

OPTIV Reference

Design principle

- Fixed-bridge type multisensor CMM with two sensor axes (OPTIV Dual Z)
- Low-vibration granite construction
- Precision air bearings on all axes
- Active vibration dampers as standard, passive vibration dampers as an option
- Integrated parametric temperature compensation

XYZ axis travel

		5.4.3 Dual Z	7.6.3 Dual Z
Travel [mm]	X	530	730
	Y	400	600
	Z1, Z2	300	300

Measuring accuracy

**Volumetric length measuring error according to ISO 10360-2:2009
at 20 °C ± 0.8 °C (with the HP-S-X1 scanning probe)**

	5.4.3 Dual Z	7.6.3 Dual Z
$E_{OX/Y,MPE} [\mu m]$	$0.5 + L / 300^{1)}$	
$E_{OXY,MPE} [\mu m]$	$0.8 + L / 300^{1)}$	
$E_{O,MPE} [\mu m]$	$1.3 + L / 300^{1)}$	

Length measuring error according to ISO 10360-7:2011 at 20 °C ± 0.8 °C

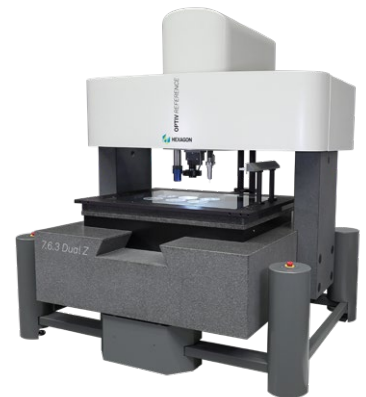
	5.4.3 Dual Z	7.6.3 Dual Z
$E_{UX/Y,MPE} [\mu m]$	$0.5 + L / 600^{1) 2)}$	
$E_{UXY,MPE} [\mu m]$	$0.8 + L / 600^{1) 2)}$	

¹⁾ L = measuring length [mm].

²⁾ With an optical resolution of ≤ 1 μm/pixel (please see table "Vision sensor properties" on page 3).



OPTIV Reference 5.4.3 Dual Z



OPTIV Reference 7.6.3 Dual Z

Footprint, weight, table payload

5.4.3 Dual Z		7.6.3 Dual Z
Footprint [mm] ¹⁾	L	1525
	W	1483
	H	1890
Weight [kg] ¹⁾		2300
Table payload [kg]		150
on the glass plate [kg]		50

¹⁾ Dimension of the basic configuration; extended configuration may increase footprint and weight.
For detailed information see OPTIV Reference machine and stage layouts.

Additional information on the OPTIV Reference machine and stage layouts available:

. OPTIV Reference machine and stage layouts

Dynamics

5.4.3 Dual Z		7.6.3 Dual Z
Resolution of the scales [μm]	X / Y / Z1, Z2	0.001
Travel speed [mm/s]	X / Y / Z1, Z2	150 / 150 / 150
	Vector	260
Acceleration [mm/s ²]	X / Y / Z1, Z2	250 / 250 / 250
	Vector	430

Environmental specification of the measuring environment

- Environmental temperature 20 °C ± 0.8 °C
- Temperature gradient 0.9 K/d, 0.7 K/h, 0.6 K/m
- Relative humidity 40-70 %, non-condensing

Supply data

Power supply

5.4.3 Dual Z		7.6.3 Dual Z
Input voltage	1/N/PE 115-230 V~ ± 10 %	
Frequency	50 / 60 Hz ± 5 %	
Max. power consumption	1500 VA	

Air supply

5.4.3 Dual Z		7.6.3 Dual Z
Connection	½-inch quick-connect coupling	
Pressure	Minimum 0.6 MPa (6.0 bar), maximum 1.0 MPa (10.0 bar)	
Consumption	Approx. 70 Nl/min (75-90 Nl/min with active pneumatic damping)	
Purity class	Pre-cleaned air according to ISO 8573-1 class 1	

Safety regulations

The OPTIV Reference multisensor coordinate measuring machine complies with the following standards:

- DIN EN ISO 12100 (Safety of machinery)
- DIN EN 60204-1 (Safety of machinery – Electrical equipment of machines)
- DIN EN ISO 13849-1 (Safety of machinery – Safety-related parts of control systems)
- DIN EN 61000-6 (Electromagnetic compatibility EMC, immunity / emission of machines)
- DIN EN 55011 (Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics)

NRTL certification upon request.

