAIN.

- Twist roller drive allows smooth changeover of coarse/fine stage movement
- Swivel plate comes as standard for PS 12x8C, PS 10x6B and PS 8x6B.
- The coarse/fine changeover lever and the RESET and SEND buttons are located near the X- and Y-axis knobs



X-axis knob (near buttons)



Y-axis knob (near buttons)

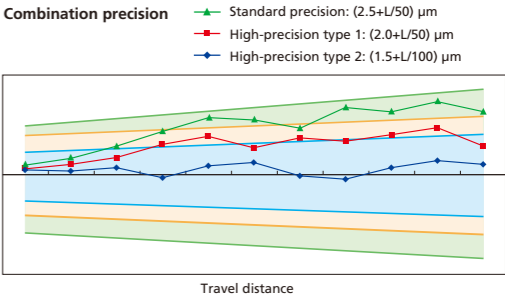
MM-800 High-Precision Type (Factory Option)

The MM-800 high-precision type provides increased flexibility in choosing modules for system configurations. It enables optimum system configuration according to user needs, and provides excellent reliability during measurements with configurations consisting of a digital camera and/or other accessories.

- 1.5+L/100 μm (high-precision type 2)<sup>1,2</sup> for PS 8x6B, PS 10x6B, PS 12x8C
- 2.0+L/50 μm (high-precision type1)<sup>2</sup>
- 2.5+L/50 μm (standard type, calibration data included)

<sup>\*1</sup> When using MM-800 for high precision type2, object lens 10x or higher, vibration isolation table and suitable temperature controlled room are required.

<sup>\*2</sup> Contact Nikon for details of system configuration.



LM Models3-Axis and Z-Motorized Model

The LM models have a built-in motorized Z-axis scale, enabling accurate 3-axis measurements. In addition, the optional Focusing Aid uses a split prism to ensure Z-axis focusing accuracy and minimize measurement errors caused by the difference in the objective's depth of focus.

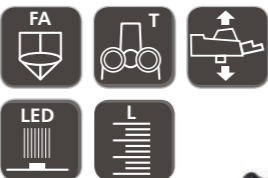
MM-800/LM



Configured with PS 10x6B stage, trinocular optical FA head



MM-400/LM



Configured with PS 6x4B stage, trinocular optical FA head



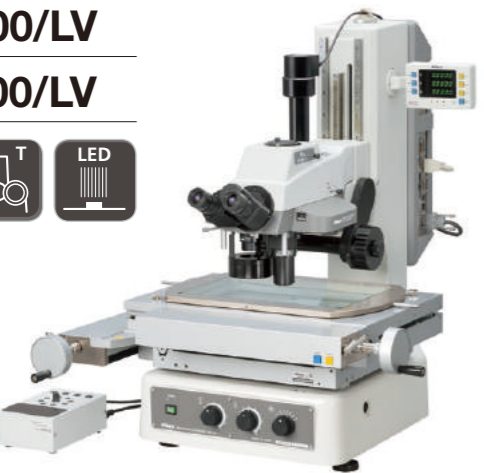
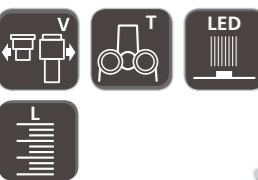
Applications: Dies & molds, Finely machined parts, Stamped parts, Injection molded parts, Medical devices

LV/LVFA ModelsVariable Magnification Models

These models allow two objective lenses (low and high magnification) to be mounted simultaneously, thus making magnification changeover easy. Both low-magnification wide-field-of-view measurement and high-magnification high-precision-height measurement can be performed on a single microscope. Please check specifications before purchasing a variable magnification model.

