MICROCORD STRATO-APEX SERIES
High Accuracy CNC Coordinate Measuring Machine

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 state-of-the-art CNC coordinate measuring machine that achieves high 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 probing error: \( \text{MPE}_{\text{HP}} = 1.3 \mu \text{m} \) (STRATO-Apex 574)
  - Maximum permissible scanning test time \( \text{MPT}_{\text{HP}} = 40 \text{ sec} \) (STRATO-Apex 574)
  - (cf. Existing FALCIO Series: \( \text{MPE}_{\text{HP}} = 2.2 \mu \text{m} \))
    - \( \text{MPT}_{\text{HP}} = 110 \text{ sec.} \))

*Probe used: SP25M*
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 × 10^-6/°C) is combined with a high-performance reflective linear encoder with resolution of 2/100 μm 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. (Applies to STRATO-Apex 700/900 Series).
- 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.

Vibration-damping unit with auto-leveling air springs

Vibration-damping unit positioning
Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>STRATO-Apex 574</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>19.6” (500mm)</td>
</tr>
<tr>
<td>Y</td>
<td>27.5” (700mm)</td>
</tr>
<tr>
<td>Z</td>
<td>15.7” (400mm)</td>
</tr>
<tr>
<td>Guide method</td>
<td>Air bearings on all axes (static pressure air bearings)</td>
</tr>
<tr>
<td>Drive method</td>
<td></td>
</tr>
<tr>
<td>CNC mode</td>
<td>Drive speed: 8 to 300 mm/s for each axis (maximum combined speed: 519 mm/s)</td>
</tr>
<tr>
<td>J/S mode</td>
<td>Measuring Speed 1 to 3 mm/s</td>
</tr>
<tr>
<td>Measuring acceleration (3D)</td>
<td>Drive Speed 0 to 80 mm/s</td>
</tr>
<tr>
<td>Measuring acceleration (3D)</td>
<td>Measuring Speed 0 to 3 mm/s</td>
</tr>
<tr>
<td>Measuring acceleration (3D)</td>
<td>Fine-positioning Speed 0.05 mm/s</td>
</tr>
<tr>
<td>Measuring speed</td>
<td>0.23G (319 mm/s/ )</td>
</tr>
<tr>
<td>Measuring method</td>
<td>Linear encoder</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.0000019” (0.00005 mm)</td>
</tr>
<tr>
<td>Work table</td>
<td>Granite</td>
</tr>
<tr>
<td>Size (table surface)</td>
<td>26.6” x 55.9” (676mm x 1420mm)</td>
</tr>
<tr>
<td>Tapped inserts</td>
<td>M8 1.25 mm</td>
</tr>
<tr>
<td>Workpiece</td>
<td></td>
</tr>
<tr>
<td>Maximum height</td>
<td>22.04” (560mm)</td>
</tr>
<tr>
<td>Maximum mass</td>
<td>396 lbs (180kg)</td>
</tr>
<tr>
<td>Machine mass</td>
<td>3373 lbs (1530kg)</td>
</tr>
<tr>
<td>Power supply specifications (including the probe option interface)</td>
<td>Power supply: AC100-120/200-240 V ± 10%, power supply capacity: 700 VA (of which 170 VA is used for the probe option interface)</td>
</tr>
<tr>
<td>Air supply</td>
<td>0.4 MPa (4kgf/cm²) or 58 PSI</td>
</tr>
<tr>
<td>Consumption</td>
<td>2.1CFM (60 L/minute) air source minimum: 4.2 (120 L/minute)</td>
</tr>
<tr>
<td>Guaranteed accuracy</td>
<td></td>
</tr>
<tr>
<td>temperature range</td>
<td>64.4 – 71.6 °F (18 - 22 °C)</td>
</tr>
<tr>
<td>Temperature change</td>
<td></td>
</tr>
<tr>
<td>Per hour</td>
<td>1.0 K</td>
</tr>
<tr>
<td>Per 24 hours</td>
<td>2.0 K</td>
</tr>
<tr>
<td>Temperature gradient</td>
<td></td>
</tr>
<tr>
<td>Vertical/horizontal</td>
<td>1.0 K/m</td>
</tr>
</tbody>
</table>

* While the appearance of the natural stone measuring table varies according to the source, the high stability for which this material is known can always be relied upon.

