Contour Measuring System
CONTRACER CV-1000/2000

Bulletin No. 2102

Digital, cost-effective contour measuring instruments feature excellent portability and versatility.

Mitutoyo

Digital analysis type that feature excellent portability and versatility
CONTRACER CV-1000/2000

Versatile combinations to suit different applications

■ Choose the combination that best suits your application.

CV-1000N2

※Stand: option (see P.6)

CV-2000M4

※Stand: standard accessory

Optional Software FORMTRACEPAK

Desktop PC Type

CV-2000M4 + DESKTOP PC
CV-1000N2 + DESKTOP PC

Portability enables on-site measurement

CV-1000N2

Measuring range

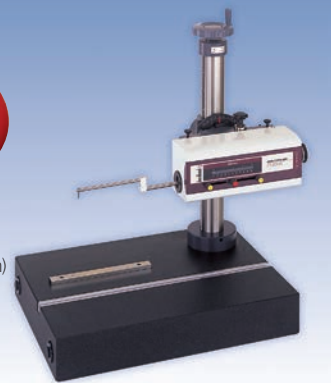X axis: 1.97"(50mm)   Z axis: .99"(25mm)
Z axis resolution: .016μin (0.4μm)

Versatility

CV-2000M4

Measuring range

X axis:3.94"(100mm) Z axis:1.58"(40mm)
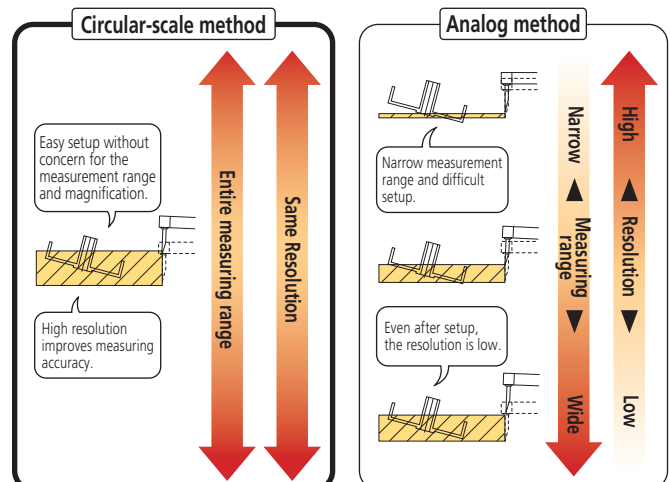Z axis resolution: .02μin (0.5μm)

Z-axis Detecting Unit

■ Linear digital scales are provided for detecting position on the X-axis.
A newly developed digital circular-arc scale is used on the Z-axis.

These offer high resolution measurement in a wide range.

Patent registered (in Japan, USA, UK)
Patent pending (in Germany)

Light emitter
Circular scale
Light receiver

The Circular Scale
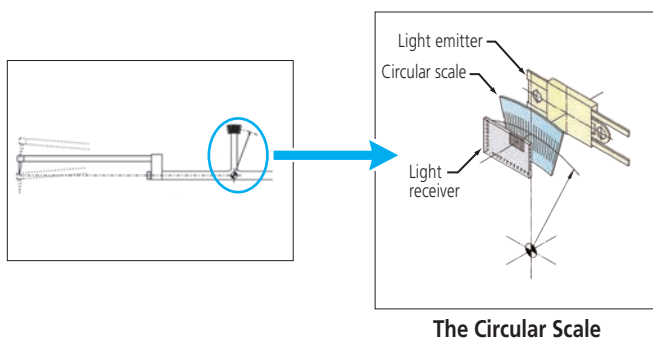
Operators are free from bothersome operations such as the measurement magnification switching and calibration for each magnification required for analog instruments.

Circular-scale method

Easy setup without concern for the measurement range and magnification.

High resolution improves measuring accuracy.

Entire measuring range

Same Resolution

Analog method

Narrow measurement range and difficult setup.

Even after setup, the resolution is low.

