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SP80 ultra-high accuracy scanning probe

Class leading performance with flexible use of styli

The SP80 is a quill-mounted scanning probe that uses digital scale and readhead technology, plus Renishaw's innovative isolated optical metrology principles, to provide exceptional scanning performance, even with long styli.

The digital scale and readheads with 0.02 µm resolution enable exceptional scanning performance with up to 1000 mm long and 500 g mass styli, including star configurations.

The SP80 has a kinematic mount that offers a repeatable connection to the mating plate mounted on the quill (KM80), allowing the probe to be removed easily. Unbalanced star configurations do not require counterbalancing and the kinematic stylus changing allows for repeatable relocation of the stylus, optimising stylus arrangements for each feature, and overcoming the need for requalification.

Using an isolated optical metrology system that measures the deflection of the whole mechanism, the SP80 provides accurate position sensing without stacked axis errors. Additionally, kinematic stylus holders provide crash protection in the XY plane, and a bump stop prevents damage to the probe in the Z-axis.

Key benefits

Long stylus carrying capability - with high accuracy

The combination of long stylus reach with maintained high accuracy performance makes SP80 the first choice scanning probe for many applications.

Rapid stylus interchange

Interchange of the stylus holders (SH80) can be automated for optimised productivity by using a rack system and stylus change ports (SCP80) mounted to Renishaw's modular rack system.

Low cost of ownership

SP80's system modularity enables expansion as required. Robust design promotes long working life but should anything go wrong, Renishaw's rapid service / exchange program minimises downtime.

Horizontal mounting option - SP80H

A horizontal mounting option is also available.

Innovations

Isolated optical metrology

SP80 directly measures the deflection of the whole mechanism, which provides outstandingly accurate position sensing. The isolated optical metrology system can detect sources of variable error such as thermal and dynamic effects. By contrast, probes with displacement sensors mounted to stacked axes suffer from increased dynamic latency.

Specifications

Probe attributes	Ultra-high accuracy scanning probe with 3-axis measurement (±PX, ±PY, ±PZ) *	
Orientation	Vertical with SP80, horizontal with SP80H	
Size	Body	80 mm (3.15 in) square
	Length (including SH80 stylus holder)	150 mm (5.91 in)
Quill mounting	KM80	80 mm (3.15 in) square quill to kinematic SP80 quill mount (standard)
	KM6080	60 mm (2.36 in) square quill to 80 mm (3.15 in) square kinematic SP80 probe mount (option)
	SM80	Shank mount and other custom made adaptor plates available - contact your Renishaw supplier for details
Measurement range	3-axis measurement: ±25 mm (±0.12 in) (PX, PY, PZ) *	
Overtravel range	PX* and PY* protected by breakout of the kinematic joint to the SH80 PZ* has a mechanical 'bump-stop'	
Resolution of digital scales	0.02 µm	
Measurement capability test to ISO10360-2 **	Better than 1.0 µm with a 50 mm stylus Better than 2.0 µm with a 1000 mm stylus	
Scanning capability test to ISO10360-4 **	Better than 0.5 µm with a 50 mm stylus Better than 6.0 µm with a 1000 mm stylus	
Return to zero	Approximately 1% of working deflection	
Spring rate	Approximately 1.8 N/mm (X, Y, Z)	
Stylus carrying capability	Renishaw M5 stylus range Maximum 500 g mass (unbalanced) Maximum 1000 mm projection ***	
Mass	SP80 probe body only	860 g
	SH80 stylus holder	185 g
	KM80 quill mount	110 g
Pull off force of SH80	<20 N when using SCP80 - otherwise approximately 80 N	
Probe power supply	+9 V to +18 V at 300 mA maximum dc	
System power supply (including IU80)	+5 V ±0.25 V at 1 A maximum dc	
SP80 probe outputs (PX, PY, PZ) *	1.5 V ±0.25 V p-p. analogue quadrature signal (nominal 2.5 V zero crossing reference)	
Interfacing options	• Using a UCC2-2 SP80 daughtercard for direct integration • Using a Renishaw PCI counter card (CC6) and the Renishaw interpolator unit (IU80) • Other interface cards designed by the OEM and using in conjunction with an IU80 • Using a counter card and interpolator units designed by the OEM	
Change rack system	SCP80 units mounted to MRS or MRS2	
	SCP80V units mounted to MRS or MRS2 for rear facing styli	

