Contour Measuring Systems

CONTRACER CV-3200/4500 Series

High-accuracy contour measuring machine with exciting new features
Upper and lower surfaces can be measured continuously by using Mitutoyo’s double-sided conical stylus. This continuous measurement data can be used to facilitate analysis of features that were difficult to measure before, such as the effective diameter of an internal screw-thread.

The measuring force can be varied in 5 steps by using the software provided (FORMTRACEPAK), eliminating the need to adjust the measuring force by switching weights or through positional adjustment. The CV-4500 Series can also maintain the specified measuring force even when tilted.

The CV-4500 Series features a built-in precision arc scale on the Z1-axis (detector) that allows the arc trajectory of the stylus tip to be read directly, minimizing the detector mechanism error and enabling precision, high-resolution measurement. On the X-axis (driver) is a linear scale, allowing high-accuracy full-stroke measurement.

The one-step calibration kit supplied with the CV-4500 Series has been upgraded to enable easy calibration of the double-ended conical stylus featuring a contact on both the top and the bottom. Fiddly work such as calibrating the Z1-axis gain, symmetry, and stylus radius can now be carried out in a single operation.

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The total measurement time can be shortened by speeding up the traverse movements.
Mitutoyo’s newly designed detector arm lowers workpiece interference while expanding the measurement range in the Z1-axis (detector).

New top-bottom continuous measurement and variable measuring force enable efficient, highly accurate measurement of a wide range of objects.

Detector measurement range expanded by 10 mm

![Detector with new arm design](image)

**One-touch arm attachment** (Patent pending in Japan)
The arm mount uses a magnetic joint for quick and easy arm replacement. The mount also includes a safety mechanism.

- CV-4100 (Conventional product)
- CV-4500

Remote-control unit enables safe, easy & fast measurement

The remote-control unit lets you move quickly from positioning to measurement. The unit also features an emergency stop switch and speed control knob for added safety while the machine is moving at high speeds.

![Excellent operability](image)

**Remarkable Ease of Operation**

Incorporation of an ABS scale in the Z2-axis eliminates the need for wearisome origin point re-setting conventionally required for every step of repeated measurements over stepped or multiple sections.

![New Remote Control Box](image)

**Simple positioning by fine feed mechanisms**

Small holes and inclined planes can be efficiently measured using the inclined X-axis drive unit and fine-feed handles on the X- and Z2-axes.

![Simple positioning by fine feed mechanisms](image)

**Simplified CNC Function**

With the support for a wide range of optional peripherals designed for use with the CNC Form Measuring Unit enables simplified CNC measurement.

- 1-axis Rotary unit: Automatic circular-form measurement
- 2-axis Rotary unit: Automatic multiple-section continuous measurement

![Simplified CNC Function](image)
CONTRACER
CV-3200 Series

Detector with new arm design
Expands measurement range while reducing workpiece interference Mitutoyo’s newly designed detector arm lowers workpiece interference while expanding the measurement range in the Z1-axis (detector).
• When using the SPH-71 one-sided cut stylus

Detector measurement range expanded by 10 mm

One-touch arm attachment (Patent pending in Japan)
The arm mount uses a magnetic joint for quick and easy arm replacement. The mount also includes a safety mechanism.
• CV-3100 (Conventional product) • CV-3200

Hassle-free one-step calibration
The CV-3200 Series provides a dedicated calibration gage that lets you carry out fiddly work such as calibrating the Z1-axis gain, symmetry, and stylus radius in a single operation. Calibration of upward measurement is also possible by using Mitutoyo’s optional calibration stage.
• Calibration kit for CV-3200 series

Best-in-class displacement accuracy
The CV-3200 Series features a built-in precision arc scale on the Z1-axis (detector) that allows the arc trajectory of the stylus tip to be read directly, minimizing the detector mechanism error and enabling precision, high-resolution measurement. On the X-axis (drive) is a linear scale, allowing high-accuracy full-stroke measurement.

Accuracy
Z1-axis (detector unit): \( \pm (1.6 + \frac{|2H|}{100}) \mu m \)
\( H = \) Measurement height from the horizontal position (mm)
X-axis (drive unit): \( \pm (0.8 + 0.01L) \mu m \)
\( L = \) drive length (mm)

Resolution
Z1-axis (detector unit): 0.04\( \mu m \)
X-axis (drive unit): 0.05\( \mu m \)

*1 These specifications apply to the CV-3200S4/H4/W4. For specifications of other products in the series, see Specifications on page 14.
Best-in-class accuracy, high-speed movement, and new detector arm design enable hassle-free, highly accurate measurement.