Narrow ▲ Measuring range ▼ Wide

High ▲ Resolution ▼ Low

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Specifications

| Model No.		CV-1000N2	CV-2000M4
Order No.		218-621A	218-641A
Measuring range	X axis	1.97" (50mm)	3.94" (100mm)
	Z axis	.99" (25mm)	1.58" (40mm)
Accuracy	X axis	±(138+20L)µin [(3.5+2L/100)µm] L:Measurement length: inch(mm)	
	Z axis	±(138+|158H|)µin [±(3.5+|4H|/25)µm] H: Measurement height (mm) from a level position (less than ±12.5mm)	±(138+|158H|)µin [±(3.5+|4H|/25)µm] H: Measurement height (mm) from a level position (less than ±20.0mm)
Traverse linearity (with the X axis horizontal)		.14µin/2" (3.5µm/50mm)	.14µin/4" (3.5µm/100mm)
Z axis resolution		.016µin (0.4µm)	.02µin (0.5µm)
Drive speed	Measuring	.008"/s or .02"/s (0.2mm/s or 0.5mm/s)	
	Moving	.008"/s or .04"/s (0.2mm/s or 1.0mm/s) and manual	
Measuring force		.008"/s or .04"/s (0.2mm/s or 1.0mm/s) (in horizontal, using the standard arm)	
Limiting trace angle of stylus		Up (dependent on surface quality): 77° Down (dependent on surface quality): 87°	
Direction of measurement		Toward drive unit	
Direction of the stylus when measuring		Down	
X-axis operation *		Motor driven / manual control knob is included	
Stand		Option	Manual column stand
Base dimensions (W×D×H)		—	23.63 x 17.72" / 600×450mm
Base material		—	Granite
External dimensions (W×D×H)		19.60 x 5.46 x 7.1" (489.7 × 138.5 × 178mm)	27.1 x 17.72 x 29.13" (687.7 × 450 × 739.8mm)
Mass		11lbs (5.0kg)	255lbs (115.8kg)

*Positioning, retraction, etc

Dimensions

Unit: Inch(mm)

CV-1000N2
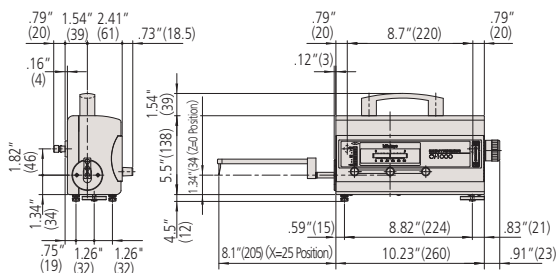
CV-2000M4
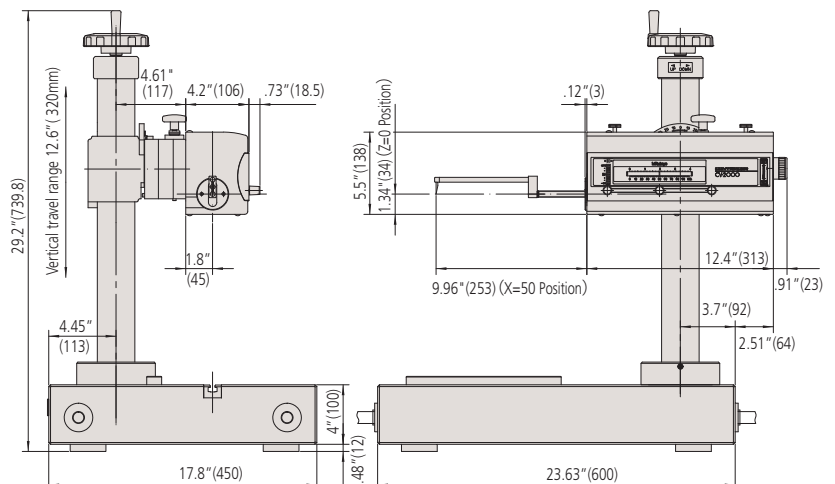
FORMTRACEPAK

