A state-of-the-art CNC coordinate measuring machine that offers a rare blend of high-speed operation combined with highly accurate measurement.
STRATO-Apex Series: A long-awaited, state-of-the-art CNC accuracy combined with high-speed operation
The high drive speed and acceleration guarantee top scanning performance

**Improved machine rigidity**
- High speed and accuracy in measurement is ensured by a redesign of the machine body that has improved rigidity of the structure, and by a remodeled guide mechanism.

**Newly developed, built-in, high-performance controller**
- Uses a digital servo system that processes all control loops for position, speed, and current as digital signals.
- The digital servo system offers the following benefits:
  1. Little drift or deterioration with time
  2. Wide dynamic range
  3. Easy implementation of various types of control algorithm

**Scanning measurement technology**
- High-performance scanning measurement has been achieved through the improved structural rigidity and incorporation of a newly developed compensation technology.
- Maximum permissible scanning probe error: \( \text{MPE}_{\text{HP}} = 1.8 \, \mu\text{m} \) (derived from scanning master ball during setup)
- Maximum permissible scanning time \( \text{MPT}_{\text{HP}} = 45 \, \text{sec} \) (to achieve 1.8 \( \mu\text{m} \) error)
- \( \text{MPT}_{\text{HP}} = 110 \, \text{sec.} \)
- *Probe used: SP25M*
coordinate measuring machine that achieves high

in a machine that also offers high-accuracy measuring in the 1 μm class

Internal heat generation minimized

- The controller is positioned outside the main unit, thereby eliminating the effect of the generated heat on the main unit.
- Compact layout has been achieved, resulting in a small footprint, even with the externally positioned controller.

Ultra-high precision glass scales

- An ultra-high precision crystallized glass scale which has practically no thermal expansion (coefficient of linear expansion $0.01 \times 10^{-6} /{^\circ}C$) is combined with a high-performance reflective linear encoder with resolution of $2/100 \mu m$ to create the ultra-high accuracy measurement unit installed on each axis of STRATO-Apex. This is basically the same unit as used in the LEGEX Series of ultra-high accuracy CNC coordinate measuring machines.
- A unique securing method used for the scales minimizes the hysteresis error that can result from the difference in the coefficients of linear expansion between the installation plane and scale.

Vibration-damping unit included as a standard accessory

- Vibration of the floor where the unit is installed shows up as measurement value variations. The STRATO-Apex Series comes equipped with a vibration-damping unit that uses auto-leveling air springs. The vibration-damping unit not only prevents floor vibrations from reaching the main unit, but also has a function that uses a sensor to detect load changes caused by movements of the individual axes and placement of a workpiece and quickly restores the main unit to horizontal orientation.
### Specifications

**STRATO-Apex 776**

<table>
<thead>
<tr>
<th>Measure Range</th>
<th>STRATO-Apex 776</th>
<th>STRATO-Apex 7106</th>
<th>STRATO-Apex 9106</th>
<th>STRATO-Apex 9166</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>705 mm</td>
<td>1005 mm</td>
<td>1605 mm</td>
<td>605 mm</td>
</tr>
<tr>
<td>Y</td>
<td>705 mm</td>
<td>1005 mm</td>
<td>1605 mm</td>
<td>605 mm</td>
</tr>
<tr>
<td>Z</td>
<td>605 mm</td>
<td>1005 mm</td>
<td>1605 mm</td>
<td>605 mm</td>
</tr>
</tbody>
</table>

**Guide Method**
- Air bearings on all axes (static pressure air bearings)

**Drive Speed**
- **CNC mode**
  - Drive speed: From 8 to 300 mm/s for each axis (maximum combined speed: 519 mm/s)
  - Measuring speed: 1 to 3 mm/s
- **JS mode**
  - Drive speed: 0 to 80 mm/s
  - Measuring speed: 0 to 3 mm/s
  - Fine-positioning speed: 0.05 mm/s

**Drive Acceleration**
- 1,500 mm/s² for each axis (maximum combined acceleration: 2,598 mm/s²)

**Measuring Method**
- Linear encoder

**Resolution**
- 0.00002 mm

**Work Table**
- Material: Granite
- Size (table surface): 880 x 1420 mm, 880 x 1720 mm, 1080 x 1720 mm, 1080 x 2320 mm
- Tapped inserts: M8 x 1.25 mm