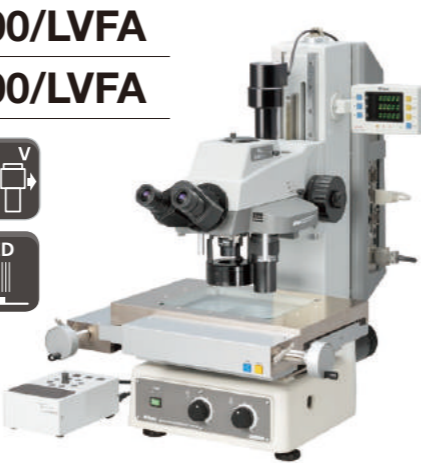
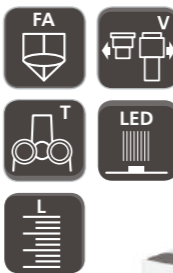
MM-800/LV

MM-400/LV



MM-800/LVFA

MM-400/LVFA



L/SL Models3-Axis Measurement Model

With a built-in Z-axis scale, this type is the basic standard for Nikon's measuring microscope series. Various models are available—with or without Focusing Aid, monocular or trinocular optical head. You can select the best one according to your measuring range, use and budget. The SL model is recommended for 3rd-party (non-Nikon) digital read-outs and therefore does not include the MM controller that interfaces with the Nikon DRO.

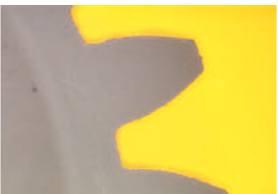
MM-800/L

MM-800/SL with 3rd-party DRO

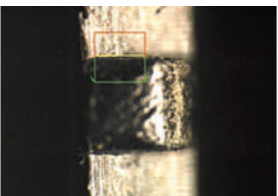


Configured with PS 8x6B stage, trinocular optical FA head

Applications: Dies & molds, Finely machined parts, Stamped parts, Injection molded parts, Medical devices



Plastic Gear Teeth with Smaller Module



Black Injection Molding Parts - Connector



Configured with PS 4x4B stage, trinocular optical head

MM-400/L

MM-400/SL with 3rd-party DRO



Specifications

Type	MM-800/LM	MM-400/LM	MM-800/LV, MM-800/LVFA	MM-400/LV, MM-400/LVFA
Z-axis movement	Motorized (max. speed: 10mm/sec)		Manual (dual side coarse/fine focus knob)	
MM controller backpack interface	Built-in		—	
Optical head	Monocular optical head, Trinocular optical head, Trinocular optical FA head		Variable magnification optical head, Variable magnification optical FA head	
Z-axis linear scale	Built-in		—	
Eyepiece inclination angle	—		25°	
Eyepiece	CFWN10x (Field No. 20)			
Objective	Measuring microscope objectives			
Objective lens magnification (working distance)	—		1x (79mm), 3x (75mm), 5x (64mm), 10x (48mm), 20x (20mm), 50x (15mm), 100x (4mm)	
Stage	PS 12x8C, PS 10x6B, PS 8x6B	PS 6x4B, PS 4x4B, PS 2x2B	PS 12x8C, PS 10x6B, PS 8x6B, PS 6x4B, PS 4x4B, PS 2x2B	PS 6x4B, PS 4x4B, PS 2x2B
Light source	Diascopic	LED diascopic illuminator (standard), 12V-50W halogen light source (option)*		
	Episcopic			
Max. workpiece height	200mm	150mm	200mm	150mm
Dimensions (W x D x H)/weight	385 x 785 x 725mm/approx. 72kg	300 x 600 x 638mm/approx. 50kg	380 x 735 x 725mm/approx. 72kg	300 x 600 x 638mm/approx. 50kg

\*TI-PS100W power supply is required

Specifications

Type		MM-800/L	MM-800/SL	MM-400/L	MM-400/SL
Z-axis movement		Manual (dual side coarse/fine focus knob)			
MM controller backpack interface		Built-in	—	Built-in	—
Optical head		Monocular optical head, Trinocular optical head, Trinocular optical FA head			
Z-axis linear scale		Built-in			
Eyepiece		CFWN10x (Field No. 20)			
Objective		Measuring microscope objectives			
Stage		PS 12x8C, PS 10x6B, PS 8x6B		PS 6x4B, PS 4x4B, PS 2x2B	
Light source	Diascopic	LED diascopic illuminator (standard), 12V-50W halogen light source (option)*			
	Episcopic	LED episcopic illuminator			
Max. workpiece height		200mm		150mm	
Dimensions (W x D x H)/weight		385 x 785 x 725mm/approx. 72kg		300 x 600 x 638mm/approx. 50kg	

