

5-Axis CNC CMM CRYSTA-Apex EX Series

*5-axis capability creates an amazing new standard
for measurement excellence*



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Coordinate Measuring Machines

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Products



Bulletin No. 2147

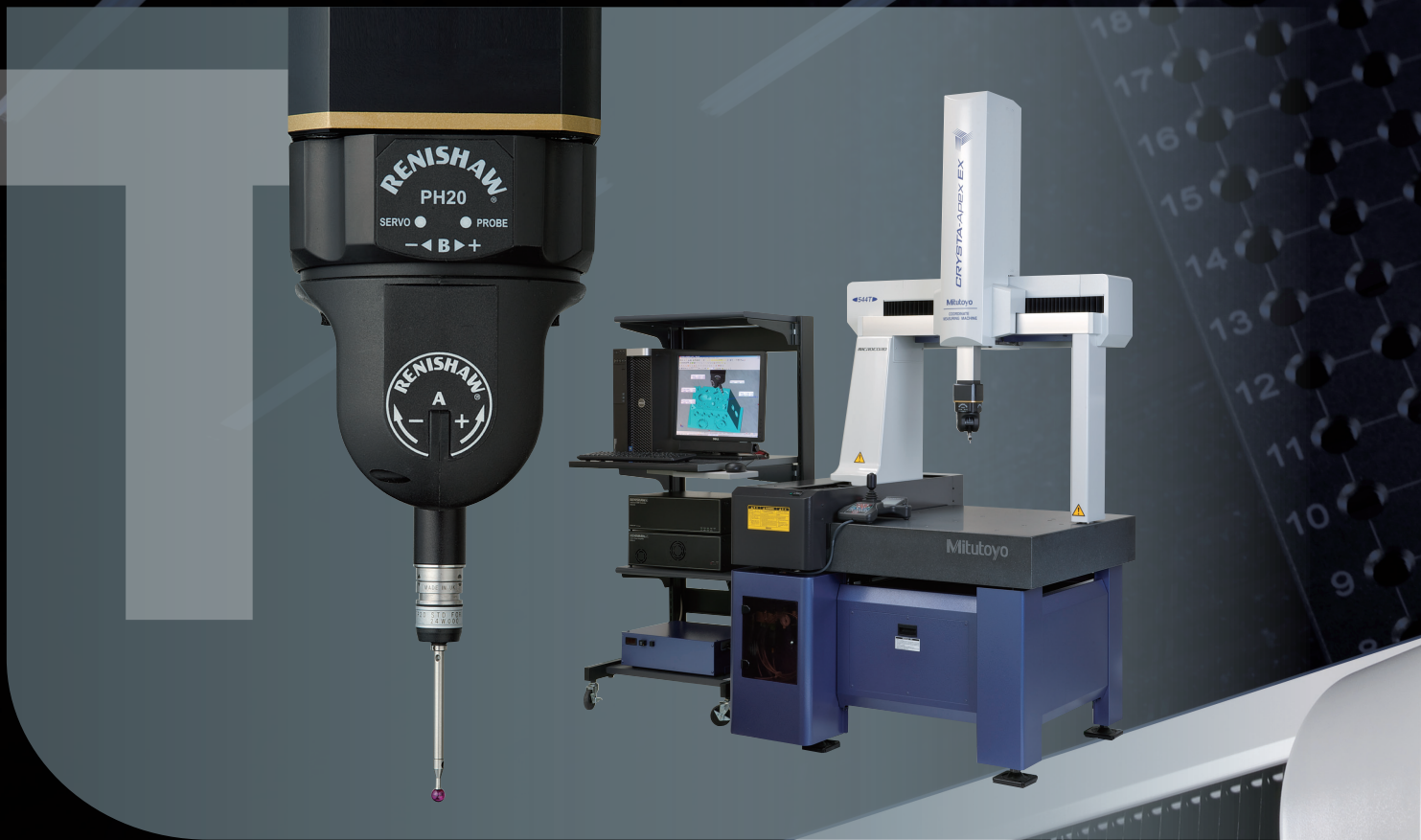
Mitutoyo

5-Axis CNC CMM CRYSTA-Apex EX Series

Smooth 5-axis probe control achieves superior measurement productivity

CRYSTA-Apex EX 500T/700T/900T Series

- Incorporates PH20 5-axis touch-trigger probe.
- Smooth 5-axis control drastically reduces measurement time for probe orientation.