Basic configuration

Vision sensor

- Camera sensor for non-contact measurement
 - of smallest and closely toleranced features
 - of sensitive parts that cannot be touched
 - of dense clusters of minute features
 - of palletised parts
- Video autofocus and contour scanning mode
- Flexible illumination with coaxial LED top light, telecentric LED back light, LED ring light with 2 rings and 6 segments each
- Digital high-resolution CMOS cameras with Gigabit Ethernet interface
- Available optics
 - 10x motorised CNC zoom with colour camera (optional monochrome camera), for a continuous adjustment of field of view and resolution
 - Optional OPTIV Dual Camera fixed focal length precision optics with monochrome cameras and changeable telecentric lenses 3x, 5x and 10x, in two steps electronically switchable magnification by factor 1:3

Vision sensor properties

	10x motorised CNC zoom	OPTIV Dual Camera		
Lens	Zoom	3x	5x	10x
Optical magnification min./max.	0.64x / 6.4x	1.67x / 3.0x	2.78x / 5.0x	5.56x / 10.0x
Working distance [mm] ¹⁾	86	75	64	48
Clearance height [mm] ²⁾	55	60	60	48
Maximum field of view [mm]	10.6 x 8.5	4.50 x 3.60	2.70 x 2.16	1.35 x 1.08
Minimum field of view [mm]	1.06 x 0.85	1.47 x 1.18	0.88 x 0.71	0.44 x 0.35
Resolution [μ m/pixel]	8.3 to 0.83	3.52 / 1.15	2.11 / 0.69	1.05 / 0.35

Values rounded.

¹⁾ Distance between part surface and bottom edge of the lens.

²⁾ Distance between part surface and bottom edge either of the ring light (for 3x or 5x lens) or the 10x lens.

Vision sensor accuracy

Probing error according to ISO 10360-7:2011 at 20 °C \pm 0.8 °C

$$P_{F2D,MPE} = 0.8 \mu\text{m}$$

$$P_{FV2D,MPE} = 0.8 \mu\text{m}$$

HP-S-X1C / HP-S-X1S scanning probe

- Single-point probing, self-centering measurement and continuous high-speed-scanning
- Scanning measuring rate up to 1000 points/s
- HP-S-X1S mounted on HH-A-T5 motorised indexing probe head

HP-S-X1C / HP-S-X1S properties

	Probe interface	Stylus joint	Resolution	Measuring range	Linear stiffness	Maximum stylus length range and weight	Styli changer rack
HP-S-X1C	Dovetail connector	M3	< 0.1 µm	± 2 mm in all axes	1.2 N/mm	Vertical: up to 100 mm Horizontal: up to 100 mm 33 g (including stylus clamping)	HR-X with 3 ports; can be extended to 6 ports
HP-S-X1S	TKJ (kinematic joint)	M3	< 0.1 µm	± 2 mm in all axes	1.2 N/mm	Vertical: up to 100 mm Horizontal: up to 20 mm 20 g (including stylus clamping)	HR-X with 3 ports; can be extended to 6 ports

HP-S-X1C / HP-S-X1S accuracy

Volumetric probing error according to ISO 10360-5:2010 at 20 °C ± 0.8 °C

$$P_{FTU,MPE} = 1.3 \mu\text{m}^{1)}$$

$$P_{STU,MPE} = 0.9 \mu\text{m}^{1)}$$

Volumetric scanning error according to ISO 10360-4:2000 at 20 °C ± 0.8 °C

$$MPE_{THP} = 1.9 \mu\text{m} (t = 90 \text{ s})^{2)}$$

¹⁾ Valid for single stylus lengths 20-100 mm. ²⁾ Valid for single stylus length 20 mm.

