Vision Measuring Machine with Micro-Form Scanning Probe
MiSCAN Vision System
A multiple sensor microscopic-form measurement system, using combined technologies of coordinate and vision measurement system technology.

**MiSCAN Vision System**

**Highly accurate autonomous scanning covering micro-form to large workpieces**

The newly developed MPP-NANO probe can use styli as small as 125 μm diameter to achieve measurement of microscopic workpieces. Using the observation camera, setup of measurement can be easily achieved while also checking for dirt and scratches on the workpiece. The highly proven SP25M scanning probe is also supported to allow small- and large-sized workpieces and features to be measured.

**Vision measurement functions provide high-level performance**

The system utilizes the same image head as the Quick Vision series, Mitutoyo's best-selling vision measuring system. The Quick Vision Apex lighting system is also incorporated, providing multiple lighting functions and excellent evaluation software to provide high performance.
The MiSCAN is well suited for micro-form measurement

The MiSCAN system is the ideal hybrid measuring machine with vision head and scanning probe (MPP-NANO, SP25M). The image head enables precise positioning and targeting measurement even in locations where visual checking is difficult.

With the MPP-NANO stylus, an observation unit is included. When using the extra small 0.125mm diameter stylus, checking on the monitor provides the operator a safe approach to the targeted measuring area.

A magnetic kinematic joint connection enables easy stylus replacement. MPP-NANO stylus replacement tools are included as standard equipment.
In recent years, the need for fine-detail processing technology has been rapidly increasing, including measurement of the sensing technology essential for vehicle motorization and autonomous driving. Simultaneously, enabling high-accuracy, high-throughput measurement of microscopic form is required. Mitutoyo has responded quickly to these needs, and started selling the Micro Form Measuring System UMAP Vision System some time ago. According to the current need for improving productivity, we have developed the MiSCAN Vision System, a measuring system capable of measuring micro form with the MPP-NANO, a small diameter scanning probe.

Examples of micro-form measurement achieved with the MiSCAN Vision System and MPP-NANO

**Microscopic gear teeth**

Conventionally, highly efficient scanning of microscopic gear teeth has been difficult. However, using the MiSCAN Vision System together with the MPP-NANO we can provide this functionality. Simply enter each nominal using GEARPAK, Mitutoyo’s gear teeth evaluation software, to easily evaluate the tooth profile error and tooth trace error.

![Module 0.8 master gear measurement](image1)

![Measurement using the MPP-NANO 0.125-mm-diameter stylus](image2)

![GEARPAK-Cylindrical analysis](image3)

**Lenses and optical tubes**

The MiSCAN Vision System and MPP-NANO enables high-accuracy, highly efficient measurement of miniature optical Tubes used in micro camera arrays. The MPP-NANO can also measure the contour of high degree aspheric lenses used in the vehicle-mounted camera with high accuracy.

![Optical tube](image4)

![Aspheric-form MPP-NANO measurement](image5)

![SCANPAK form-analysis example](image6)

**Precision molds**

The MiSCAN Vision System and MPP-NANO enable scanning measurement of microscopic feature detail, such as precision punches and dies, using extra-small-diameter styli, which are available with diameters as small as 0.125 mm.

![MPP-NANO mold scanning](image7)

![Image seen using the stylus observation camera unit](image8)

![SCANPAK form-analysis example](image9)
**Precision mechanical parts**

The MiSCAN Vision System and MPP-NANO enable highly efficient, high-accuracy measurement of miniature mechanical parts that improve precision in industrial machinery.

- Precision mechanical parts (linear guide)
- Image seen using the stylus observation camera unit
- SCANPAK form analysis example

**Micro-hole measurement**

Conventionally, only destructive measurement was possible for the inner diameter of nozzles and draw dies. However, the MiSCAN Vision System and MPP-NANO now enables scanning measurement using the stylus on holes with a maximum aspect ratio of 17:1.

- Maximum aspect ratio: 17:1 (for R500-125-85)
- MPP-NANO micro-hole measurement
- FORMTRACEPAK-AP analysis results

**Fine detail contour analysis**

Optional CAT1000S software enables nominal scanning measurement and form evaluation of micro V-grooves and rectangular grooves.