\*TI-PS100W power supply is required

2-Axis Models/S Models MM-800/400/800S/400S (2-Axis Measurement Model)

These are the basic models in the MM-400/800 series. High in cost performance, these models are expressly designed for 2-axis (XY) applications. To meet your application and budget, various models are available—monocular or trinocular optical heads, plus 12x8 large stage or 2x2 small stage sizes are available. The 400S and 800S models are specifically for use with non-Nikon digital read-outs.

MM-800

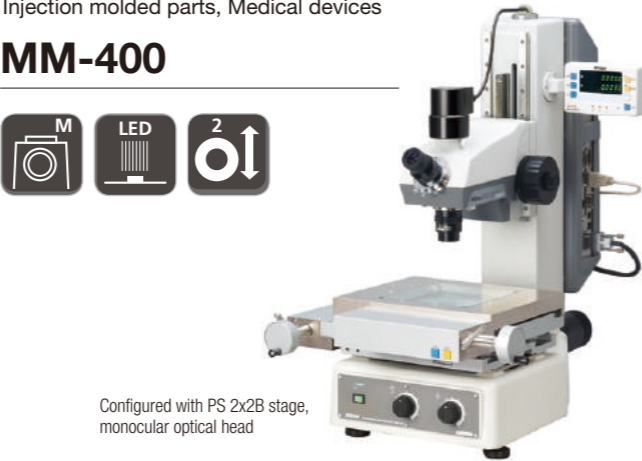


Configured with PS 8x6B stage, trinocular optical head

Applications:

Dies & molds, Finely machined parts, Stamped parts, Injection molded parts, Medical devices

MM-400



Configured with PS 2x2B stage, monocular optical head

MM-400/S with 3rd-party DRO



Configured with PS 2x2B stage, trinocular optical head, ND 1200 QUADRA-CHEK

MM-800/S with 3rd-party DRO



Configured with PS 8x6B stage, trinocular optical head, ND 1200 QUADRA-CHEK

Applications:

Stamped parts, Injection molded parts, Medical devices, Drills, Micro tooling, Automotive Components

Specifications

Type	MM-800	MM-800/S	MM-400	MM-400/S
Z-axis movement	Manual (dual side coarse/fine focus knob)			
MM controller backpack interface	Built-in	—	Built-in	—
Optical head	Monocular optical head, Trinocular optical head			
Z-axis linear scale	—			
Eyeiece	Dedicated 10x (Field No. 20)	CFWN10x (Field No. 20)	Dedicated 10x (Field No. 20)	CFWN10x (Field No. 20)
Objective	Measuring microscope objectives			
Stage	PS 12x8C, PS 10x6B, PS 8x6B	PS 12x8C, PS 10x6B, PS 8x6B	PS 6x4B, PS 4x4B, PS 2x2B	PS 6x4B, PS 4x4B, PS 2x2B
Light source	Diascopic	LED diascopic illuminator (standard), 12V-50W halogen light source (option)*		
	Episcopic	LED episcopic illuminator		
Max. workpiece height	200mm	150mm	200mm	150mm
Dimensions (W x D x H)/weight	385 x 785 x 725mm/approx. 72kg	385 x 785 x 725mm/approx. 72kg	300 x 600 x 638mm/approx. 50kg	300 x 600 x 638mm/approx. 50kg

\*TI-PS100W power supply is required

MM-200 Compact, light, precise and easy to use measuring microscope for dimensioning and tolerancing

Uniquely designed for all machining engineers and inspectors

Compact, Space-saving, 40-kg Body

The affordable MM-200 features a space-saving design with a footprint equivalent to an A3-size sheet, or 420 x 297 mm (main body with monocular eyepiece tube).

