

## Nikon MH12-MPM Encoder

MH12-MPM encoder is the smallest encoder of the DigiMicro product line from Nikon. It employs a newly designed mechanical guide structure offering extremely smooth and precise linear motion suitable for applications in motion control systems in nanometer scale. The encoders feature resolution down to 1 nanometer with sub-micron accuracy.

MH12-MPM features a Nikon exclusive diffraction-type optical encoder. The encoder mechanism is enclosed in a sealed compact extruded-aluminum housing, which resists contamination and dirt.



Figure 1. Nikon MH12-MPM encoder

The encoders come with an 8 mm diameter holder enabling quick and easy set-up at user site. The flexible cable also dampens the vibration. Figure 2 shows the standard 18-pin connector, which is directly compatible with NanoWave MPM300/OEM and Nikon MPM300.



Figure 2. One click connector for MPM300 compatibility

## STANDARD FEATURES

- 1 Nanometer Resolution with MPM300
- Extremely smooth plunger motion
- Better than 1,000,000 cycles reliability
- Direct and easy connection to MPM300
- Flexible choice in the probe tips
- On-axis measurement
- Easy to set-up
- Smallest among Nikon DigiMicro family

## Incremental Encoders for Motion Control

Combined with MPM300 motion co-processing unit, Nikon's MH12-MPM encoders instantly provides a compact motion control solution with an obtainable resolution of 1 nanometer.

While MPM300 provides an integrated PID core for fast and easy motion control system integration, it also outputs standard A-Quad-B digital signals, which are compatible with many commercially available encoder counters and motion control boards.

Because all Nikon DigiMicro encoders are "on-axis" measurement instruments, they can easily be mounted on the relevant measurement plane. As a result, Abbe errors are also greatly reduced or even eliminated (vs. side-mounted encoders placed on underlying translational stages).

Due to DigiMicro encoder's self contained optical units, there is no need to mount and align read-heads with diffraction grating scales. This avoids many mechanical complications saving expensive engineering time while eliminating a host of measurement errors and reliability problems, typical with this type of installations.

## A Reputation for Excellence

Recognized as a world leader in photolithographic tool manufacturer and its high precision optics design capability, Nikon has established a reputation for high-precision and high reliability industrial products throughout Japan and other Asian countries.

When used as position encoders in motion control systems, SAL-S40N and DigiMicro products fulfill some of the most demanding applications in semi-conductor and other manufacturing processes.

## Nikon DigiMicro Encoder Accessories

Also available from NanoWave are a variety of DigiMicro accessories. These include several different types of probe tips which can be attached to the end of the plunger.

These plunger tips are interchangeable with many probes as offered by Nikon (shown in Figure 3) as well as customer-designed probes.



Figure 3. Probe tip accessories

Nikon also offers a standard ceramic stand for MH12-MPM.



Figure 4. MS5-C (MH12-MPM stand)

## Product Applications

MH12-MPM encoders have a wide variety of industrial and research applications.

- Optical fiber alignment
- Calibration Instruments
- Medical Equipment
- Robotics
- Industrial Automation
- Precision Machining
- Semiconductor Equipment



The simple set-up and “on-axis” measurement allows user to quickly construct custom nano-precision motion system with MPM300 unit as illustrated in Figure 5.

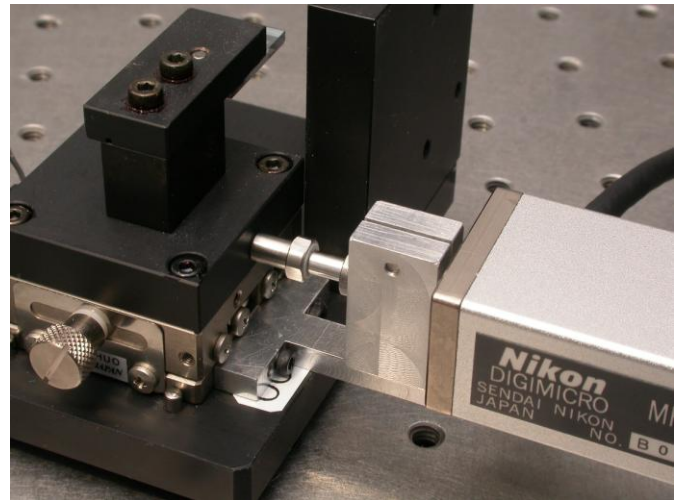
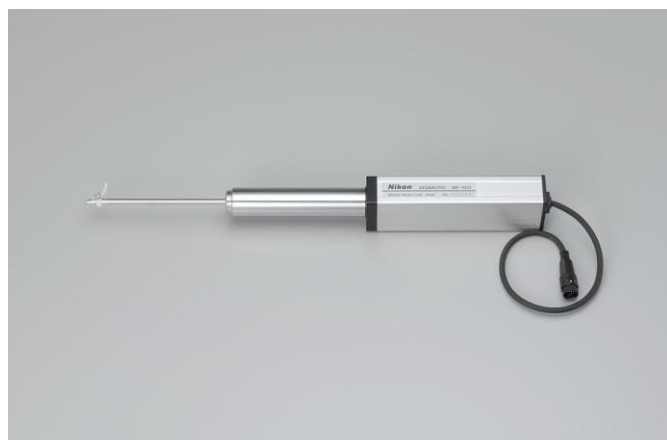


Figure 5 – Low-cost nano-stage build using Nikon Digimicro MH12-MPM head, commercial micrometer stage and piezo actuator.