* Where P specifies that it is the probe's axis rather than the machine's

** Tested on a CMM with specification of 0.48 µm +L/1000

*** SH80 EXT stylus holder must be used with 1000 mm stylus extensions

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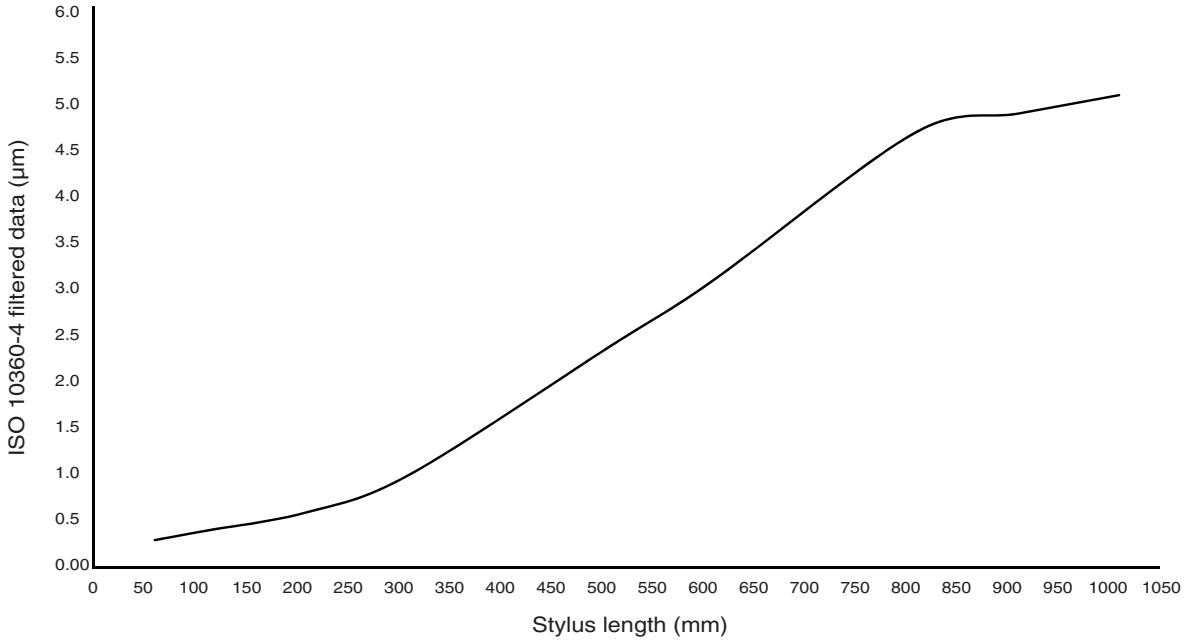
SP80 performance

The plot below illustrates SP80's remarkable high accuracy scanning performance with increasing stylus lengths.



CMM specification: U = 0.48 µm ±L/1000

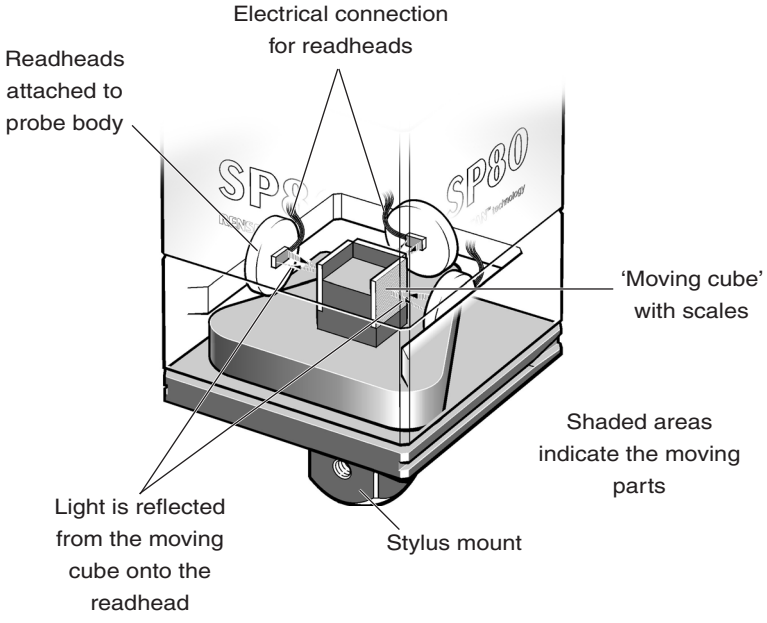
60 UPR harmonic filtering

Scan deflection = 0.5 mm

Scan speed = 5 mm/s (except on 1000 mm stylus where scan speed = 2 mm/s)

Isolated optical metrology

Isolated optical metrology can be explained as a feature of the transducer system. The readheads for each axis are fixed to the body of the probe, and measure the deflection in each direction. Any inter-axis movement caused by the arc motion of each pair of parallel-acting springs is directly measured by the sensor system. The squareness and straightness of the SP80's axes are, therefore, not derived from the mechanism, but optically from the scale cube itself. Direct measurement of the stylus motion relative to the static probe body removes the need for moving wire connections which may impede motion



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In summary

SP80 and SP80H are the scanning probes of choice for automotive and power train sectors where high accuracy form measurement with deep reach into components is required. The system's flexibility and affordability is acknowledged as being significant in terms of user benefits such as:

- Ultra-high accuracy measurement, provided by digital scale and readheads
- Long styli carrying capability for access to deep features
- Isolated optical metrology for direct accurate measurement of stylus deflection
- Kinematic stylus holder changing for system flexibility
- Low inertia mechanism for excellent dynamic response
- Bump stop crash protection in the Z-axis, together with a detachable stylus holder for XY crash protection
- No motors, resulting in excellent thermal stability and reliability

Additional information

Selected part numbers

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A-2238-0700	SP80 probe kit (includes probe body, SH80, KM80, PL157 probe cable and 60 mm × D8 stylus)
A-2238-0703	KM80 - standard quill mounting plate
A-2238-0705	SH80 - stylus holder
A-2238-0489	SH80 EXT - stylus holder
A-2238-0706	SCP80 - stylus change port
A-2238-0720	IU80 - interpolator unit
A-4068-0400	CC6 - PCI counter card
A-1333-0021	UCC1 / SP80 daughtercard
A-1016-7133	PL158 - IU80 to CC6 cable
A-1016-7129	PL156 - IU80 unterminated cable

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