- Micro V-groove
- Creating nominal sections from CAD data (CAT1000S)
- SCANPAK design value verification
## Specifications

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<tr>
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<td></td>
<td></td>
<td></td>
<td>E1X, E1Y</td>
<td>E1Z</td>
<td>E2XY</td>
<td>E0MPE</td>
<td>18 - 23 °C</td>
<td>15.7x10.7” / 399x271 mm</td>
<td>33lbs / 15 kg</td>
<td>33.8x37.4x63.3” / 859x951x1609 mm</td>
<td>793.7lbs / 360 kg</td>
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<tr>
<td>MVS Hyper 302</td>
<td>11.8x9.7x9.7” / 300x200x200 mm</td>
<td>0.02 μm/Linear encoder</td>
<td>B&amp;W CCD camera</td>
<td>Power turret (1X-2X-6X)</td>
<td>Co-axial light, transmitted light, PRL (programmable ring light)</td>
<td>MPP-NANO/SP25M</td>
<td>0.8+2L/1000</td>
<td>1.5+4L/1000</td>
<td>1.9+4L/1000</td>
<td>0.5 °C/1 H and 1 °C/24 H</td>
<td>15.7x15.7x9.8” / 400x400x250 mm</td>
<td>66lbs / 30 kg</td>
<td>40.4x55.4x70” / 1027x1407x1778 mm</td>
<td>1,276.5lbs / 579 kg</td>
<td></td>
</tr>
<tr>
<td>MVS Hyper 404</td>
<td>15.7x15.7x9.8” / 400x400x250 mm</td>
<td>0.1 μm/Linear encoder</td>
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<td></td>
<td></td>
<td>Only SP25M</td>
<td>1.5+3L/1000</td>
<td>1.5+4L/1000</td>
<td>2.5+6L/1000</td>
<td></td>
<td>19.4x21.7” / 493x551 mm</td>
<td>66lbs / 30 kg</td>
<td>40.4x55.4x70” / 1027x1407x1778 mm</td>
<td>1,276.5lbs / 579 kg</td>
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<tr>
<td>MVS 404 Apex</td>
<td>10.8x15.7x9.8” / 275x400x250 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.4+3L/1000</td>
<td>2.0+4L/1000</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>88.2lbs / 40 kg</td>
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<tr>
<td>MPP-NANO/SP25M</td>
<td>6.9x7.9x7.9” / 175x200x200 mm</td>
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<td>1.9+4L/1000</td>
<td>2.5+6L/1000</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>88.2lbs / 40 kg</td>
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</tbody>
</table>

*1 Accuracy-guaranteed machines conforming to ISO10360-7:2011 are also supported.
*2 Image accuracy using a QV-HR 2.5X objective and 2X tube lens.
*3 Except at limits of stage displacement or concentrated loading.

Note: CNC Vision Measuring Systems in this brochure incorporate a main startup system (relocation detection system) that disables operation when an unexpected vibration occurs or the machine is relocated. Be sure to contact your nearest Mitutoyo Sales Office prior to relocating your machine after initial installation.
### MPP-NANO For MVS-H302

The world's most compact and accurate scanning probe

- Styli as small as a 0.125 mm-diameter are available for scanning measurement of fine-detailed features.
- Deep grooves and deep holes can be measured at the maximum aspect ratio of 17:1 (ø500L8.5).
- High accuracy form measurement is enabled by achieving high repeatability: ≤ 0.05 μm (MVS-H302).
- The measuring force is as low as approximately 1 mN. Therefore, it will not scratch or deform the workpiece.
- The stylus can easily be replaced thanks to the magnetic joint connection.
- The stylus observation unit (optional) enables easy positioning of the stylus tip.

#### Specifications

<table>
<thead>
<tr>
<th>Item name</th>
<th>MPP-NANO stylus, ø125L2</th>
<th>MPP-NANO stylus, ø300L4</th>
<th>MPP-NANO stylus, ø500L4.5</th>
<th>MPP-NANO stylus, ø500L8.5</th>
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<tr>
<td>Model</td>
<td>R125-85-20</td>
<td>R300-85-40</td>
<td>R500-85-45</td>
<td>R500-125-85</td>
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<tr>
<td>Nominal tip diameter</td>
<td>125 μm</td>
<td>300 μm</td>
<td>500 μm</td>
<td>500 μm</td>
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<tr>
<td>Nominal stylus length</td>
<td>2 mm</td>
<td>4 mm</td>
<td>4.5 mm</td>
<td>8.5 mm</td>
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<td>Stem diameter</td>
<td>0.08 mm</td>
<td>0.2 mm</td>
<td>0.3 mm</td>
<td>0.3 mm</td>
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<td>Aspect ratio</td>
<td>16</td>
<td>13.3</td>
<td>9</td>
<td>17</td>
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<tr>
<td>Tip material</td>
<td>Ruby</td>
<td>Ruby</td>
<td>Ruby</td>
<td>Ruby</td>
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### SP25M

Compact, high accuracy scanning probe

- The highly proven SP25 scanning probe used with 3D measuring machines can be used on the MiSCAN.
- Stylus changer FCR25 (optional) handles multiple styli, including one in the horizontal position, and enables automatic stylus changes.
- Captures the target point in high-accuracy point measurement and centripetal aligning point measurement (optional).
Non-contact measurement (vision measurement)

The MiSCAN Vision System is equipped with an optical observation system and an illumination unit of the QUICK VISION measuring system. It can perform as a high-level vision measuring system.