**Remarkable Ease of Operation**
Incorporation of an ABS scale in the Z2-axis eliminates the need for wearisome origin point re-setting conventionally required for every step of repeated measurements over stepped or multiple sections.

**Simple positioning by fine feed mechanisms**
Small holes and inclined planes can be efficiently measured using the inclined X-axis drive unit and fine-feed handles on the X- and Z2-axes.

**Excellent operability**
Remote-control unit enables safe, easy & fast measurement
The remote-control unit lets you move quickly from positioning to measurement. The unit also features an emergency stop switch and speed control knob for added safety while the machine is moving at high speeds.

**Fast movement improves measurement efficiency**
X-axis (drive unit): 80mm/s (MAX)
Z2-axis (column): 30mm/s (MAX)
The total measurement time can be shortened by speeding up the movement.

**Simplified CNC Function**
With the support for a wide range of optional peripherals designed for use with the CNC Form Measuring Unit enables simplified CNC measurement.

- 1-axis Rotary unit: Automatic circular-form measurement
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**Remote-control unit enables safe, easy & fast measurement**
Emergency stop switch
Drive speed control knob
New Remote Control Box

**Inclination unit**
Z2-axis fine-feed handle
X-axis fine-feed handle
X-axis inclination handle

**Inclined X-axis drive unit and fine-feed handles on the X- and Z2-axes.**

**ABSOLUTE®**
Absolute System Patented by MITUTOYO
Contour Analysis Software: FORMTRACEPAK

FORMTRACEPAK functions offer total support for measurement system control, surface roughness analysis, contour analysis, contour tolerancing, and inspection report creation.

Measurement control

To make only a single measurement, you can create a part program in the single mode. To measure multiple workpieces of an identical shape, you can use the teaching mode. FORMTRACEPAK supports the new top-bottom continuous measurement and variable measuring force functions of the CV-4500 Series (see page 2 for details), providing an even higher level of usability. Since you can embed the entire flow, from making measurement to printing a report, into a part program, you can efficiently make measurements, analyze data, and output a report. A function is also provided that enables you to insert comments accompanied with photographs at desired timings, enabling you to embed the roles described in a measurement procedure document that specifies important points such as work settings.

To make immediate measurements, you can use the pull-down menu to easily select and call up the desired operating procedure.

Multiple language support (15 languages)

You can switch the language* to be used in the measurement, analysis, and layout windows. After measurements have been made, you can switch to another language and create a report in that language. This function can be used worldwide.

* Supported languages: Japanese, English, German, French, Italian, Spanish, Polish, Hungarian, Swedish, Czech, Simplified Chinese, Traditional Chinese, Korean, Turkish, Portuguese.

Online help function*

Online help that can be viewed any time is incorporated into the software. In addition to index and keyword searches, a status saving help button, which displays menus and Windows help with a click of the mouse, is provided.

* Online help function supports only Japanese and English.

Button-editing function

You can hide buttons that are not used frequently. For example, you can choose to display only those buttons that are used frequently and increase the size of the displayed graphics window, thereby customizing the window to suit your needs.

Simple statistical commands

You can perform statistical calculations of contour analysis results without using a separate program such as Excel.
Contour analysis function
A wide variety of commands, which form the basic elements for analysis, are provided, including those for points (10 kinds), lines (6 kinds), and circles (6 kinds). A rich set of commands that combine these elements to calculate angles, pitches, and distances, a contour tolerancing function, and a design value generation function are also provided as standard features. These functions, combined with the function that allows you to customize the calculation command buttons by hiding less frequently used commands, let you tailor the window according to the user environment.

Circle and line automatic determination function
Using the circle/line auto-fitting command, you can automatically calculate all circles and lines contained in the data without having to click the command button each time.

Removal of abnormal points function
Irregular defects in the data are filtered out from the calculation. This function can effective when specifying the calculation range for locations at which the boundary between circle and line is difficult to determine.