Length measurement error

<table>
<thead>
<tr>
<th>Standard</th>
<th>Probe used</th>
<th>Max. permissible length measurement error</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 10360-2: 2009</td>
<td>SP25M</td>
<td>1.7 x 10^{-6} ± 2.5 x 10^{-6}</td>
</tr>
</tbody>
</table>

Single stylus form error

<table>
<thead>
<tr>
<th>Standard</th>
<th>Probe used</th>
<th>Max. permissible single stylus form error</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 10360-5: 2010</td>
<td>SP25M</td>
<td>4 x 10^{-6}</td>
</tr>
</tbody>
</table>

Scanning probing error

<table>
<thead>
<tr>
<th>Standard</th>
<th>Probe used</th>
<th>Maximum permissible scanning probing error</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 10360-4: 2000</td>
<td>SP25M</td>
<td>1.3 x 10^{-6}</td>
</tr>
</tbody>
</table>

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.
Length measurement error of $E_0, MPE=0.7+2.5L/1000$ (μm)

**Dimensions**

- **Item** | **STRATO-Apex 574**
  - A | 24.99" (635mm)
  - B | 31.49" (800mm)
  - C | 16.53" (420mm)
  - D | 64.96" (1650mm)
  - W | 49.99" (1270mm)
  - H | 94.88" (2410mm)

* Distance between support legs

**Installation floor space**

- **Item** | **STRATO-Apex 574**
  - A | 108.8" (2765mm)
  - B | 49.8" (1265mm)
  - C | 15.9" (404.5mm)
  - D | 25.0" (635mm)
  - E | 127.9" (3250mm)
  - F | 64.9" (1650mm)
  - G | 31.4" (800mm)
  - H | 35.4" (900mm)

**Tapped insert positions in the table surface**

- **Item** | **STRATO-Apex 574**
  - 13-M8x1.25

* Workpiece loading area
** Y-axis guiding surface
Specifications

<table>
<thead>
<tr>
<th>Item</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>Measuring range</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>27.5&quot; (700mm)</td>
<td>39.3&quot; (1000mm)</td>
<td>62.9&quot; (1600mm)</td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>27.5&quot; (700mm)</td>
<td>39.3&quot; (1000mm)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>23.6&quot; (600mm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guide method</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive speed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CNC mode</td>
<td>Air bearings on all axes (static pressure air bearings)</td>
<td>Drive Speed: From 8 to 300 mm/s for each axis (maximum combined speed: 519 mm/s)</td>
<td>Drive Speed: 0 – 80 mm/s</td>
<td>Drive Speed: 0 – 8 mm/s</td>
</tr>
<tr>
<td>I/S mode</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive acceleration (3D)</td>
<td>0.26G (2.598 mm/s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring method</td>
<td>Linear encoder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>0.000000078&quot; (0.000002 mm)</td>
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</tr>
<tr>
<td>Work table</td>
<td>Granite</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size (table surface)</td>
<td>33.9&quot; x 55.9&quot; (862 mm x 1420 mm)</td>
<td>33.9&quot; x 67.7&quot; (862 mm x 1720 mm)</td>
<td>41.8&quot; x 67.7&quot; (1062 mm x 1720 mm)</td>
<td>41.8&quot; x 91.3&quot; (1062 mm x 2320 mm)</td>
</tr>
<tr>
<td>Tapped inserts</td>
<td>MB 1.25 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workpiece</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum height</td>
<td>30.31&quot; (770 mm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Machine mass</td>
<td>1760 lbs (800 kg)</td>
<td>2200 lbs (1000 kg)</td>
<td>2640 lbs (1200 kg)</td>
<td>3300 lbs (1500 kg)</td>
</tr>
<tr>
<td>Power supply specifications</td>
<td>Power supply voltage: AC100-120/200-240 V ± 10%; power supply capacity: 700 VA (of which 170 VA is used for the probe option interface)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air supply</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure</td>
<td>0.4 MPa (4 kgf/cm²) or 58 PSI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td>66.2 – 69.8 °F (19 – 21 °C)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature change</td>
<td>Per hour: 1.0 K</td>
<td>Per hour: 2.0 K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature gradient</td>
<td>vertical/horizontal: 1.0 K/h</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* While the appearance of the natural stone measuring table varies according to the source, the high stability for which this material is known can always be relied upon.