Measurement Control

- An appropriate mode can be used to suit the purpose, such as the Single mode for one-time measurement and the Teaching mode for creating part programs to measure multiple pieces of identical workpieces.
 A flow sequence from measurement to report printout can be defined in a part program, thus allowing efficient measurement, analysis, and report output.
  The function to display a comment with a picture is also available at any time and is useful when constructing a measuring procedure manual to record important points to keep in mind, such as workpiece setting.
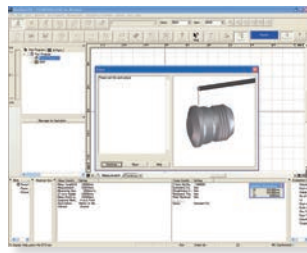
- The command buttons necessary for executing and creating a measurement procedure (part program) are laid out on the measurement control screen. Any unused button or display area can be displayed or hidden arbitrarily, allowing the operator to customize the screen layout for ease of use.

- A measurement procedure can be easily invoked by selecting it from the pull-down menu.
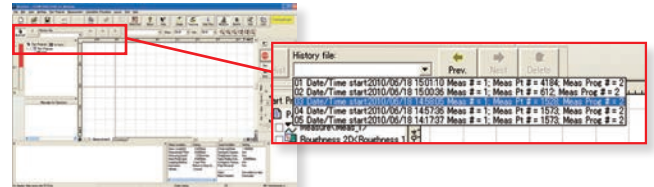
Contour Analysis

- Various commands including point commands (10 kinds), line commands (6 kinds), and circle commands (6 kinds) are provided to cover the basic elements of analysis. Standard calculation commands that combine these elements for angle, pitch or distance calculation are also provided.
  The display can be tailored by the customization function to suit the application. For example, the calculation command can be hidden to simplify the measurement environment and allow the user to focus just on the commands actually used in the application.
- With the useful Automatic Circle/Line Application command it is possible to automatically calculate all circles and lines that are included in the data without pressing the command button many times over.
- The Outlier Removal Function is very useful, for example, for automatically removing flaws from the data and setting the calculation range for sections where the boundary between a circle and a line cannot be easily identified.
- Calculation results are output as text (in csv or/and txt format). The geometrical measurement data can either be output as point-series data into a text file or CAD file (in DXF or IGES format) or copied onto the clipboard.
  It is also possible to use some commercial documentation software and statistical processing software to share the data on a PC that is not installed with the Mitutoyo-original analysis software or where reverse engineering with CAD is intended.
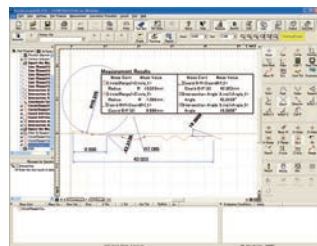
- **Features of the contour tolerance zone measurement function**

  The Best-fit function that allows both design data and measurement data to be translated to their optimal coordinates is equipped as standard.
  From this tolerance zone measurement result, it is not only possible to present a visual form of geometrical data and the amount of error at each coordinate, or the amount of error around the contour, but also to output the result in text-file format, which can be applied for feedback to a machine tool, etc.
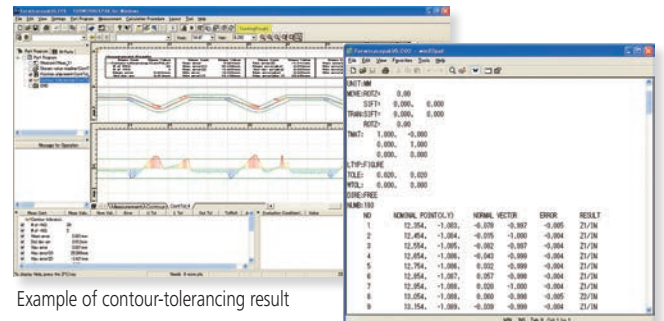
Example of contour-tolerancing result

Example of a contour-tolerancing result output as numeric values

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● Data combination function

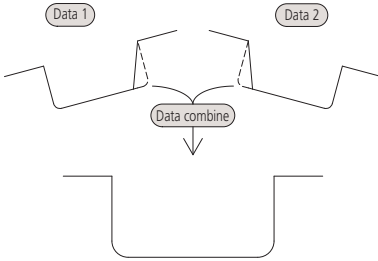To overcome machine limitations when measuring complex workpiece features, a contour can be measured in sections which are then combined into one graphic prior to being analyzed.

