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.

---

**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.

Precise positioning by monitoring the image  
Measurement using MPP-NANO stylus

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.

**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.

**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.
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**

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.

**Micro-hole measurement**

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

<table>
<thead>
<tr>
<th>Model</th>
<th>MVS Hyper 302</th>
<th>MVS Hyper 404</th>
<th>MVS 404 Apex</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Measuring range</strong></td>
<td>Image 11.8x7.9x7.9” / 300x200x200 mm</td>
<td>15.7x15.7x9.8” / 400x400x250 mm</td>
<td>10.8x15.7x9.8” / 275x400x250 mm</td>
</tr>
<tr>
<td><strong>Minimum reading/Scale unit</strong></td>
<td>0.02 μm/Linear encoder</td>
<td>0.1 μm/Linear encoder</td>
<td></td>
</tr>
<tr>
<td><strong>Image sensor</strong></td>
<td>B&amp;W CCD camera</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Observation unit</strong></td>
<td>Power turret (1X-2X-6X)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Illumination unit</strong></td>
<td>Co-axial light, transmitted light, PRL (programmable ring light)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Contact type probe</strong></td>
<td>MPP-NANO/SP25M</td>
<td>Only SP25M</td>
<td></td>
</tr>
<tr>
<td><strong>Measurement accuracy</strong></td>
<td>MPP-NANO 0.8+2L/1000</td>
<td>1.5+3L/1000</td>
<td></td>
</tr>
<tr>
<td><strong>Image</strong></td>
<td>E1X, E1Y 0.8+2L/1000</td>
<td>1.5+3L/1000</td>
<td></td>
</tr>
<tr>
<td><strong>E1Z</strong></td>
<td>1.5+2L/1000</td>
<td>1.5+4L/1000</td>
<td></td>
</tr>
<tr>
<td><strong>E2XY</strong></td>
<td>1.4+3L/1000</td>
<td>2.0+4L/1000</td>
<td></td>
</tr>
<tr>
<td><strong>E0MPE</strong></td>
<td>1.9+4L/1000</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td><strong>SP25M</strong></td>
<td>1.9+4L/1000</td>
<td></td>
<td>2.5+6L/1000</td>
</tr>
<tr>
<td><strong>Scanning accuracy</strong></td>
<td>MPP-NANO 0.6</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td><strong>SP25M</strong></td>
<td>2.5</td>
<td></td>
<td>2.7</td>
</tr>
<tr>
<td><strong>Probing accuracy</strong></td>
<td>MPP-NANO 0.6</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td><strong>SP25</strong></td>
<td>1.9</td>
<td></td>
<td>2.2</td>
</tr>
<tr>
<td><strong>Repetitive accuracy</strong></td>
<td>MPP-NANO 0.05</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td><strong>Accuracy guaranteed temperature</strong></td>
<td>18 - 23 °C</td>
<td>0.5 °C/1 H and 1 °C/24 H</td>
<td></td>
</tr>
<tr>
<td><strong>Size of stage glass</strong></td>
<td>15.7x10.7” / 399x271 mm</td>
<td>19.4x21.7” / 493x551 mm</td>
<td></td>
</tr>
<tr>
<td><strong>Max. mass of workpiece</strong></td>
<td>33lbs / 15 kg</td>
<td>66lbs / 30 kg</td>
<td>88.2lbs / 40 kg</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td>33.8x37.4x63.3” / 859x951x1609 mm</td>
<td>40.4x55.4x70” / 1027x1407x1778 mm</td>
<td></td>
</tr>
<tr>
<td><strong>Mass (including machine stand)</strong></td>
<td>793.7lbs / 360 kg</td>
<td></td>
<td>1,276.5lbs / 579 kg</td>
</tr>
</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.
• 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>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>R125-85-20</td>
<td>R300-85-40</td>
<td>R500-85-45</td>
<td>R500-125-85</td>
</tr>
<tr>
<td>Nominal tip diameter</td>
<td>125 μm</td>
<td>300 μm</td>
<td>500 μm</td>
<td>500 μm</td>
</tr>
<tr>
<td>Nominal stylus length</td>
<td>2 mm</td>
<td>4 mm</td>
<td>4.5 mm</td>
<td>8.5 mm</td>
</tr>
<tr>
<td>Stem diameter</td>
<td>0.08 mm</td>
<td>0.2 mm</td>
<td>0.3 mm</td>
<td>0.3 mm</td>
</tr>
<tr>
<td>Aspect ratio</td>
<td>16</td>
<td>13.3</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>Tip material</td>
<td>Ruby</td>
<td>Ruby</td>
<td>Ruby</td>
<td>Ruby</td>
</tr>
</tbody>
</table>