Length measurement error (unit: μm)

<table>
<thead>
<tr>
<th>Standard</th>
<th>Probe used</th>
<th>Max. permissible length measurement error</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 10360-2: 2009</td>
<td>SP25M</td>
<td>$E_{L,\text{MPE}}=0.9+2.5\text{L/1000}$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$E_{E,\text{MPE}}=0.9+2.5\text{L/1000}$</td>
</tr>
</tbody>
</table>

Repeatability (unit: μm)

<table>
<thead>
<tr>
<th>Standard</th>
<th>Probe used</th>
<th>Repeatability range of $E_{L}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 10360-2: 2009</td>
<td>SP25M</td>
<td>$R_{L,\text{MPE}}=0.8$</td>
</tr>
</tbody>
</table>

Single stylus form error (unit: μm)

<table>
<thead>
<tr>
<th>Standard</th>
<th>Probe used</th>
<th>Max. permissible single stylus form error</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 10360-5: 2010</td>
<td>SP25M</td>
<td>$P_{S,\text{MPE}}=0.9$</td>
</tr>
</tbody>
</table>

Scanning probing error (unit: μm)

<table>
<thead>
<tr>
<th>Standard</th>
<th>Probe used</th>
<th>Maximum permissible scanning probing error (Maximum permissible scanning test time [sec])</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 10360-4: 2000</td>
<td>SP25M</td>
<td>$\text{MPE}<em>{\text{S,LP}}=1.8$ ($\text{MPE}</em>{\text{S,HP}}=45$)</td>
</tr>
</tbody>
</table>

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.
Providing the Highest Speed and Accuracy in Moving-Bridge Type Coordinate Measuring Machines
Integration of Key Measurement Technologies

- **Dimensions** unit: mm

- **Installation floor space** unit: mm

- **Tapped insert positions in the table surface** unit: mm

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<table>
<thead>
<tr>
<th>Item</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>A</td>
<td>29.13&quot; (740)</td>
<td>37.01&quot; (940)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>27.56&quot; (700)</td>
<td>39.37&quot; (1000)</td>
<td>55.51&quot; (1410)</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>21.25&quot; (540)</td>
<td>24.9&quot; (632.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>73.3&quot; (1860)</td>
<td>85.1&quot; (2160)</td>
<td>108.7&quot; (2760)</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>57.48&quot; (1460)</td>
<td>65.4&quot; (1660)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>93.70&quot; (2380mm)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Distance between support legs

---

<table>
<thead>
<tr>
<th>Item</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>A</td>
<td>136.22&quot; (3460)</td>
<td>148.0&quot; (3760)</td>
<td>171.6&quot; (4360)</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>73.3&quot; (1860)</td>
<td>85.1&quot; (2160)</td>
<td>108.7&quot; (2760)</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>21.25&quot; (540)</td>
<td>24.9&quot; (632.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>27.56&quot; (700)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>116.5&quot; (2960)</td>
<td>124.4&quot; (3160)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>57.48&quot; (1460)</td>
<td>65.4&quot; (1660)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>29.13&quot; (740)</td>
<td>37.01&quot; (940)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Tapped insert positions in the table surface**

