SmartScope SP

High Performance Multisensor Metrology Systems

SmartScope® SP

System Specifications

	SmartScope SP 332	SmartScope SP 463	SmartScope SP 663
XYZ travel	300 mm x 300 mm x 250 mm	450 mm x 610 mm x 300 mm	650 mm x 660 mm x 300 mm
XYZ measuring range with standard lens	300 mm x 300 mm x 200 mm	450 mm x 610 mm x 250 mm	650 mm x 660 mm x 250 mm
Machine dimensions	850 mm x 870 mm x 1025 mm	1085 mm x 1650 mm x 2060 mm	1560 mm x 1830 mm x 1760 mm
Drive system	4-axis DC servo drive (X,Y,Z and zoom) with dual drive, air bearing Z axis	4-axis DC servo drives (X,Y,Z and zoom)	4-axis DC servo drive (X,Y,Z and zoom)
XYZ scale resolution	Standard: 0.1 µm; including dual Z-axis scales; Optional: 0.05 µm	Standard: 0.1 µm; Optional: 0.05 µm	Standard: 0.1 µm, including dual Y-axis scales; Optional 0.05 µm
System weight	160 kg	1400 kg	1800 kg
Shipping weight	220 kg	1640 kg	2300 kg
Worktable	Hardcoat worksurface with tapped fixture holes and removable glass insert		
Worktable payload	30 kg	50 kg	130 kg
Rotary axis	Optional Miniature Servo rotary, or MicroTheta rotary	Optional Miniature Servo rotary, MicroTheta rotary, HPR High Precision Rotary or Heavy Duty rotary and Dual Rotary indexers. Consult the factory for complete information about available rotary indexer combinations.	
Power requirements	100-120 VAC or 200-240 VAC, 50/60 Hz, 1 phase, 600 W	100-120 VAC or 200-240 VAC, 50/60 Hz, 1 phase, 800 W	100-120 VAC or 200-240 VAC, 50/60 Hz, 1 phase, 850 W
Compressed air requirements (332 model only)	Air supply pressure: 0.3 - 0.5 MPa; Minimum Flow capacity: 120 l/min; Air quality ISO 8573-1:2010 Class 4.3.4 or better Optional: Air dryer kit		
Rated environment	Temperature: 18-22 °C, stable to ±1 °C; Maximum rate of temperature change: 1 °C / hour, maximum vertical thermal gradient: 1 °C / meter. Humidity: 30-80%; Vibration <0.001g below 15 Hz		
Safe operating environment	Temperature: 15-30 °C, non-condensing		

SmartScope SP Optics

SP optics are designed for maximum imaging performance and flexibility over a wide range of applications. The front objective lens offers the convenience of a larger field of view, while the 5.5X zoom lens offers a range of higher magnifications to handle small features. Optional high magnification objectives easily interchange when feature sizes require it. A 5.0 megapixel metrology camera and dedicated monochromatic illuminators ensure sharp imaging at all zoom positions.

The optical lens system enables use of the optional TeleStar® Plus TTL interferometric laser. The TeleStar Plus offers extra long working distance and sub-micron resolution for high precision surface profile and depth measurements.

SmartScope SP Optics & Sensor Specifications

	Standard	Optional	
Optics	Zoom optics with AccuCentric® auto-compensation, 1X standard front lens and 5.5x optical zoom offer up to 60:1 digital/optical magnification range with maximum 90 mm WD	High magnification lenses	
Illumination	All monochromatic LED: substage profile, coaxial surface, SmartRing™ ring light	LED focus grid illuminator	
Camera	5 MP monochrome digital metrology camera		
Field of view size **Low optical zoom** **High optical zoom** **Max digital zoom**	**1X:** 12.1 mm x 10.1 mm 2.2 mm x 1.8 mm 0.20 mm x 0.16 mm	**2X:** 4.7 mm x 3.9 mm 0.9 mm x 0.7 mm 0.08 mm x 0.06 mm	**5X:** 0.9 mm x 0.7 mm 0.43 mm x 0.35 mm 0.04 mm x 0.03 mm
Scanning sensors	QVI scanning controller, SP25M scanning probe; 3 position change rack; calibration kit including kinematic mount and certified 25 mm sphere; SP25 scanning probe kit including SM25-2 scanning module, SH25-2 stylus holder (x2), and M3 D3 x L21 ruby stylus	6 position change rack; additional SM25-1, SM25-3, SM25-4, SM25-5, TM25 scanning and touch modules, stylus holders, and styli	
Laser sensors		TeleStar® Plus TTL laser adapter (includes laser pointer), TeleStar Plus interferometric TTL laser	
Controller	Windows® based, with up-to-date processor, on board networking/communication ports and integral QVI scanning controller for laser and tactile scanning; multifunction handheld controller for operator control		
Controller options	24" flat panel monitor, keyboard, 3-button mouse. Ergonomic sit-stand operator workstation for 463 and 663 models.	Dual 24" flat panel monitors; granite / laminate operator workstation for benchtop 332 model.	
Software	- ZONE3® Express 3D Metrology Software - QVI Portal	**Metrology Software:** ZONE3 Prime, ZONE3 Pro **Productivity Software:** OGP EVOLVE Suite (Design, EVOLVE SPC, Manufacturing, SmartProfile®) **Offline Software:** ZONE3	