HH-A-T5 motorised indexing probe head

- Automatic sensor orientation during the inspection cycle
- Fitted with a multiwired kinematic joint (TKJ), for full compatibility with a wide range of Hexagon TKJ sensors

HH-A-T5 properties

HH-A-T5	
Probe mounting	TKJ (multiwire)
Weight	780 g
Indexing angle	5°
A axis	+ 90° to - 115°
B axis	± 180°
Total number of positions	3024
Rotation speed	90° in 2 sec.
Position repeatability	< 0.5 µm at 100 mm from the centre of A axis rotation

OPTIV CWS optical white light sensor

- Point distance and scanning sensor for the surface-independent measurement of extremely small 3D structures and surface profiles
- Thickness measurement of (semi-)transparent objects
- Measurement rates up to 500 points/s

OPTIV CWS properties

OPTIV CWS					
Measuring range [mm]	0.3	0.6	1	3	10
Working distance [mm]	4.5	6.5	20.8	22.5	70
Resolution in Z direction [nm]	10	20	35	100	300
OPTIV CWS spot diameter [μm]	5	4	3.5	12	24
Lateral resolution [μm]	Approximately 0.5 x OPTIV CWS spot diameter				
Angular acceptance [°]	± 30°	± 30°	± 30°	± 30°	± 20°

OPTIV CWS accuracy

Probing error according to ISO 10360-8:2013 at 20 °C ± 0.8 °C

$$P_{\text{Form.Sph.1x25.Tr:ODS,MPE}} = 5 \mu\text{m}$$

$$P_{\text{Size.Sph.1x25.Tr:ODS,MPE}} = 5 \mu\text{m}$$

Air bearing CNC rotary table

Less workpiece handling: simplified accessibility to all measuring positions via workpiece rotation