## ● Best-fit processing function for measurement point strings

This function aligns the coordinate system of a set of measurement points with that of stored reference data, as closely as is possible. This removes the effects of non-optimal initial workpiece orientation and therefore enables errors in dimension or form to be clearly analyzed and presented.
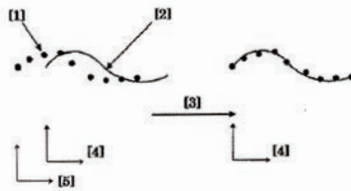
[1]Measured Points/[2]Bestfit Reference Data/[3]Bestfit/[4]Reference Coordinate System/[5]Measurement Coordinate System

● Calculation command repetition setting

If multiple identical features are located at a constant pitch, batch analysis of them can be performed by entering one-feature analysis and specifying the pitch.
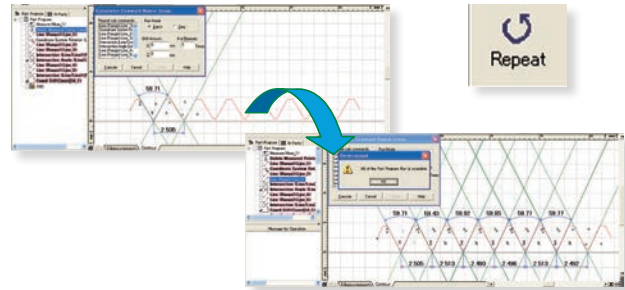
● Data superimposition command

This command allows superimposition of 2 pieces of data by detecting characteristic points. A dragging operation with the mouse allows you to freely move any sequence of measurement points to be superimposed on another.
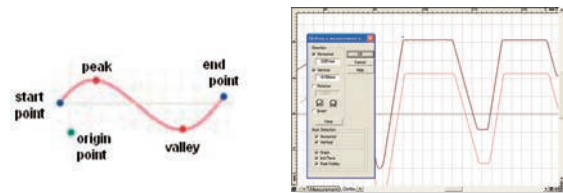
Layout Program

● Integrated layout

This program can easily lay out the measurement data and graphics for surface roughness, contour, roundness, etc., on one sheet of paper.
Pasting data is enabled by specifying a file from among those stored and thus the required measurement results can easily be pasted from multiple files.
* The roundness/cylindrical form analysis program ROUNDPAK is needed additionally. (For compatible versions, contact your local Mitutoyo Sales Office.)

● System layout printing

This function can easily and automatically lay out and print an inspection certificate just by selecting print items such as calculation result, measurement condition and measurement graphic.
It also allows detailed setting for measurement graphic size, measurement result, font, etc.
Use this function for basic printing.

● Saving the result as WEB pages

A measurement result can be stored in html or mhtml format that allows display using Internet Explorer and MS-WORD, thus enabling checking using a PC on which no layout editing program is installed.

● Report creation function

This function allows free layout of a comment, circle, line, arrow, etc., in addition to a measurement result, condition, and graphic in order to print those data in the form of a Measurement Result Report.
Bit map file data can also be pasted, thus allowing a workpiece image, corporate name logo, etc., to be laid out.
Additionally, a measurement result layout created once can be stored to reuse it when performing the same measurement.

Optional Accessories

Manual column stand for CV-1000N2

Suitable for desktop use in inspection rooms and such.