Performance and Accuracy Specifications[1]

SmartScope SP Model		332	463	663
Optical (per ISO 10360-7:2011)[5]				
X or Y length measurement errors[2,3,4]	MPE(EUX[Y])	(1.5 + 5L/1000) µm	(1.5 + 5L/1000) µm	(2.0 + 5L/1000) µm
XY length measurement errors[2,3,4]	MPE(EUXY)	(1.9 + 5L/1000) µm	(1.9 + 5L/1000) µm	(2.4 + 5L/1000) µm
Length measurement errors[2,3,9]	MPE(EU)	(3.9 + 5L/1000) µm	(3.4 + 5L/1000) µm	(4.4 + 5L/1000) µm
Repeatability of XY length measurement errors[3,4]	MPL(RUXY)	1.5 µm	1.5 µm	2.0 µm
Probing error (High zoom / low zoom)	MPE(PF2D)	1.9 µm / 10 µm	1.9 µm / 10 µm	1.9 µm / 10 µm
Probing error of imaging probe (High zoom / low zoom)	MPE(PFV2D)	1.2 µm / 5 µm	1.2 µm / 5 µm	1.2 µm / 5 µm
Autofocus Performance (per QVI #790218)[2,5]				
Z-linear autofocus accuracy	E_1	(3.8 + 5L/1000) µm	(3.8 + 5L/1000) µm	(3.8 + 5L/1000) µm
SP25 Tactile Probe Performance (per ISO 10360-5:2020)[6,7]				
Single stylus form error	MPE(P[Form.Sph.1x25:SS:Tact])	3.8 µm	2.5 µm	3.0 µm
Scanning mode form error	MPE(P[Form.Sph.Scan:PP:Tact])	4.5 µm	2.5 µm	3.5 µm
Time for scanning mode form error	MPL(τ[Sph.Scan.PP:Tact])	70 sec	70 sec	75 sec
TeleStar® Plus Laser Performance (per ISO 10360-8:2013)[8]				
Probing size error	MPE(P[Size.Sph.1x25:Tr:ODS])	3.5 µm	3.5 µm	3.5 µm

NOTES

1. Specifications apply to thermally stable system in the rated environment, operating in accordance with the procedures in the operating manual, with an evenly distributed load (up to 5 kg for 332 and 10 kg for 463/663). Depending on load distribution, accuracy at maximum payload may be less than standard.
2. Where L = measuring length in mm.
3. Artifact may be low expansion with a CTE no greater than 1×10^{-6} / °C and with a CTE expanded uncertainty (k = 2) no greater than 1×10^{-6} / °C, and will have calibrated values adjusted to the CTE of steel per ISO 10360-7:2011.
4. Measured in standard measuring plane that is within 25 mm of the worktable surface.
5. Specifications apply at the maximum optical magnification of the standard configuration.
6. Using SP25 with SM25-2 module with 3.0 mm x 21 mm A-5000-3553 stylus.
7. Target tip deflection of 0.35 mm.
8. Where measurements are taken in a region of the sphere within a cone angle of 150°.
9. On-site verification is optional.

SmartScope SP

System Configurations

SmartScope SP 332

SmartScope SP 332 offers high performance in a convenient benchtop package. The elevating-bridge design provides machined-in squareness and a large work envelope that uses very little floor space. An air-bearing Z-axis motion system provides the friction free motion and stiffness necessary for excellent scanning probe performance.

SmartScope SP 463

SmartScope SP 463 is a rugged, floor model system of proven design to handle larger, heavier parts in a workshop environment. The fixed bridge design separates the primary axis motions so they are completely independent, with no influence on each other. Rigidity and stiffness give this transport superb volumetric accuracy.

SmartScope SP 663

SmartScope SP 663 offers a large measuring volume and high payload capacity in compact footprint. The moving bridge design provides an open work envelope allowing heavy parts to be loaded by a conveyor or overhead crane if needed. Granite base and granite bridge with heavy duty cast uprights ensure thermal stability and vibration isolation for excellent scanning performance, even under adverse conditions.