5-axis control drastically reduces measurement time.



Productive operation

MICROCORD

5-axis design offers a choice of highly productive measurement methods, including "head touch" for point measurement by moving the probe head only in two axes, and ultra high speed 5-axis scanning (500mm/sec)*.

* CRYSTA-Apex EX1200 R series only

CRYSTA-APEX

CRYSTA-Apex EX 1200R Series

- Equipped with REVO 5-axis scanning probe head.
- Allows ultra high speed 5-axis scanning, far surpassing conventional 3-axis control.



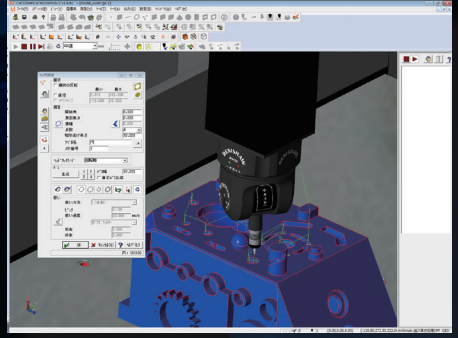
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Unique highly productive measurement



Allows productive online or Off-line programming using 3D CAD modeling.



Programming with 3D CAD model

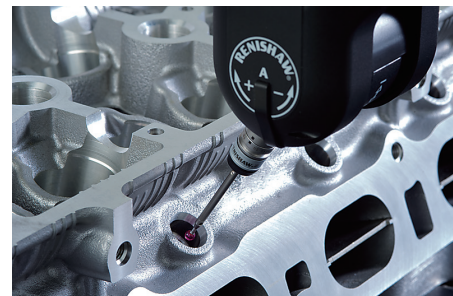
CRYSTA-Apex EX 500T/700T/900T Series

- The **CRYSTA-Apex EX 500T/700T/900T series** are CNC CMMs equipped with the **PH20** 5-axis control touch-trigger probe.
- 5-axis operation reduces the time required for probe orientational movements and allows more flexible positioning. This also ensures easy access to complex workpieces and saves time both during programming and measurement.

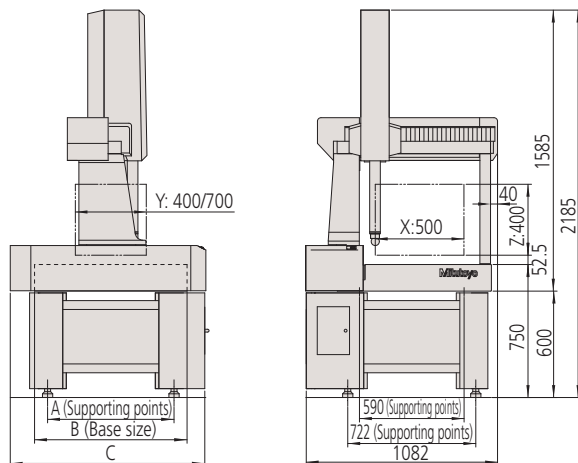


CRYSTA-Apex EX 544T

- In addition to 3-axis point measurement similar to conventional coordinate measuring machines, the **PH20** probe head also supports 'head touch' operation for quick point measurement using the two rotational axes of the probe only, with no movement required along the CMM axes.
- **PH20** incorporates a TP20 probe and allows use of modules designed for the TP20. Automatic probe changeover with a module changer is also supported.
- Even without the workpiece to be measured, a measurement program can be created on a PC using 3D CAD data. Compared to joystick operation, this makes for more efficient programming and also allows interference checking.