No.218-024   ＊Except measuring unit (**CV-1000N2**)
Vertical adjustment range: 12.6" (320mm)
Dimensions (W×D×H) :23.6"x17.7"x29.1" (600x450x740mm)
Mass: 242lbs. (110kg)

Dimensions Unit: Inch(mm)

1.89" (48)
10.23"(260)
29.1"(740)
3.94"(100)
.47"(12)
23.6"(600)

Manual column stand (OPTION)

Floor stand and tables

178-023
Vibration isolator

178-025
Vibration isolator

Tables

178-024
Floor stand
(640×470×670mm)

218-007
(1000×500×660mm)

166-215
(1200×750×670mm)

218-008
(400×500×660mm)

218-010
(500×550×700mm)
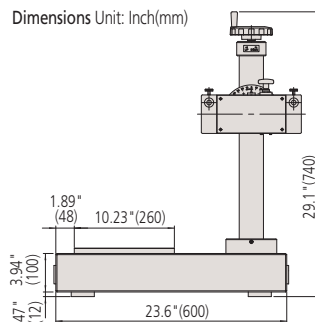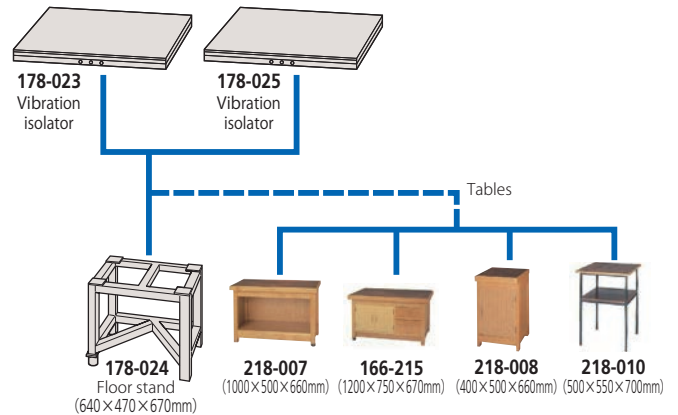
System cofiguration including optional accessories

Leveling table
(With analog heads)
178-043-1 (mm),
178-053-1 (inch)

Leveling table
(With digital heads)
178-042-1 (mm),
178-052-1 (inch)

Leveling table
178-016

Calibration stand
12AAG175

V-block
998291

Precision vise
178-019

Cross-travel table
218-001 (mm),
218-011 (inch)

Cross-travel table
218-041 (mm),
218-051 (inch)

Rotary vise
218-003

Center supports
172-142

Center support riser
172-143

Swivel center support
172-197

Holder
with clamp
176-107

V-block
with clamp
172-234

V-block
with clamp
172-378

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6

Arms and Stylus

Optional Arms and Stylus

■ Arms

Straight arm

φ8
155
H
15

Eccentric arm

φ8
185
H
40
stylus
15

For small hole

φ8
95
145
H
25
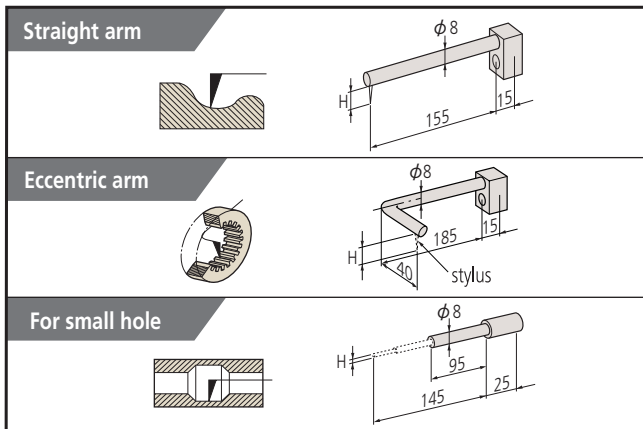
※Select an arm and stylus that match the type of measurement you require.