Text output of the calculation result and graphics data
You can output the calculation result as text (in csv or txt format), output graphics data obtained from measurements as point-string data to a text file or CAD file (in the DXF or IGES format), or copy the data to the clipboard. Combined with commercial document or statistical processing software, this feature can be used to share data with computers that do not have dedicated analysis software installed or execute CAD-based reverse engineering.

Simple pitch calculation function
You can efficiently analyze the pitch between identical shapes, such as a screw pitch or the distance between circles (center-to-center pitch), by simply specifying the desired range using mouse operations.

Contour-tolerancing function as a standard feature
The best-fit processing function that moves the coordinate values of the design data and measurement data to the optimum positions is provided as a standard feature. Since the tolerancing results can be visually displayed as graphics, displayed as tolerance values and tolerance expansions in each coordinate, or output as a text file, they can be utilized as feedback data for machining systems.
Contour Analysis Software: FORMTRACEPAK

**Contour Analysis**

**Design value generation function**
You can generate design data from CAD data (DXF or IGES file) or text data. Furthermore, since you can also convert measurement data into design data, you can save parts data prior to use (testing) as design data and effectively utilize it for checking the wear following use (testing).

**Data combination function**
You can combine partial data collected separately from a workpiece (made necessary due to shape characteristics) into a single graphic for convenient analysis.

**Calculation command repetition setting**
When identical shapes have the same pitch, you can analyze all of the shapes in a batch by specifying a single analysis location and the pitch.

**Best-fit processing function for measurement point strings**
This function tries to fit the measurement points to the stored reference data on the same coordinate system. It can eliminate the effects of a shift that may occur when setting the workpiece during automatic analysis.

**Data superimposition command**
You can superimpose two sets of data by detecting their characteristic points. Use the mouse to drag and move the measurement point strings to the desired positions to be superimposed.
Integrated layout

You can use simple operations to lay out graphics obtained from measurements as well as measurement results for surface roughness, contour, and roundness on a single page. Furthermore, since the program now allows you to specify a saved file and paste it, you can easily paste results from multiple files.

Note: the optional ROUNDPAK roundness/cylindricity analysis program is required. (Ver. 7 or higher)

Element information bar
This bar displays the attribute values of the pasted items, allowing you to easily check the contents of the pasted measurement data files.

System layout printing
By simply selecting the items to be output, you can automatically lay out the page to be printed. Use this feature when you wish to simplify the printing task.

Element insertion bar
Using the mouse to drag and drop the analysis content displayed in the element insertion bar, you can paste it into the layout. From the contour analysis result, you can also select the analysis result for a circle or line alone and paste it in position.

Saving the result as a web page
Since you can save the result in html or mhtml format, which can be displayed using Internet Explorer or Microsoft Word, you can check the result even on a PC on which no layout-editing program is installed.

Report creation function
You can freely assemble measurement results/conditions/graphics as well as comments/circles/lines/arrows, and print them out in a measurement result report. Furthermore, since you can paste bitmap files, you can also add a workpiece image or company logo to the layout. You can also save the created layout and use it again later for similar measurements.

PDF file output
You can output the PDF-format file of the measurement result report.
Optional Accessories for Automatic Measurement

**Y-axis table: 178-097**
Enables efficient, automatic measurement of multiple aligned workpieces and multiple points on a single measurement surface.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel range</td>
<td>200mm</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.05μm</td>
</tr>
<tr>
<td>Positioning accuracy</td>
<td>±3μm</td>
</tr>
<tr>
<td>Drive speed</td>
<td>Max 80mm/s</td>
</tr>
<tr>
<td>Maximum load</td>
<td>50kg</td>
</tr>
<tr>
<td>Mass</td>
<td>28kg</td>
</tr>
</tbody>
</table>

**Rotary Table θ1-axis table: 12AAD975***
For efficient measurement in the axial/transverse directions. When measuring a cylindrical workpiece, automatic alignment can be performed in combination with the Y-axis table.
* θ1-axis mounting plate (12AAE630) is required when directly installing on the base of the CV-3200/4500 series.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement</td>
<td>360°</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.004°</td>
</tr>
<tr>
<td>Maximum load</td>
<td>12kg</td>
</tr>
<tr>
<td>Rotational speed</td>
<td>Max 10°/s</td>
</tr>
<tr>
<td>Mass</td>
<td>7kg</td>
</tr>
</tbody>
</table>