- Workpiece loading area
- Y-axis guiding surface
**STRATO-Apex 1600 Series**

**Specifications**

<table>
<thead>
<tr>
<th>Item</th>
<th>STRATO-Apex 162012</th>
<th>STRATO-Apex 162016</th>
<th>STRATO-Apex 163012</th>
<th>STRATO-Apex 163016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>62.99&quot; (1600mm)</td>
<td>62.99&quot; (1600mm)</td>
<td>62.99&quot; (1600mm)</td>
<td>62.99&quot; (1600mm)</td>
</tr>
<tr>
<td>Y</td>
<td>78.73&quot; (2000mm)</td>
<td>118.10&quot; (3000mm)</td>
<td>118.10&quot; (3000mm)</td>
<td>118.10&quot; (3000mm)</td>
</tr>
<tr>
<td>Z</td>
<td>47.24&quot; (1200mm)</td>
<td>62.99&quot; (1600mm)</td>
<td>47.24&quot; (1200mm)</td>
<td>62.99&quot; (1600mm)</td>
</tr>
<tr>
<td>Guide method</td>
<td>Air bearings on all axes (static pressure air bearings)</td>
<td>Air bearings on all axes (static pressure air bearings)</td>
<td>Air bearings on all axes (static pressure air bearings)</td>
<td>Air bearings on all axes (static pressure air bearings)</td>
</tr>
<tr>
<td>Drive method</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CNC mode</td>
<td>Drive speed: From 8 to 350 mm/s for each axis (maximum combined speed: 606 mm/s)</td>
<td>Measuring speed 1 – 3 mm/s</td>
<td>Measuring speed 0 – 3 mm/s</td>
<td>Measuring speed 0 – 3 mm/s</td>
</tr>
<tr>
<td>J/S mode</td>
<td>Drive speed: 0 – 80 mm/s</td>
<td>Measuring speed 0 – 3 mm/s</td>
<td>Fine-positioning speed 0.05 mm/s</td>
<td>Fine-positioning speed 0.05 mm/s</td>
</tr>
<tr>
<td>Drive acceleration (3D)</td>
<td>0.13G (1,350 mm/s²)</td>
<td>0.13G (1,350 mm/s²)</td>
<td>0.13G (1,350 mm/s²)</td>
<td>0.13G (1,350 mm/s²)</td>
</tr>
<tr>
<td>Measuring method</td>
<td>Linear encoder</td>
<td>Linear encoder</td>
<td>Linear encoder</td>
<td>Linear encoder</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.0000001&quot; (0.00005 mm)</td>
<td>0.0000001&quot; (0.00005 mm)</td>
<td>0.0000001&quot; (0.00005 mm)</td>
<td>0.0000001&quot; (0.00005 mm)</td>
</tr>
<tr>
<td>Work table</td>
<td>Material: Granite</td>
<td>Granite</td>
<td>Granite</td>
<td>Granite</td>
</tr>
<tr>
<td>Size (table surface)</td>
<td>72.83&quot; x 129.13&quot; (1850mm x 3280mm)</td>
<td>72.83&quot; x 168.50&quot; (1850mm x 4280mm)</td>
<td>72.83&quot; x 168.50&quot; (1850mm x 4280mm)</td>
<td>72.83&quot; x 168.50&quot; (1850mm x 4280mm)</td>
</tr>
<tr>
<td>Tapped inserts</td>
<td>M8 x 1.25</td>
<td>M8 x 1.25</td>
<td>M8 x 1.25</td>
<td>M8 x 1.25</td>
</tr>
<tr>
<td>Workpiece</td>
<td>Maximum height</td>
<td>53.14&quot; (1350mm)</td>
<td>68.99&quot; (1750mm)</td>
<td>68.99&quot; (1750mm)</td>
</tr>
<tr>
<td>Maximum mass</td>
<td>7,716 lbs. (3500kg)</td>
<td>8,818 lb. (4000kg)</td>
<td>8,818 lb. (4000kg)</td>
<td>8,818 lb. (4000kg)</td>
</tr>
<tr>
<td>Machine mass (includes the vibration-damping platform and controller, but not workpiece)</td>
<td>24,581 lbs. (11,150kg)</td>
<td>24,691 lbs. (11,200kg)</td>
<td>33,730 lbs. (15,300kg)</td>
<td>33,840 lbs. (15,350kg)</td>
</tr>
<tr>
<td>Power supply specifications</td>
<td>Power supply voltage: AC100-120/200-240 V ± 10%; power supply capacity: 1500 W (of which 170 W is used for the probe option interface)</td>
<td>Power supply voltage: AC100-120/200-240 V ± 10%; power supply capacity: 1500 W (of which 170 W is used for the probe option interface)</td>
<td>Power supply voltage: AC100-120/200-240 V ± 10%; power supply capacity: 1500 W (of which 170 W is used for the probe option interface)</td>
<td>Power supply voltage: AC100-120/200-240 V ± 10%; power supply capacity: 1500 W (of which 170 W is used for the probe option interface)</td>
</tr>
<tr>
<td>Air supply</td>
<td>Pressure: 0.4 MPa (4kgf/cm²) or 58 PSI</td>
<td>Consumption: 3.53CFM (100 L/min) source minimum: 8.82CFM (250 L/min)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guaranteed accuracy</td>
<td>Temperature range: 64.4°F – 71.6°F (18 – 22 °C)</td>
<td>Temperature change: Per hour 1.8°F (1.0 °C); Per 24 hours 3.6°F (2.0 °C)</td>
<td>Temperature gradient: vertical/horizontal 1.8°F (1.0 °C/m)</td>
<td></td>
</tr>
</tbody>
</table>

* While the appearance of the natural stone measuring table varies according to the source, the high stability for which this material is known can always be relied upon.

---

**STRATO-Apex 162012/163012**

**Length measurement error**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Probe used</th>
<th>Max. permissible length measurement error</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 10360-2: 2009</td>
<td>SP25M</td>
<td>$E_{L,MP}=2.5+4.0L/1000$</td>
</tr>
</tbody>
</table>

**Repeatability**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Probe used</th>
<th>Repeatability range of $E_r$</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 10360-2: 2009</td>
<td>SP25M</td>
<td>$R_{L,MP}=2.5$</td>
</tr>
</tbody>
</table>

**Single stylus form error**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Probe used</th>
<th>Max. permissible single stylus form error</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 10360-5: 2010</td>
<td>SP25M</td>
<td>$P_{SL,MP}=2.3$</td>
</tr>
</tbody>
</table>