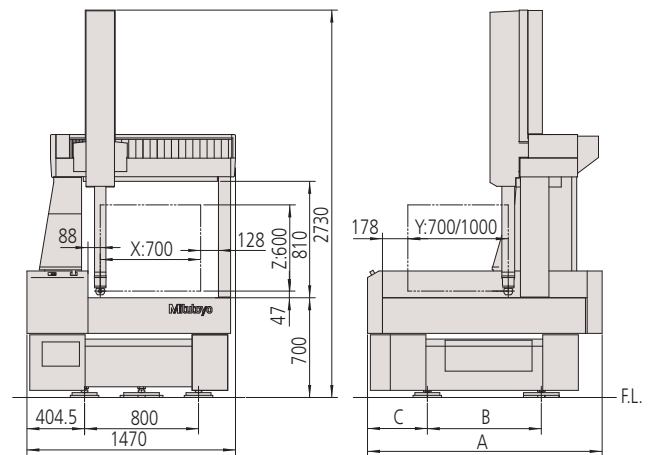


CRYSTA-Apex EX 500T Series DIMENSIONS (Unit: mm)



Model No.	A	B	C
CRYSTA-Apex EX544T	713	860	1122
CRYSTA-Apex EX574T	1013	1160	1458

CRYSTA-Apex EX 700T Series DIMENSIONS (Unit: mm)



Model No.	A	B	C
CRYSTA-Apex EX 776T	1650	800	420
CRYSTA-Apex EX 7106T	1950	1000	470

SPECIFICATIONS

Type: BRIDGE	Model No.	CRYSTA-Apex EX 544T	CRYSTA-Apex EX 574T	CRYSTA-Apex EX 776T	CRYSTA-Apex EX 7106T	CRYSTA-Apex EX 9106T	CRYSTA-Apex EX 9166T	CRYSTA-Apex EX 9206T
Range	X axis	19.68" (500mm)		27.55" (700mm)		35.43" (900mm)		
	Y axis	15.74" (400mm)	27.55" (700mm)		39.36" (1000mm)		62.99" (1600mm)	78.73" (2000mm)
	Z axis	15.74" (400mm)		23.62" (600mm)				
Resolution		0.000004" (0.0001mm)						
Guide Method		Air bearing on each axis						
Work table	Material	Granite						
	Size	25.11 x 33.86" (638 x 860mm)	25.11 x 45.67" (638 x 1160mm)	34.64 x 55.90" (880 x 1420mm)	34.64 x 67.71" (880 x 1720mm)	42.51 x 67.71" (1080 x 1720mm)	42.51 x 91.33" (1080 x 2320mm)	42.51 x 107.0" (1080 x 2720mm)
	Tapped insert	M8 x 1.25mm						
Workpiece	Max. height	21.45" (545mm)		31.49" (800mm)				
	Max. load	396 lbs. (180kg)		1,763 lbs. (800kg)	2,204 lbs. (1000kg)	2,645 lbs. (1200kg)	3,306 lbs. (1500kg)	3,968 lbs. (1800kg)
Mass (incl. stand & controller)		1,181 lbs. (536kg)	1,424 lbs. (646kg)	3,739 lbs. (1696kg)	4,347 lbs. (1972kg)	4,964 lbs. (2252kg)	6,369 lbs. (2889kg)	8,670 lbs. (3933kg)
Dimensions W x D x H		42.60x44.17x86.02" (1082x1122x2185mm)	42.60x57.40x86.02" (1082x1458x2185mm)	57.87x64.96x107.48" (1470x1650x2730mm)	57.87x76.77x107.48" (1470x1950x2730mm)	65.74x76.77x107.48" (1670x1950x2730mm)	65.74x105.90x107.48" (1670x2690x2730mm)	65.74x121.65x107.48" (1670x3090x2730mm)
ISO-10360-2:2009 E _{0,MPE}	18-22°C (64.4-71.6°F)			(2.2+3L/1000)µm				
	16-26°C (60.8-78.8°F)			(2.2+4L/1000)µm				
	ISO-10360-2:2009+							
ISO-10360-5: 2010	R _{0,MPL}	1.8µm		2.2µm				
	P _{FTU,MPE}	2.2µm						

Stylus Configurations for ISO Tests TP20: Ø4mm x L12mm	Air Supply	500	700/900	Environment	18-22°C (64.4-71.6°F)	16-26°C (60.8-78.8°F)
	Pressure	58.0 PSI (0.4MPa)		Rate of change	2.0C° or less per hour 2.0C° or less per day	2.0C° or less per hour 5.0C° or less per day
	Consumption	1.76CFM (50L/min)	2.11CFM (60L/min)	Gradient	1.0C° or less per meter vertical & horizontal	
	Source	3.53CFM (100L/min)	4.23CFM (120L/min)			