Type of arm	Arm No.	Parts No.	Adaptation stylus No.	H: Inch (mm)
Straight arm	AB-51	935111	SPH-51,52,53,54,55,56,57	.24"(6)
	AB-61	935112	SPH-61,62,63,64,65,66,67	.48"(12)
	AB-71*	935113	SPH-71,72,73,74,75,76,77,79	.79"(20)
	AB-81	935114	SPH-81,82,83,84,85,86,87	1.19"(30)
	AB-91	935115	SPH-91,92,93,94,95,96,97	1.66"(42)
Eccentric arm	AB-52	935116	SPH-51,52,53,54,55,56,57	.24"(6)
	AB-62	935117	SPH-61,62,63,64,65,66,67	.48"(12)
	AB-72	935118	SPH-71,72,73,74,75,76,77,79	.79"(20)
	AB-82	935119	SPH-81,82,83,84,85,86,87	1.19"(30)
	AB-92	935120	SPH-91,92,93,94,95,96,97	1.66"(42)
For small hole	AB-11	935110	SP-11,31	.016"(0.4)
			SP-12,32	.04"(1)
			SP-13,33	.1"(2.5)

*Standard accessory

■ Styli

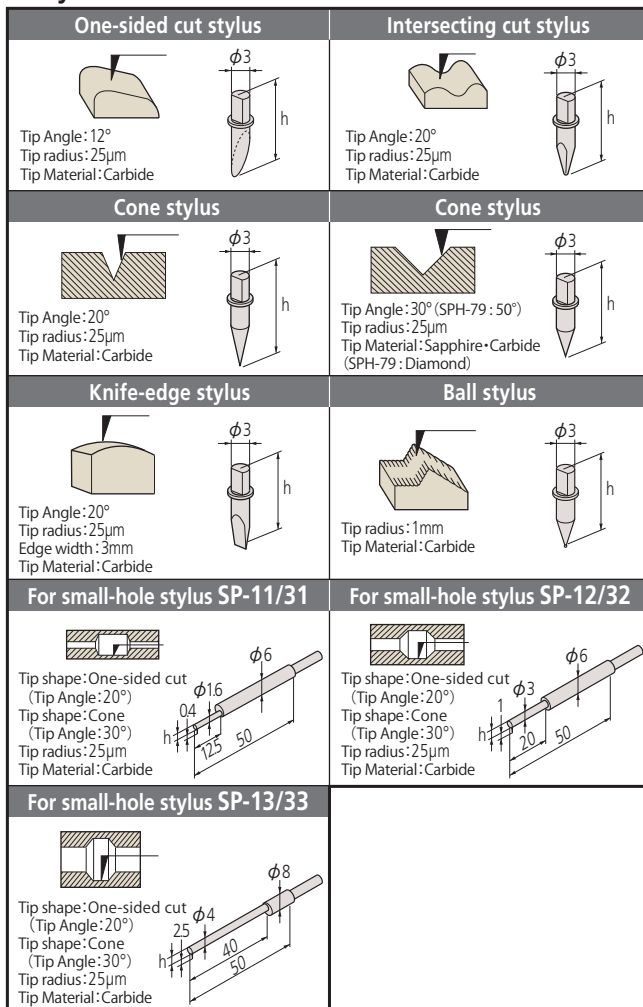| One-sided cut stylus	Intersecting cut stylus
φ3 h Tip Angle：12° Tip radius：25μm Tip Material：Carbide	φ3 h Tip Angle：20° Tip radius：25μm Tip Material：Carbide
Cone stylus	**Cone stylus**
φ3 h Tip Angle：20° Tip radius：25μm Tip Material：Carbide	φ3 h Tip Angle：30°(SPH-79：50°) Tip radius：25μm Tip Material：Sapphire・Carbide （SPH-79：Diamond)
Knife-edge stylus	**Ball stylus**
φ3 h Tip Angle：20° Tip radius：25μm Edge width：3mm Tip Material：Carbide	φ3 h Tip radius：1mm Tip Material：Carbide
For small-hole stylus SP-11/31	**For small-hole stylus SP-12/32**
φ6 φ1.6 0.4 h 12.5 50 Tip shape：One-sided cut （Tip Angle：20°) Tip shape：Cone （Tip Angle：30°) Tip radius：25μm Tip Material：Carbide	φ6 φ3 1 h 20 50 Tip shape：One-sided cut （Tip Angle：20°) Tip shape：Cone （Tip Angle：30°) Tip radius：25μm Tip Material：Carbide
For small-hole stylus SP-13/33	
φ8 φ4 2.5 h 40 50 Tip shape：One-sided cut （Tip Angle：20°) Tip shape：Cone （Tip Angle：30°) Tip radius：25μm Tip Material：Carbide	