### 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.

Contact measurement/Scanning measurement

The MiSCAN Vision System uses the main unit controller and software that have long been used in 3D measurement and provides high-level coordinate measurement technology.

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

CAT1000S (optional)
Using 3D CAD data, section extraction in the nominal scanning or linear and plane contour evaluations are available.

FORMTRACEPAK-AP (optional)
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>Objective lens</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>
</tr>
</thead>
<tbody>
<tr>
<td>Order No.</td>
<td>02AKT199</td>
<td>02AKT250</td>
<td>02ALA150</td>
<td>02AKT300</td>
<td>02ALA170</td>
<td>02AWD010</td>
<td>02AKT650</td>
<td>02ALG010</td>
<td>02ALG020</td>
</tr>
<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>
<tr>
<td>PRO model imaging area (H5 mm x V5 mm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turret 1X</td>
<td>12.54x9.4</td>
<td></td>
<td>6.27x4.7</td>
<td>2.49x1.86</td>
<td>1.42x0.93</td>
<td>0.62x0.47</td>
<td>0.25x0.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turret 2X</td>
<td>6.27x4.7</td>
<td>3.13x2.3</td>
<td>1.24x0.93</td>
<td>0.62x0.47</td>
<td>0.31x0.23</td>
<td>0.10x0.07</td>
<td>0.04x0.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turret 6X</td>
<td>2.09x1.56</td>
<td>1.04x0.78</td>
<td>0.41x0.31</td>
<td>0.20x0.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* When using a QV-SL0.5X, QV-HR10X, QV-10X or QV-25X objective, partial functional limitations such as insufficient light intensity may occur depending on the target workpiece.

Stylus observation camera unit

For MPP-NANO, Order No. 02ATX846A

For FCR25 SP25M

Order No. 02ATV887

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

External dimensions and measuring ranges

[MVS-H302 diagram]

[Stage size: MVS-H302, Contact probe (MPP-NANO/SP-25M)]

[MVS-X404/X302 diagram]

[Stage size: MVS-X404, Contact probe (SP-25M)]
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.

Find additional product literature and our product catalog
www.mitutoyo.com

Note: All information regarding our products, and in particular the illustrations, drawings, dimensional and performance data contained in this printed matter as well as other technical data are to be regarded as approximate average values. We therefore reserve the right to make changes to the corresponding designs. The stated standards, similar technical regulations, descriptions and illustrations of the products were valid at the time of printing. In addition, the latest applicable version of our General Trading Conditions will apply. Only quotations submitted by ourselves may be regarded as definitive. Specifications are subject to change without notice.

Mitutoyo products are subject to US Export Administration Regulations (EAR). Re-export or relocation of our products may require prior approval by an appropriate governing authority.

Trademarks and Registrations
Designations used by companies to distinguish their products are often claimed as trademarks. In all instances where Mitutoyo America Corporation is aware of a claim, the product names appear in initial capital or all capital letters. The appropriate companies should be contacted for more complete trademark and registration information.

Mitutoyo America Corporation
www.mitutoyo.com
One Number to Serve You Better
1-888-MITUTOYO (1-888-648-8869)

M³ Solution Centers:
Aurora, Illinois (Headquarters)  
Boston, Massachusetts  
Charlotte, North Carolina  
Cincinnati, Ohio  
Detroit, Michigan  
Los Angeles, California  
Birmingham, Alabama  
Seattle, Washington  
Houston, Texas