**Rotary Table θ2-axis unit: 178-078***
You can measure multiple points on a cylindrical workpiece and automate front/rear-side measurement.
* θ2-axis mounting plate (12AAE718) is required when directly installing on the base of the CV-3200/4500 series.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Displacement</td>
<td>360°</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.0072°</td>
</tr>
<tr>
<td>Maximum load</td>
<td>4kg</td>
</tr>
<tr>
<td>Rotational speed (loading moment)</td>
<td>(343 N·cm or less)</td>
</tr>
<tr>
<td>Mass</td>
<td>5kg</td>
</tr>
</tbody>
</table>

**Centering chuck (ring operated): 211-032**
This chuck is useful when measuring small workpieces. You can easily clamp them with its knurled ring.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retention range</td>
<td></td>
</tr>
<tr>
<td>Inner latch OD</td>
<td>ø1 - ø36mm</td>
</tr>
<tr>
<td>Inner latch ID</td>
<td>ø16 - ø69mm</td>
</tr>
<tr>
<td>Outer latch OD</td>
<td>ø25 - ø79mm</td>
</tr>
<tr>
<td>Dimensions</td>
<td>ø118x41mm</td>
</tr>
<tr>
<td>Mass</td>
<td>1.2kg</td>
</tr>
</tbody>
</table>

**Micro-chuck: 211-031**
This chuck is suitable for clamping extra-small diameter workpieces (ø1 mm or less), which cannot be retained with the centering chuck.

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retention range</td>
<td></td>
</tr>
<tr>
<td>OD</td>
<td>ø0.1 - ø1.5mm</td>
</tr>
<tr>
<td>Dimensions</td>
<td>ø118 x48.5mm</td>
</tr>
<tr>
<td>Mass</td>
<td>0.6kg</td>
</tr>
</tbody>
</table>
Optional Accessories

3-axis Adjustment Table: 178-047

This table helps make the adjustments required when measuring cylindrical surfaces. The corrections for the pitch angle and the swivel angle are determined from a preliminary measurement and the Digimatic micrometers are adjusted accordingly. A flat-surfaced workpiece can also be leveled with this table. By using Mitutoyo’s 3-axis adjustment table, the workpiece can be aligned and leveled easily, simply by following the FORMTRACEPAK guidance. No experience or special expertise is required.

Guidance display when using 3-axis adjustment table

Table and fixture systems

Levels:
- Leveled table 178-043-1 (mm), 178-053-1 (inch)
- Digital Leveled table 178-042-1 (mm), 178-052-1 (inch)
- Leveled table 178-016
- Leveled table (for D.A.T.) 178-016
- Leveled table 178-016

V-blocks:
- V-block 998291
- Precision vise 178-019

Center supports:
- Center support 172-142
- Center support 172-143

Cross-travel tables:
- Cross-travel table 218-001 (mm), 218-011 (inch)
- Cross-travel table 218-041 (mm), 218-051 (inch)

Supports:
- Swivel center support 172-197
- Holder with clamp 176-107
- V-block with clamp 172-234, 172-378

Calibration stands:
- Calibration stand 1 12AAM100
- Calibration stand 2 12AAG175

*1 Required for calibrating upward measurement of CV-3200 series.
*2 Required for calibrating in bulk by mounting straight arm/small-hole stylus arm without using cross-travel table and Y-axis table.
Optional Accessories

Vibration isolators

Desk types

Desk type*1
No.12AAK110
Monitor arm*2
No.12AAK120
Side table*3
No.12AAL019

Example combination: with side table but no monitor arm (tester and PC not included)

Example combination: with monitor arm but no side table*3 (tester and PC not included)

*1 For models with a product code that ends in S4, S8, H4, or H8. Please contact us directly if you require units for models with a product code that ends in W4 or W8 (large base models).
*2 Used together with vibration isolator (No.12AAK110).
*3 User to provide a printer rack.

Desktop types

Manually charged pneumatic type*4
No.178-023

Automatically charged pneumatic type*4
No.178-025

Stand for Desktop type
External size (WxDxH): 640x470x660mm
Mass: 25kg
No.178-024

*4 For models with a product code that ends in S4, S8, H4, or H8. Please contact us directly if you require units for models with a product code that ends in W4 or W8 (large base models).