Type of stylus	Stylus No.	Parts No.	Adaptation arm No.	H: Inch (mm)
One-sided cut stylus	SPH-51	354882	AB-51•52	.55"(14)
	SPH-61	354883	AB-61•62	.79"(20)
	SPH-71*	354884	AB-71•72	1.10"(28)
	SPH-81	345885	AB-81•82	1.5"(38)
	SPH-91	354886	AB-91•92	1.97"(50)
Intersecting cut stylus	SPH-52	354887	AB-51•52	.55"(14)
	SPH-62	354888	AB-61•62	.79"(20)
	SPH-72	354889	AB-71•72	1.10"(28)
	SPH-82	354890	AB-81•82	1.5"(38)
	SPH-92	354891	AB-91•92	1.97"(50)
Cone stylus Tip angle 20° (Carbide)	SPH-57	12AAE865	AB-51•52	.55"(14)
	SPH-67	12AAE866	AB-61•62	.79"(20)
	SPH-77	12AAE867	AB-71•72	1.10"(28)
	SPH-87	12AAE868	AB-81•82	1.5"(38)
	SPH-97	12AAE869	AB-91•92	1.97"(50)
Cone stylus Tip angle 30° (Sapphire)	SPH-53	354892	AB-51•52	.55"(14)
	SPH-63	354893	AB-61•62	.79"(20)
	SPH-73	354894	AB-71•72	1.10"(28)
	SPH-83	354895	AB-81•82	1.5"(38)
	SPH-93	354896	AB-91•92	1.97"(50)
Cone stylus Tip angle 50° (diamond)	SPH-79	355129	AB-71•72	1.10"(28)
Cone stylus Tip angle 30° (Carbide)	SPH-56	12AAA566	AB-51•52	.55"(14)
	SPH-66	12AAA567	AB-61•62	.79"(20)
	SPH-76	12AAA568	AB-71•72	1.10"(28)
	SPH-86	12AAA569	AB-81•82	1.5"(38)
	SPH-96	12AAA570	AB-91•92	1.97"(50)
Knife-edge stylus	SPH-54	354897	AB-51•52	.55"(14)
	SPH-64	354898	AB-61•62	.79"(20)
	SPH-74	354899	AB-71•72	1.10"(28)
	SPH-84	354900	AB-81•82	1.5"(38)
	SPH-94	354901	AB-91•92	1.97"(50)
Ball stylus	SPH-55	354902	AB-51•52	.55"(14)
	SPH-65	354903	AB-61•62	.79"(20)
	SPH-75	354904	AB-71•72	1.10"(28)
	SPH-85	354905	AB-81•82	1.5"(38)
	SPH-95	354906	AB-91•92	1.97"(50)
For small-hole stylus (One-sided cut)	SP-11	932693	AB-11	.08"(2)
	SP-12	932694	AB-11	.16"(4)
	SP-13	932695	AB-11	.26"(6.5)
For small-hole stylus (Cone)	SP-31	12AAE873	AB-11	.08"(2)
	SP-32	12AAE874	AB-11	.16"(4)
	SP-33	12AAE875	AB-11	.26"(6.5)

*Standard accessory

Coordinate Measuring Machines

Vision Measuring Systems

Form Measurement

Optical Measuring

Sensor Systems

Testing Equipment and Seismometer

Digital Scale and DRO Systems

Small Tool Instruments and Data Management

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