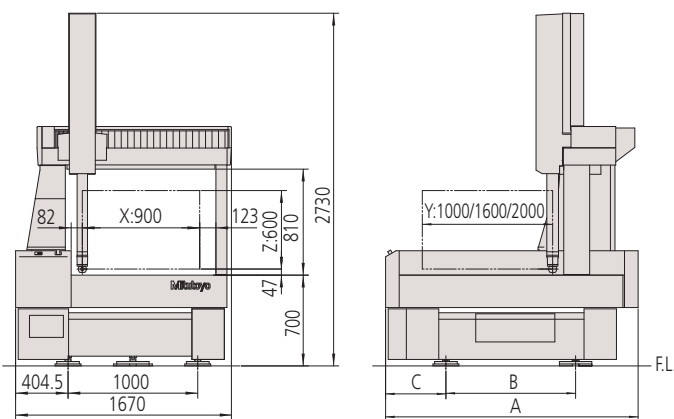
† This test is not part of Mitutoyo America's standard A2LA accredited CMM calibration procedure and is quoted upon request.

Specifications PH20

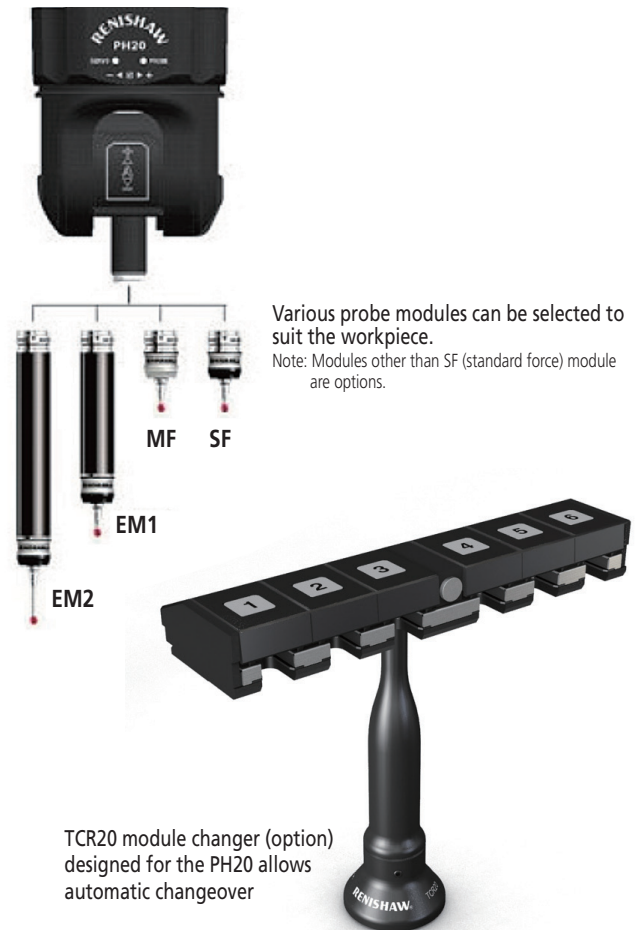
Rotation angle (Pitch angle)	Vertical (A-axis)	-115° to +115° (0.08sec)
	Horizontal (B-axis)	∞ (0.08sec)
Stylus	Maximum length	50mm

CRYSTA-Apex EX 900T Series DIMENSIONS

(Unit: mm)



Model No.	A	B	C
CRYSTA-Apex EX 9106T	1950	1000	470
CRYSTA-Apex EX 9166T	2690	1320	700
CRYSTA-Apex EX 9206T	3090	1500	800



CRYSTA-Apex EX 1200R Series

Helical scan



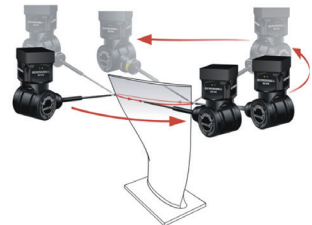
Gasket scan



Sweep scan



Airfoil section scan



- CRYSTA-Apex EX 1200R series products are advanced CNC CMMs equipped with the REVO 5-axis scanning probe head.
- 5-axis operation reduces the time required for probe repositioning movements and allows more flexible positioning. This also facilitates access to complex workpieces and saves time both during programming and measurement.
- Allows ultra-high-speed 5-axis scanning (max. 500 mm/s), far surpassing conventional 3-axis control. Support for high speed sampling of up to 4,000 points per second allows acquisition of densely spaced measurement points, even during fast scanning.
- Internal implementation of laser sensing technology ensures high accuracy measurement, even with long styli (up to 500 mm*).