Arms

<table>
<thead>
<tr>
<th>Description</th>
<th>Arm No.</th>
<th>Parts No.</th>
<th>Applicable stylus No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight arm</td>
<td>AB-31*5 12AAM101</td>
<td>SPH-5 6, 7, 8, 9, 5PHW-56 66.76</td>
<td></td>
</tr>
<tr>
<td>Eccentric arm</td>
<td>AB-32 12AAM102</td>
<td>SPH-5 6, 7, 8, 9, 5PHW-56 66.76</td>
<td></td>
</tr>
<tr>
<td>Small-hole arm</td>
<td>AB-33 12AAM103</td>
<td>SPH-41, 42, 43</td>
<td></td>
</tr>
</tbody>
</table>

*5 Standard accessory
*6 Stylus for CV-4500 series
*7 One-sided cut stylus SPH-71 (standard accessory) mounting

Example combination: with straight arm but no eccentric arm
Example combination: with eccentric arm but no small-hole arm
Example combination: with small-hole arm but no straight arm
## Styli

<table>
<thead>
<tr>
<th>Stylus name</th>
<th>Stylus No.</th>
<th>Parts No.</th>
<th>Application arm No.</th>
<th>H (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Double-sided conical stylus</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPHW-56</td>
<td>12AA0M95</td>
<td>AB-31, AB-32</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>SPHW-66</td>
<td>12AA0M96</td>
<td>AB-31, AB-32</td>
<td></td>
<td>32</td>
</tr>
<tr>
<td><strong>One-sided cut stylus</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPH-51</td>
<td>354682</td>
<td>AB-31, AB-32</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>SPH-61</td>
<td>354683</td>
<td>AB-31, AB-32</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>SPH-71</td>
<td>354684</td>
<td>AB-31, AB-32</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>SPH-81</td>
<td>354685</td>
<td>AB-31, AB-32</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>SPH-91</td>
<td>354686</td>
<td>AB-31, AB-32</td>
<td></td>
<td>42</td>
</tr>
<tr>
<td><strong>Intersecting cut stylus</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPH-52</td>
<td>354687</td>
<td>AB-31, AB-32</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>SPH-62</td>
<td>354688</td>
<td>AB-31, AB-32</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>SPH-72</td>
<td>354689</td>
<td>AB-31, AB-32</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>SPH-82</td>
<td>354690</td>
<td>AB-31, AB-32</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>SPH-92</td>
<td>354691</td>
<td>AB-31, AB-32</td>
<td></td>
<td>42</td>
</tr>
<tr>
<td><strong>Cone stylus</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tip angle 30° Sapphire tipped</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPH-53</td>
<td>354692</td>
<td>AB-31, AB-32</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>SPH-63</td>
<td>354693</td>
<td>AB-31, AB-32</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>SPH-73</td>
<td>354694</td>
<td>AB-31, AB-32</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>SPH-83</td>
<td>354695</td>
<td>AB-31, AB-32</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>SPH-93</td>
<td>354696</td>
<td>AB-31, AB-32</td>
<td></td>
<td>42</td>
</tr>
<tr>
<td>Tip angle 20° Carbide-tipped</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPH-54</td>
<td>354697</td>
<td>AB-31, AB-32</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>SPH-64</td>
<td>354698</td>
<td>AB-31, AB-32</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>SPH-74</td>
<td>354699</td>
<td>AB-31, AB-32</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>SPH-84</td>
<td>354900</td>
<td>AB-31, AB-32</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>SPH-94</td>
<td>354901</td>
<td>AB-31, AB-32</td>
<td></td>
<td>42</td>
</tr>
<tr>
<td>Tip angle 50° Diamond tipped</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPH-79</td>
<td>355129</td>
<td>AB-31, AB-32</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td><strong>Knife edge stylus</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tip angle 20° 3mm Edge width</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPH-77</td>
<td>354887</td>
<td>AB-31, AB-32</td>
<td></td>
<td>20</td>
</tr>
<tr>
<td>SPH-87</td>
<td>354888</td>
<td>AB-31, AB-32</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>SPH-97</td>
<td>354889</td>
<td>AB-31, AB-32</td>
<td></td>
<td>42</td>
</tr>
<tr>
<td><strong>Ball stylus</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tip shape: One-sided cut</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPH-41</td>
<td>12AA0M96</td>
<td>AB-33</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>SPH-42</td>
<td>12AA0M97</td>
<td>AB-33</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>SPH-43</td>
<td>12AA0M98</td>
<td>AB-33</td>
<td></td>
<td>6.5</td>
</tr>
</tbody>
</table>

*1 Stylus for CV-4500 series
*2 Standard accessory of CV-4500 series
*3 Standard accessory of CV-3200 series
*4 Stylus SPH-21, 22, and 23 for CV-3100/4100 series are not available.