**Workpiece**
- Maximum height: 770 mm
- Maximum mass: 800 kg, 1000 kg, 1200 kg, 1500 kg
- Machine mass (includes the vibration-damping platform and controller, but not workpiece): 1895 kg, 2180 kg, 2410 kg, 3085 kg

**Power Supply Specifications**
- Power supply voltage: AC 100-120/200-240 V ± 10%; power supply capacity: 700 VA (of which 170 VA is used for the probe option interface)

**Air Supply**
- Pressure: 0.4 MPa
- Consumption: 60 L/min under normal conditions (air source: At least 120 L/min)

**Guaranteed Accuracy**
- Temperature range: 19 – 21 °C
- Temperature change: 1.0 K, 2.0 K
- Temperature gradient: 1.0 K/m

**Maximum permissible error**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 10360-2: 2001 (JIS B 7440-2: 2003)</td>
<td>SP25M/MFP-310Q</td>
<td>MPEe=0.9+2.5 U/1000</td>
</tr>
<tr>
<td>ISO 10360-2: 2001 (JIS B 7440-2: 2003)</td>
<td>TP200</td>
<td>MPEe=1.4+2.5 U/1000 (for model 776/7106)</td>
</tr>
</tbody>
</table>

**Probe used**

<table>
<thead>
<tr>
<th>Probe used</th>
<th>Maximum permissible probing error</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP25M</td>
<td>MPEe=0.9</td>
</tr>
<tr>
<td>MPP-310Q</td>
<td>MPEe=1.8</td>
</tr>
<tr>
<td>TP200</td>
<td>MPEe=2.0 (MPTt=70)</td>
</tr>
</tbody>
</table>

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**Note:** This machine incorporates a main unit Startup system (relocation detection system), which disable operation when an unexpected vibration is applied or the machine is relocated. Be sure to contact your nearest Mitutoyo Sales Office prior to relocating this machine after initial installation.

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**Mitutoyo**

**Providing the Highest Speed and Accuracy in Moving-Bridge Type Coordinate Measuring Machines**

**Integration of Key Measurement Technologies**

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**Specifications**

- STRATO-Apex 776
- STRATO-Apex 7106
- STRATO-Apex 9106
- STRATO-Apex 9166

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**Probing error**

- **Probe used**
- **Maximum permissible probing error**

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**Scanning accuracy specification**

(Model 776/7106)

- **Probe used**
- **Maximum permissible scanning probe error (Maximum permissible scanning test time) [sec]**

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**Guaranteed Accuracy**

- Temperature range: 19 – 21 °C
- Temperature change: 1.0 K, 2.0 K
- Temperature gradient: 1.0 K/m

---

**Power Supply Specifications**

- Power supply voltage: AC 100-120/200-240 V ± 10%; power supply capacity: 700 VA (of which 170 VA is used for the probe option interface)

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**Air Supply**

- Pressure: 0.4 MPa
- Consumption: 60 L/min under normal conditions (air source: At least 120 L/min)
Bridge Type Coordinate Measuring Machines

### Dimensions

![Dimensions Diagram](image)

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<th>STRATO-Apex 9106</th>
<th>STRATO-Apex 9166</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>740</td>
<td>1000</td>
<td>940</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>700</td>
<td>1000</td>
<td>1410</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>540</td>
<td>632.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>1860</td>
<td>2160</td>
<td>2760</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>1460</td>
<td></td>
<td>1660</td>
<td></td>
</tr>
</tbody>
</table>

### Installation floor space

![Installation floor space Diagram](image)

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<tbody>
<tr>
<td>A</td>
<td>3210</td>
<td>3410</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>1460</td>
<td>1660</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>4160</td>
<td>4460</td>
<td>5060</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>1860</td>
<td>2160</td>
<td>2760</td>
<td></td>
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<tr>
<td>E</td>
<td>520</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>740</td>
<td></td>
<td></td>
<td>940</td>
</tr>
<tr>
<td>G</td>
<td>4160</td>
<td>4460</td>
<td>5060</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>1460</td>
<td>1660</td>
<td>1860</td>
<td>2160</td>
</tr>
</tbody>
</table>

### Tapped insert positions in the table surface

![Tapped insert positions Diagram](image)