* Distance from probe rotation center to stylus tip

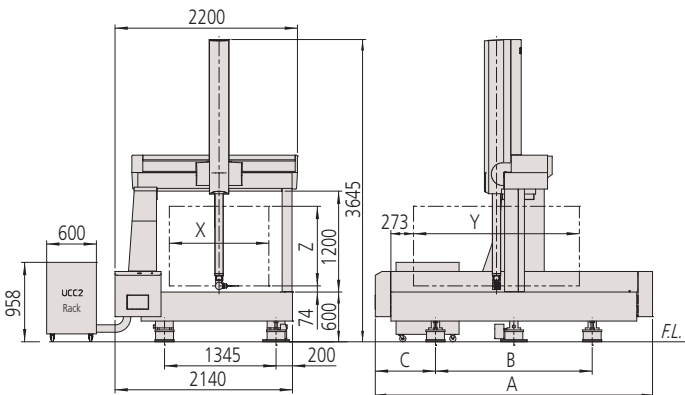
- Two types of probes are supported: RSP2 for 5-axis scanning and SP25M type RSP3 probe allowing use of a cranked stylus. Automatic changeover of these probes with an auto probe changer is possible, enabling fully automated measurement of parts with diverse shapes.
- Probe calibration of RSP2 requires only about 20 minutes to enable use of the full angular range. Compared to conventional scanning probes, which notably reduces preparation time.



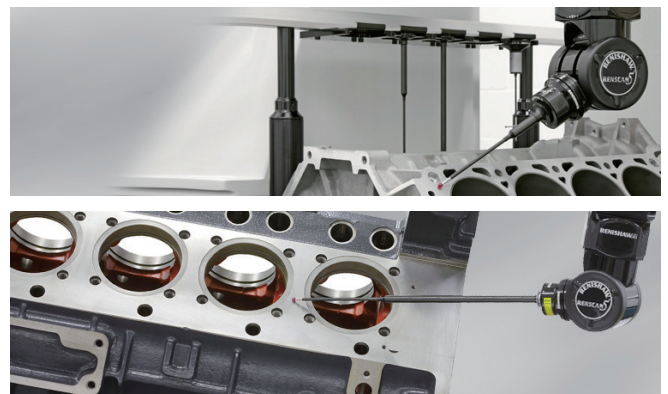
CRYSTA-Apex EX 1200R Series DIMENSIONS

(Unit: mm)

CRYSTA-Apex EX 123010R



Model No.	X	Y	Z	A	B	C
CRYSTA-Apex EX 121210R	1200	1200	960	2545	1700	420
CRYSTA-Apex EX 122010R	1200	2000	960	3345	1890	725
CRYSTA-Apex EX 123010R	1200	3000	960	4345	2500	920



SPECIFICATIONS

Type: BRIDGE	Model No.	Crysta-Apex EX 121210R	Crysta-Apex EX 122010R	Crysta-Apex EX 123010R
Range	X axis	47.24" (1200mm)		
	Y axis	47.24" (1200mm)	78.73" (2000mm)	118.10" (3000mm)
	Z axis	39.36" (1000mm)		
Resolution		0.000004" (0.0001mm)		
Guide Method		Air bearing on each axis		
Work table	Material	Granite		
	Size	55.90" x 85.23" (1420mm x 2165mm)	55.90" x 116.73" (1420mm x 2965mm)	55.90" x 156.10" (1420mm x 3965mm)
	Tapped insert	M8 x 1.25mm		
Workpiece	Max. height	45.66" (1160mm)		
	Max. load	4,409 lbs. (2000kg)	5,511 lbs. (2500kg)	6,613 lbs. (3000kg)
Mass (incl. stand & controller)		8,928 lbs. (4050kg)	13,558 lbs. (6150kg)	20,084 lbs. (9110kg)
Dimensions W x D x H		86.61 x 100.19 x 143.50" (2200 x 2545 x 3645mm)	86.61 x 131.69 x 143.50" (2200 x 3345 x 3645mm)	86.61 x 171.06 x 143.50" (2200 x 4345 x 3645mm)
ISO-10360-2:2009 E _{0,MPE}		18-22°C (64.4-71.6°F)		
		(2.9+4L/1000)µm		
		16-26°C (60.8-78.8°F)		
		(2.9+5L/1000)µm		
ISO-10360-5: 2010	P _{FTU,MPE}	3.2µm		