- Air bearing CNC rotary table Ø 122 mm

Air bearing CNC stacked rotary tables (OPTIV Dual Rotary) ¹⁾

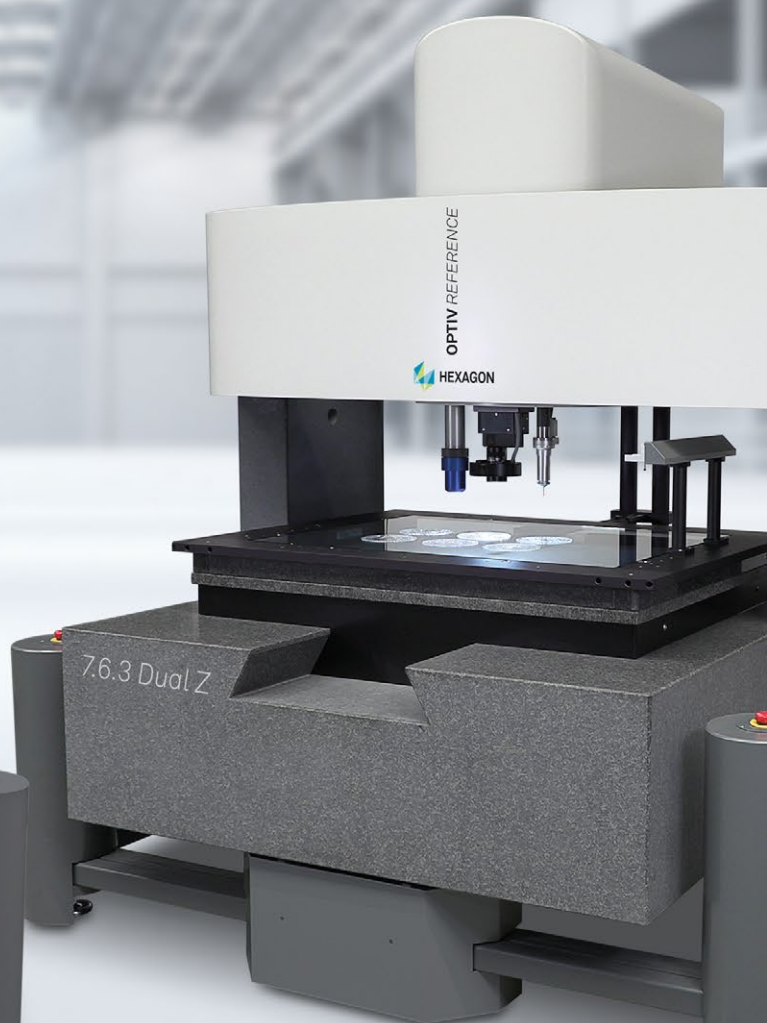
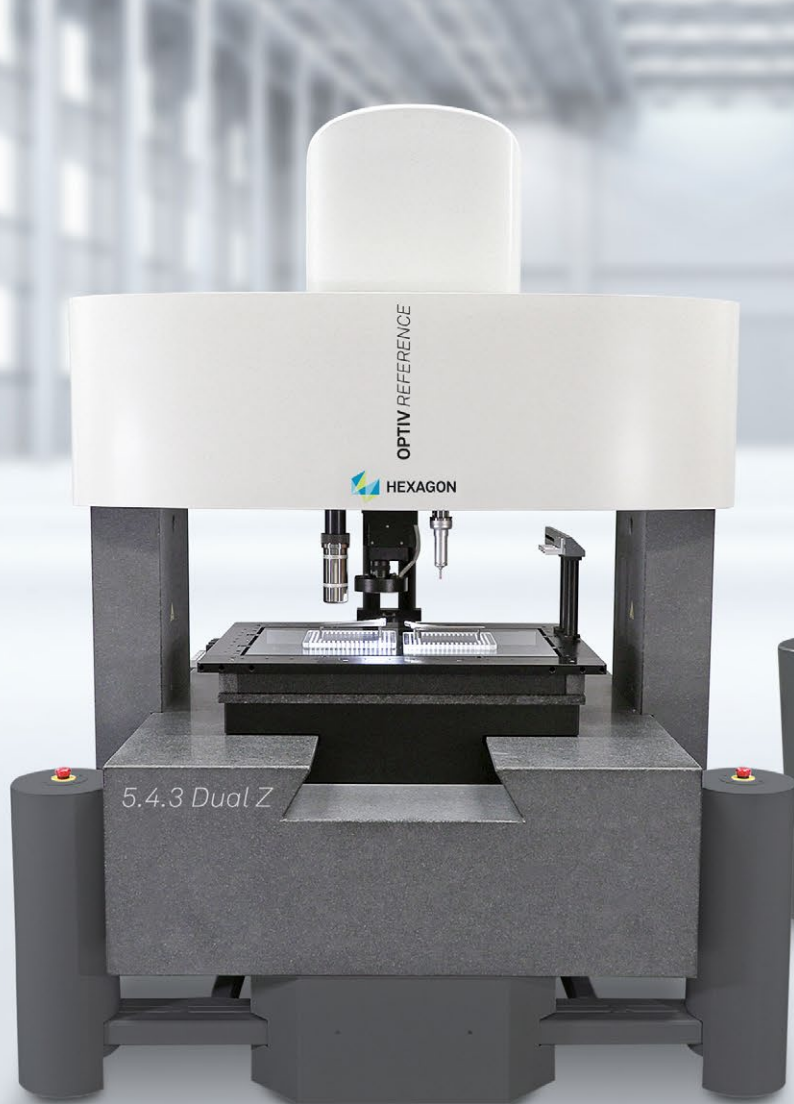
Optimising the measuring volume of the machine: simplified accessibility to all measuring positions via 2-axis workpiece rotations