Monocular Eyepiece Head / C-mount Video Head

The monocular eyepiece tube model is available for those who prefer to measure with their own eye, while the C-mount video head model provides easy video monitoring.

MM Controller Backpack Interface for Digital Readout and Data Processing

The MM-200 has a backpack control interface unit for XY stage scale readout, illumination control, communication ports to external devices such as PC, digital readout and so on. Simply apply the data processing unit, the DP-E1A, to complicated GD & T measurements. The E-MAX DS-V system allows easy-to-use advanced video edge detection technologies. Popular digital readouts such as HEIDENHAIN ND 1200 QUADRA-CHEK are also available.

\* QUADRA-CHEK is a trademark of HEIDENHAIN.

White LED Lighting Sources

The built-in episcopic and diascopic light sources are all long-life white LEDs. The optional LED ring lights enhance edge observation through the use of an oblique illumination angle.

Applications

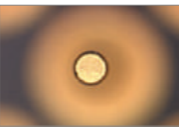
- Small Size Die & Mold
- Drill Bits
- Inserts
- Fine Pitch Connector
- Medical Devices
- Watch Parts
- Gears

Drill Bits

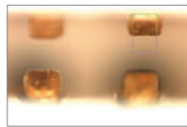


The image was generated by optional EDF/ Stitching Express software

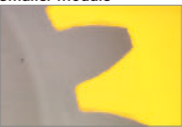
PGA - Insertion Pin



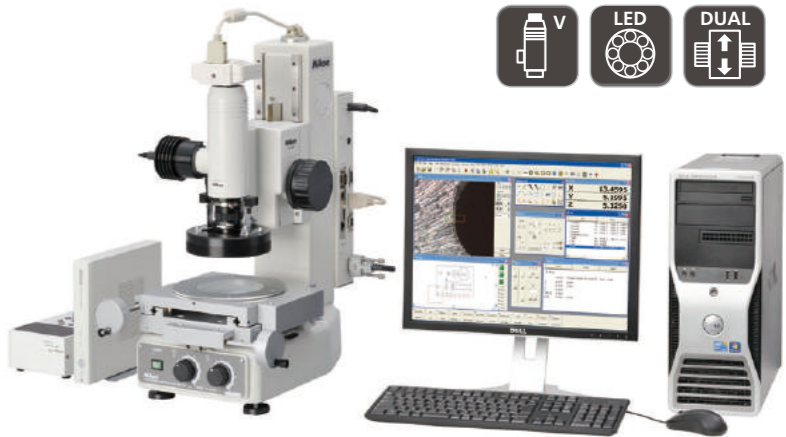
Connector - Housing Inside



Plastic Gear Teeth with Smaller Module



MM-200 with Monocular Eyepiece Tube and DP-E1A



MM-200 with C-mount Video Head and E-MAX DS-V

Specifications

Type	Monocular Eyepiece Tube Type	C-mount Video Head Type
Optical head	MM-200 monocular optical head	C-mount video head for MM-200
XYZ stroke	50 mm x 50 mm x 110 mm	
Stage accuracy	2.5 + L/50 μm (with LEC), 3 + L/50 μm (L = measurement length in mm)	
Scale resolution	0.01/0.1(default)/1/10 μm	
Max. loading weight	2 kg for guaranteed accuracy, 5 kg for operation	
Magnification accuracy	0.1 %	
Objective lenses (W.D.)	Standard: 3x (75.5 mm), Optional: 1x (79 mm), 5x (64 mm), 10x (48 mm)	
Light sources	Standard: diascopic/episcopic (white LED), Optional: 8-segmented ring light (white LED)	
Dimensions & weight	316 x 455 x 533 (W x D x H), 40 kg	
Input voltage range	100 - 240 V (Max. 1.8 A)	