- **STRATO-Apex 776**
  - 87.5
  - 175
  - 350
  - 525
  - 700
  - 1090

- **STRATO-Apex 7106**
  - 87.5
  - 175
  - 350
  - 525
  - 700
  - 1090

- **STRATO-Apex 9106**
  - 225
  - 450
  - 675
  - 900
  - 1300

- **STRATO-Apex 9166**
  - 87.5
  - 225
  - 450
  - 675
  - 900
  - 1300

* Workpiece loading area
** Y-axis guiding surface
Software options handle all kinds of measurement

**GEOPAK (high-functionality general-purpose measurement program)**
This module is the heart of the MCOSMOS software system and is used to measure and analyze geometric elements. All the functions are provided by icons or pull-down menus, so even novices can promptly select desired functions. Its main features include easier viewing of measuring procedures and results such as realtime graphic display of measurement results and a function for direct call-up of elements from results graphics.

**CAT1000S (freeform surface evaluation program)**
Checks and compares the workpiece with the CAD data containing freeform surfaces and directly outputs the results in the form of CAD data in various formats. Software to directly convert from/to various types of CAD data is available as an option.

**MeasurLink STATMeasure Plus (statistical-processing and process-controlling program)**
Performs various types of statistical computations using measurement results. In addition, by displaying a control diagram on a real-time basis, this program allows defects that may occur in the future (e.g., wear or damage to cutting tools) to be discovered early on. This program can also be linked to a higher-level network environment to build a central control system.

**SurfaceMeasure606 (non-contact laser probe)**
A lightweight, high-performance, non-contact probe developed for CNC coordinate measuring machines. Powder spray-less measurement has been achieved through automatic setting of appropriate laser intensity and camera sensitivity according to environment or material, providing a simpler and more comfortable laser scanning environment.

**CAT1000P (off-line teaching program)**
This module enables the user to use CAD data and on-screen simulation to create parts programs for making automated measurements (off-line teaching). This module allows the user to begin creating a parts program as soon as the design data has been finalized, shortening the entire process.

**MSURF (non-contact laser measurement and evaluation program)**
MSURF-S is used for obtaining measured point cloud data with the SurfaceMeasure (non-contact laser probe), while MSURF-I is used for comparing this data with the master model data, and for making dimensional measurements. Furthermore, MSURF-G for offline teaching allows the user to create a measurement macro even without the actual workpiece, improving the measuring machine’s uptime.

**SCANPAK (contour measurement program)**
Software for scanning and evaluating workpiece contours (2D). Evaluates contour tolerance between measurement data and design data, and performs various types of element and inter-element calculations based on a desired range of measurement data specified by the user.
GEARPAK (gear evaluation program)
For evaluating the most types of involute gears.

MPP-310Q (scanning probe)
A probe that collects coordinate values (point cloud data) at high accuracy by moving at speeds of up to 120 mm/s while in contact with the workpiece. Because MPP-310Q can also be used with the rotary table (MRT320) for synchronous scanning, it is effective for measuring gears, blades, ball screws, cylindrical cams, etc.

MPP-10 (probe for effective screw depth measurement)
The probe that made it possible for a coordinate measuring machine to measure effective screw depth for the first time. The introduction of the auto probe changing system allows normal dimensional measurements as well as effective screw depth measurements to be made automatically.

SP25M (compact high-accuracy scanning probe)
This is a compact, high-accuracy, multi-function scanning probe with a 25-mm outside diameter that makes scanning measurements, high-accuracy point measurements, and centripetal point measurements (optional function). The SP25M is used with the PH10MQ/10M auto probe head to provide a high degree of measurement freedom.

QVP (vision probe)
This probe automatically detects edges from image data of the workpiece magnified by a CCD camera. It is extremely useful for measuring microfabricated products that cannot be measured using a contact-type probe and soft objects that cannot be subjected to any measurement force. The QVP can also be used for measuring height based on autofocus.

UMAP-CMM
This head makes it possible to use an ultra-small stylus (0.1- or 0.3-mm diameter). It can be installed on the PH10MQ to measure the shape and dimensions of microfabricated products from multiple directions.

NC-Auto measure
This program generates CAD data from NC data.

Solid Model Developer
This program generates CAD data from data measured using MICOSMOS.

VISIONPAK (vision measurement program)
This program controls QVP and performs various computational analyses on captured images.
Small Tool Instruments and Data Management

Test Equipment and Seismometers

Digital Scale and DRO Systems

Coordinate Measuring Machines

Sensor Systems

Optical Measuring

Form Measurement

Vision Measuring Systems

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