### Arm stylus (comprising an arm and stylus)

<table>
<thead>
<tr>
<th>Arm stylus name</th>
<th>Stylus No.</th>
<th>Parts No.</th>
<th>H (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double-sided small hole arm stylus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPHW-31</td>
<td>12AA0M108</td>
<td></td>
<td>2.4</td>
</tr>
<tr>
<td>SPHW-32</td>
<td>12AA0M109</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>SPHW-33</td>
<td>12AA0M110</td>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

*5 Arm Stylus for CV-4500 series
## Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>CV-3200S4</th>
<th>CV-3200H4</th>
<th>CV-3200W4</th>
<th>CV-3200S8</th>
<th>CV-3200H8</th>
<th>CV-3200W8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X-axis</td>
<td>100mm</td>
<td>200mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z1-axis (detector unit)</td>
<td>60mm (±30mm in horizontal situation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z2-axis (column) travel range</td>
<td>300mm</td>
<td>500mm</td>
<td>300mm</td>
<td>500mm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Detector (Z1-axis, detector unit)

- **Scale unit**: Arc scale
- **Resolution**: CV-3200 series: 0.04μm, CV-4500 series: 0.02μm
- **Stylus updown motion**: Arc movement
- **Measuring direction**: Both pulling and pushing directions
- **Measuring face direction**: 
  - CV-3200 series: Downward or upward
  - CV-4500 series: Both upward and downward (direction switch from FORMTRACEPAK)
- **Stylus traceable range**: Ascent 77°, Descent 83° (with one-sided cut stylus, standard accessory)

### Drive unit

- **Scale unit**: X-axis Separate type linear encoder, Z2-axis (column) ABS encoder
- **Resolution**: X-axis: 0.05μm, Z2-axis (column): 1μm
- **Drive speed**: X-axis: 0 - 80mm/s and manual operation, Z2-axis (column): 0 - 30mm/s and manual operation
- **Measuring speed**: X-axis: 0.02 - 5mm/s
- **Straightness (when the X-axis is horizontal)**: X-axis: 0.8μm/100mm, 2μm/200mm
- **X-axis inclination angle**: ±45°

### Accuracy (20°C)

- **CV-3200 Series**:
  - X-axis: ±(0.8 + 0.01L) μm, L = Drive length (mm)
  - Z1-axis (column): ±(1.6 + | 2H | /100) μm, H = Measurement height from the horizontal position
- **CV-4500 Series**: 
  - X-axis: ±(0.8 + 0.01L) μm, L = Drive length (mm)
  - Z1-axis (column): ±(0.8 + | 2H | /100) μm, H = Measurement height from the horizontal position

### External dimensions (W×D×H)

<table>
<thead>
<tr>
<th>Main unit</th>
<th>756x482x966mm</th>
<th>756x482x1166mm</th>
<th>1156x482x1176mm</th>
<th>766x482x966mm</th>
<th>766x482x1166mm</th>
<th>1166x482x1176mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller</td>
<td>221x344x490mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remote box</td>
<td>248x102x62.2mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Mass

<table>
<thead>
<tr>
<th>Main unit</th>
<th>140kg</th>
<th>150kg</th>
<th>220kg</th>
<th>140kg</th>
<th>150kg</th>
<th>220kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remote box</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.9kg</td>
</tr>
</tbody>
</table>

### Operating temperature range
- 15 - 25°C (within ±1K temperature fluctuation on calibration and measurement)

### Operating humidity range
- 20 - 80%RH (with no condensation)

### Storage temperature range
- −10 to 50°C

### Storage humidity range
- 5 - 90%RH (with no condensation)
The CV-3200 series detector comes with weights for adjusting the measuring force.
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 up 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 bespoke measuring solutions and even, if deemed cost-effective, take your critical measurement challenges in-house on a sub-contract basis.

Note: Product illustrations are without obligation. Product descriptions, in particular any and all technical specifications, are only binding when explicitly agreed upon.

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