VISIONPAK-PRO

High-level vision measurement functions are equipped, including a one-click tool that enables easy edge detection; a dual-area contrast tool that automatically recognizes optimal illumination; and filters (morphology filter) that enable highly accurate edge detection.

High-accuracy vision measurement

High-accuracy edge detection is performed using the image obtained by the image sensor.

Programmable power turret

The observation unit uses a high-resolution programmable power turret with high magnification repeatability.

Programmable ring illuminator

A high-function programmable ring illuminator that has the ability to control the irradiation angle and direction is equipped as standard.

Image auto focus

The auto focus enables non-contact high-accuracy height measurement. Pattern focus enabling focusing on transparent and mirror objects is also equipped.
MCOSMOS has long been used in 3D measurement; in addition to size measurement, it offers very powerful geometric tolerancing functions such as linear contour and plane contour evaluations.

Using contour data obtained by the MiSCAN Vision System, nominal verification, best-fit contour construction and more are available in addition to element calculation.

Using 3D CAD data, section extraction in the nominal scanning or linear and plane contour evaluations are available.

Using data obtained by the MiSCAN Vision System enables highly sophisticated analysis including nominal verification, over-pin diameter measurement and arbitrary depth measurement.
Main options

Objective lens

<table>
<thead>
<tr>
<th>Order No.</th>
<th>QV-SL0.5X*</th>
<th>QV-HR1X</th>
<th>QV-SL1X</th>
<th>QV-HR2.5X</th>
<th>QV-SL2.5X</th>
<th>QV-HR5X</th>
<th>QV-HR10X*</th>
<th>QV-10X*</th>
<th>QV-25X*</th>
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<tbody>
<tr>
<td>Working distance</td>
<td>30.5 mm</td>
<td>40.6 mm</td>
<td>52.5 mm</td>
<td>40.6 mm</td>
<td>60 mm</td>
<td>20 mm</td>
<td>20 mm</td>
<td>30.5 mm</td>
<td>13 mm</td>
</tr>
</tbody>
</table>

For MPP-NANO, Order No. 02ATX846A

- Master ball (ø4) for MPP-NANO: Order No. 02ATY823
- Master ball (ø16) for SP25M: Order No. 02ATY790
- Calibration gauge for MPP-NANO: Order No. 02ATV821
- Calibration gauge for SP25M: Order No. 02ATV882

For FCR25 SP25M, Order No. 02ATV887

- Master ball (ø4) for MPP-NANO: Order No. 02ATX846A
- Master ball (ø16) for SP25M: Order No. 02ATV887
- Calibration gauge for MPP-NANO: Order No. 02ATV821
- Calibration gauge for SP25M: Order No. 02ATV882

External dimensions and measuring ranges

- Common measuring range of image and contact probe
- Contact probe measuring range
- Image measuring range
Excellent reliability

Traceability to national standards
Mitutoyo’s calibration artifacts and instruments that are used to establish machine accuracy specifications are maintained in a continuous chain of traceability to national dimensional standards. This is our customers’ assurance of reliable measurement.

A Global Market Leader

World’s top level of global network
Mitutoyo has expanded its market all over the world since the establishment of the first overseas sales company, MTI Corporation (currently Mitutoyo America Corporation) in the USA in 1963. At present, we have R&D, manufacturing, sales, and technical service bases in 29 countries with an agency network connecting over 80 countries.
Coordinate Measuring Machines  Vision Measuring Systems  Form Measurement  Optical Measuring

Sensor Systems  Test Equipment and Seismometers  Digital Scale and DRO Systems  Small Tool Instruments and Data Management

Whatever your challenges are, Mitutoyo supports you from start to finish.

Mitutoyo is not only a manufacturer of top quality measuring products but one that also offers qualified support for the lifetime of the equipment, backed by comprehensive services that ensure your staff can make the very best use of the investment.

Apart from the basics of calibration and repair, Mitutoyo offers product and metrology training, as well as IT support for the sophisticated software used in modern measuring technology. We can also design, build, test and deliver measuring solutions and even, if deemed cost-effective, take your critical measurement challenges in-house on a sub-contract basis.

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