	MH12-MPM	MF-501-MPM	MF-1001-MPM
<b>Specifications</b>			
travel range (plunger stroke)	12 mm	50 mm	100 mm
minimum resolution	1 nm	1 nm	1 nm
response speed (@ 1 nm res.)	400 mm/s	400 mm/s	400 mm/s
lifetime without degradation	> 1,000,000 cycles	> 1,000,000 cycles	> 1,000,000 cycles
<b>Accuracy (@ 20 C +/- 1 C)</b>			
across full travel range	700 nm or better	1 micron	3 micron
repeatability (per JIS 8.7509-8-4)	200 nm	500 nm	500 nm
return error	150 nm	500 nm	500 nm
certification & unit accuracy profile	(optional)	(optional)	(optional)
<b>Physical Characteristics</b>			
size (excl. plunger casing, plunger & tip)	58 x 31 x 24 mm	163 x 42 x 30 mm	274 x 42 x 30 mm
plunger casing diameter	8 mm	25 mm	25 mm
total mass	145 g	310 g	480 g
mass of moving parts	20 g	37 g	56 g
force to compress plunger spring*	0.44 to 0.64 N	0.39 to 1.42 N	0.39 to 1.42 N
operating radial force tolerance	0.981 N	0.981 N	0.981 N
operating torsion tolerance	0.0049 Nm	0.0049 Nm	0.0049 Nm
non-operating radial force tolerance	9.8 N	1.961 N	1.961 N
non-operating torsion tolerance	0.39 Nm	0.294 Nm	0.294 Nm
<i>*Default, adjustable at factory</i>			
<b>Electrical</b>			
operating DC voltage	5 V	5 V	5 V
USB cable supplied**	2000 +/-50 mm	2000 +/-50 mm	2000 +/-50 mm
<i>**connects to MPM300 or MPM300/OEM</i>			
<b>Environmental</b>			
operating temperature	20 C to 40 C	20 C to 40 C	20 C to 40 C
non-operating temperature	-20 C to 60 C	-20 C to 60 C	-20 C to 60 C
operating humidity	< 95% non-condensing	< 95% non-condensing	< 95% non-condensing
non-operating humidity	< 95% non-condensing	< 95% non-condensing	< 95% non-condensing
non-operating humidity	< 80% (@ 40 to 60 C)	< 80% (@ 40 to 60 C)	< 80% (@ 40 to 60 C)



MF-501-MPM \*



MF-1001-MPM \*

\* Photo of the cable length and the connector may vary from actual products.

### Mechanical Drawing

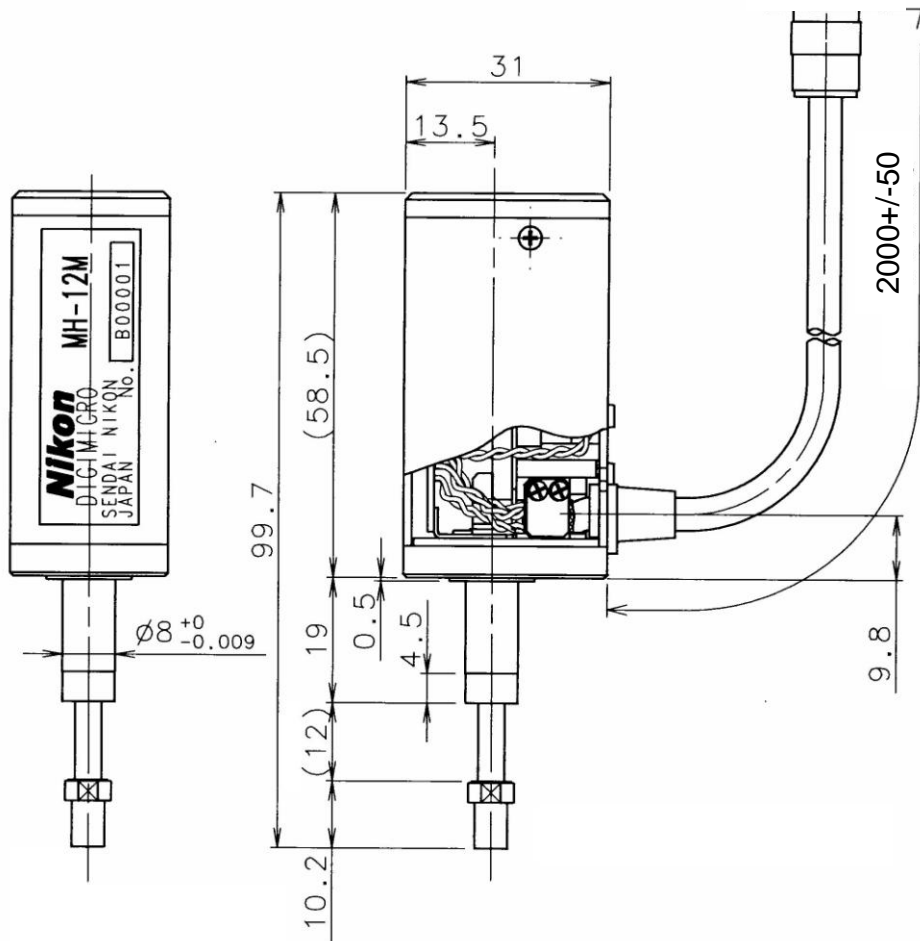




Figure 7 – MPM300/OEM Board



Figure 8 – MPM300 shown with Cable, and Wall USB power supply.

### Distributed & Supported by NanoWave

NanoWave is pleased to bring these advanced measuring Instruments to the North American market with technical support and advanced engineering services. We have over 30 years of combined experience in high-performance, high precision measurement and motion control systems.

NanoWave has also teamed with Nikon Corporation to leverage their advanced encoder technologies and widely respected manufacturing expertise to bring new market opportunities.

For more information on products, services, prices, and deliveries, please visit our website at [www.nanowave.com](http://www.nanowave.com) or send any questions to [info@nanowave.com](mailto:info@nanowave.com)

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