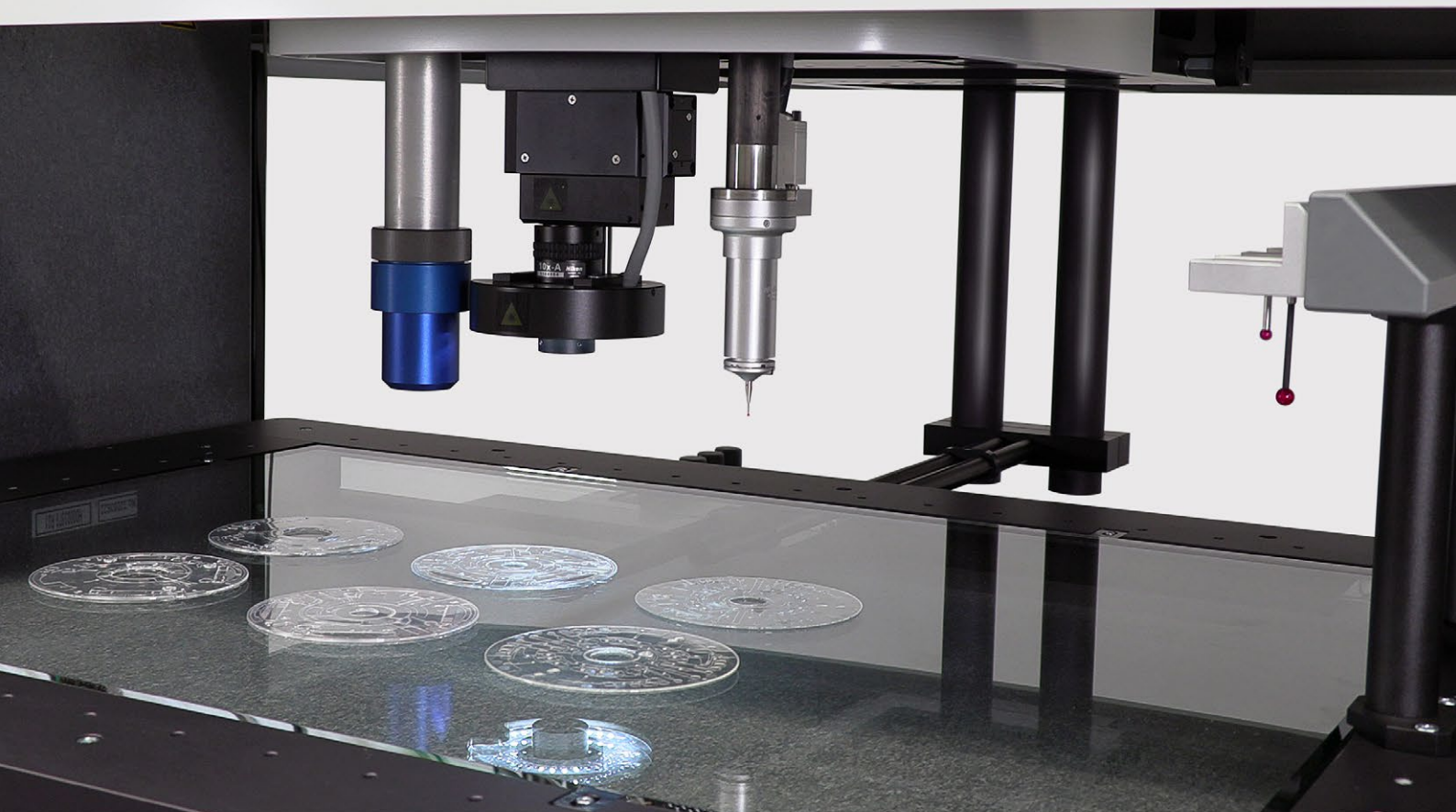
- Air bearing CNC stacked rotary tables Ø 100 mm (rotate) + Ø 130 mm (swivel)
- Swivel range ± 95°

Additional information on the air bearing CNC rotary table and CNC stacked rotary tables (OPTIV Dual Rotary) available:

. Air bearing CNC rotary table and stacked rotary tables (OPTIV Dual Rotary) for OPTIV Reference data sheet

¹⁾ Only available for OPTIV Reference 5.4.3 Dual Z.







Hexagon is a global leader in digital reality solutions, combining sensor, software and autonomous technologies. We are putting data to work to boost efficiency, productivity, quality and safety across industrial, manufacturing, infrastructure, public sector, and mobility applications.

Our technologies are shaping production and people-related ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Hexagon's Manufacturing Intelligence division provides solutions that use data from design and engineering, production and metrology to make manufacturing smarter.

Learn more about Hexagon (Nasdaq Stockholm: HEXA B) at hexagon.com and follow us [@HexagonAB](https://twitter.com/HexagonAB).