**Scanning probing error**

| Maximum permissible scanning probing error (Maximum permissible scanning test time) (sec) | SP25M | $MPE_{L,MP}=2.5$ |

---

*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.*
High accuracy combined with wide measuring range
Best suited for highly accurate measurement of large workpieces

**STRATO-Apex 162016/163016**

### Length measurement error

<table>
<thead>
<tr>
<th>Standard</th>
<th>Probe used</th>
<th>Max. permissible length measurement error</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 10360-2: 2009</td>
<td>SP25M</td>
<td>$E_{lmp}=3.0+4.0L/1000$</td>
</tr>
</tbody>
</table>

### Repeatability

<table>
<thead>
<tr>
<th>Standard</th>
<th>Probe used</th>
<th>Repeatability range of $E_x$</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 10360-2: 2009</td>
<td>SP25M</td>
<td>$R_{x lmp}=2.5$</td>
</tr>
</tbody>
</table>

### Single stylus form error

<table>
<thead>
<tr>
<th>Standard</th>
<th>Probe used</th>
<th>Max. permissible single stylus form error</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 10360-5: 2010</td>
<td>SP25M</td>
<td>$P_{fil, lmp}=2.8$</td>
</tr>
</tbody>
</table>

### Scanning probing error

<table>
<thead>
<tr>
<th>Standard</th>
<th>Probe used</th>
<th>Maximum permissible scanning probing error (Maximum permissible scanning test time) [sec]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 10360-4: 2000</td>
<td>SP25M</td>
<td>$MPE_{lmp}=3.0$ ($MPT_{lmp}=60$)</td>
</tr>
</tbody>
</table>

### Dimensions

**DMIS**

<table>
<thead>
<tr>
<th>Item</th>
<th>STRATO-Apex 162012</th>
<th>STRATO-Apex 162016</th>
<th>STRATO-Apex 163012</th>
<th>STRATO-Apex 163016</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>25.59&quot; (650)</td>
<td>27.56&quot; (700)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>55.70&quot; (1415)</td>
<td>71.45&quot; (1815)</td>
<td>55.70&quot; (1415)</td>
<td>71.45&quot; (1815)</td>
</tr>
<tr>
<td>C</td>
<td>39.37&quot; (1000)</td>
<td>53.14&quot; (1350)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>145.07&quot; (3685)</td>
<td>184.44&quot; (4685)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>170.86&quot; (4340)</td>
<td>202.36&quot; (5140)</td>
<td>172.83&quot; (4390)</td>
<td>204.33&quot; (5190)</td>
</tr>
<tr>
<td>W</td>
<td>110.45&quot; (2805mm)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Distance between support legs

### Installation floor space

**Options**

- Support legs
- Auxiliary legs

<table>
<thead>
<tr>
<th>Item</th>
<th>STRATO-Apex 162012/162016</th>
<th>STRATO-Apex 163012/163016</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>208.07&quot; (5285)</td>
<td>244.47&quot; (6285)</td>
</tr>
<tr>
<td>B</td>
<td>145.07&quot; (3685)</td>
<td>184.44&quot; (4685)</td>
</tr>
<tr>
<td>C</td>
<td>38.07&quot; (840)</td>
<td>38.97&quot; (990)</td>
</tr>
<tr>
<td>D</td>
<td>78.73&quot; (2000)</td>
<td>106.29&quot; (2700)</td>
</tr>
</tbody>
</table>

### Tapped insert positions in the table surface

**Workpiece loading area**

**Y-axis guiding surface**

---

*Mitutoyo*
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.

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.

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

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

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.

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.
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.

MRT320

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 autofocusing.

SURFTEST PROBE
The SURFTEST PROBE is a highly sensitive detector for measuring surface roughness using a CNC coordinate measuring machine. It is compatible with automatic probe-changing systems and therefore can be handled just as easily as the usual touch trigger or scanning probes. This new probe provides the ability to perform combined, automatic measurement of dimension, form and surface roughness on one machine at one setup. Mitutoyo will endeavor to meet requests for assistance with custom measurement applications by providing dedicated software making best use of its wide range of optional detectors.
Mitutoyo supports you from start to finish. Whatever your challenges are, 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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www.mitutoyo.com

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MiCAT Planner
Automatic measurement program generation software

MiCAT Planner is Mitutoyo’s latest software development for fast and efficient CMM part programming. Operation of MiCAT Planner is very easy and intuitive. Programs are made with just a few mouse clicks in just a few minutes instead of hours our days. WORKFLOW:
1) Load design model
2) Select target CMM
3) Part placement via virtual alignment
4) Measurement program creation
5) Translate to Geopak MCOSMOS