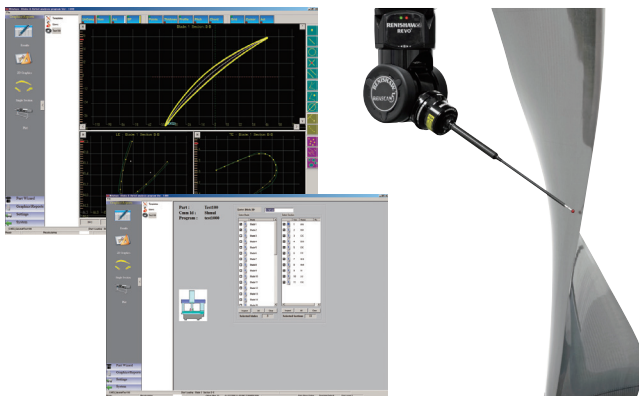
Configuration for ISO Tests	Air Supply	Environment	18-22°C (64.4-71.6°F)	16-26°C (60.8-78.8°F)
RSP2+RSH250 Ø6mm x L10mm	Pressure 72.5 PSI (0.5MPa)	Rate of change 1.0C° or less per hour	1.0C° or less per hour	1.0C° or less per hour
	Consumption 5.29CFM (150L/min)	2.0C° or less per day	2.0C° or less per day	5.0C° or less per day
	Source 8.12CFM (230L/min)	Gradient 1.0C° or less per meter vertical & horizontal		

Specification of REVO Scanning Probe

Rotation angle	Vertical (A-axis)	-5° to +120° (0.08 sec)
(Pitch angle)	Horizontal (B-axis)	∞ (0.08sec)
Stylus	Maximum length	50mm (Distance from probe rotation center to stylus tip)

MAFIS Express [Blade measurement/Evaluation program]

This software program enables creation of measurement programs and measurement and analysis of blades and blisks. A part program for measurement can be automatically created just by selecting required contents and evaluation conditions. The measurement results are displayed in a report including 2D graphics.



REVO Probe Options

• RSP2

Optimal for 5-axis scanning and touch-trigger measurement

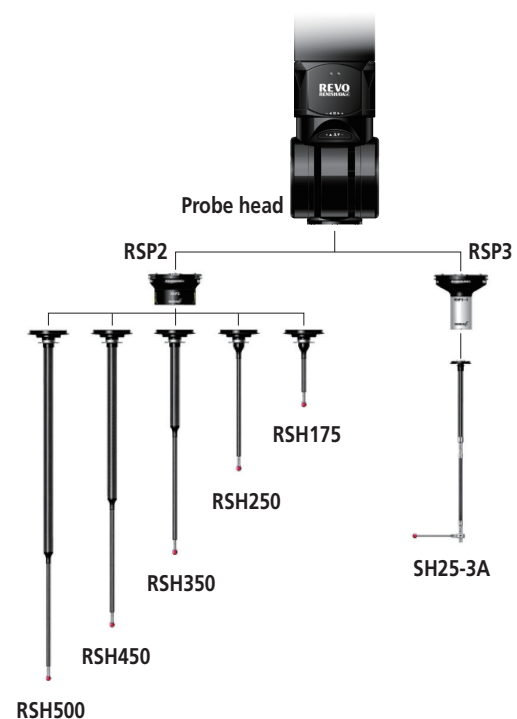
Stylus holder* supports 175 mm, 250 mm, 350 mm, 450 mm, 500 mm effective stylus length

* Optional except for RSH250

• RSP3 (Options)

SP25 scanning probe
Supports use of cranked stylus

* Auto changer supported
Allows automatic changeover of probes (RSP2, RSP3) and stylus holders (RSH175, 250, 350, 450, 500).





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