



# ZEISS DuraMax®

## Specifications

Version: 2021-11



Seeing beyond

## System description

Type according to ISO 10360-1:2000	Fixed table cantilever CMM			
Operating mode	Motorized / CNC			
Sensor mounts	Fixed installation			
Sensor	ZEISS VAST XXT (tactile) Scanning and single point sensor. Measuring speed with ZVp (ZEISS VAST probing) appr. 1.2 seconds per single point and 1.8 seconds per single point without ZVp.			
Software	ZEISS CALYPSO, ZEISS GEAR PRO			
Travel speed	Motorized	in mm/s	Axes	0 to 100
	CNC	in mm/s	Axes	max. 300
		in mm/s	Vector	max. 520
Acceleration		in m/s <sup>2</sup>	Axes	max. 1
		in m/s <sup>2</sup>	Vector	max. 1.7

## Optional equipment

	DuraMax	DuraMax HTG
Customer-specific base	Optional accessory	Not available
ZEISS standard base	Optional accessory	Not available
ZEISS shopfloor base	Optional accessory	Mandatory accessory
ZEISS rotary table	Optional in combination with a ZEISS standard or shopfloor base	Not available
ZEISS VAST XXT TL1 / TL4	Not available	Not available
CMM safety position	Optional accessory	Optional accessory
Automatic workpiece temperature sensor	Optional accessory	Mandatory accessory

## Sensors and accuracy

The functionality of the device and its specifications are only achievable when using original accessories by ZEISS. The specified parameters are observed in the application of the internal test instructions for acceptance testing and in the use of the released standards in accordance with the ISO 10360 series.

### ZEISS VAST XXT <sup>1)</sup> Modul TL3



Scanning and multi-point sensor.  
Scanning measuring rate up to 500 points/s.  
Stylus length with module:  
TL3 = 30 - 150 mm (axial), up to 65 mm radial  
Maximum stylus weight = 15 g  
Minimum stylus tip diameter = 0.3 mm

			DuraMax		DuraMax HTG	
<b>Length measurement error</b> <sup>2) 4) 6)</sup> MPE complies with ISO 10360-2: 2009	E0/E40	in µm	2.4 + L/300	18 °C - 22 °C	2.2 + L/300	18 °C - 22 °C
Extended temperature range (ZEISS TVA 1)	E0/E40	in µm	2.7 + L/250	18 °C - 26 °C	2.5 + L/250	18 °C - 26 °C
Extended temperature range (ZEISS TVA 2)	E0/E40	in µm	2.9 + L/200	18 °C - 30 °C	2.7 + L/200	18 °C - 30 °C
Extended temperature range (ZEISS TVA 3)	E0/E40	in µm	Not available		3.9 + L/100	15 °C - 40 °C
<b>Repeatability range of E0</b> MPL complies with ISO 10360-2:2009	R0	in µm	1.7		1.7	
<b>Scanning error</b> <sup>7)</sup> MPE complies with ISO 10360-4:2000	THP	in µm	2.9	18 °C - 22 °C	2.9	18 °C - 22 °C
Required measuring time MPT	τ	in s	55		55	
<b>Form measurement error</b> <sup>3) 7)</sup> MPE for roundness complies with ISO 12181 (VDI/DE 2617 sheet 2.2)	RONt (MZCI)	in µm	2.4		2.4	
<b>Single stylus form probing error</b> <sup>7)</sup> MPE complies with ISO 10360-5:2010	PFTU	in µm	2.4		2.4	
<b>Multi-stylus form probing error</b> <sup>5) 7)</sup> MPE complies with ISO 10360-5:2010	PFTM	in µm	3.9	18 °C - 22 °C	3.9	18 °C - 22 °C
<b>Multi-stylus dimension probing error</b> <sup>5) 7)</sup> MPE complies with ISO 10360-5:2010	PSTM	in µm	1.2	18 °C - 22 °C	1.2	18 °C - 22 °C
<b>Multi-stylus location probing error</b> <sup>5) 7)</sup> MPL complies with ISO 10360-5:2010	PLTM	in µm	2.7	18 °C - 22 °C	2.7	18 °C - 22 °C

1) Acceptance test with TL3 module; stylus length of 70 mm and stylus tip diameter of 8 mm.

2) Measuring length L in mm.

3) Filter used: 50 W/U; scanning speed for roundness: 5 mm/s.

4) Measuring length on ZEISS DuraMax based on typical feature sizes.

5) Measuring location near the calibration position to document sensor properties.

6) In accordance with the given temperature behavior and not volatile temperature changes.

7) All accuracy specifications of the sensors can be increased by + 0.3 µm for TVA 1 and + 0.5 µm for TVA 2/4 and 1,7µm for TVA 3/5.

### Temperature behavior

Temperature range			18°C - 22°C	18°C - 30°C	15°C - 40°C
Temperature gradient	Per day	in K/d	4.0	5.0	5.0
	Per hour	in K/h	2.0	2.0	2.0
	Spatial	in K/m	1.0	1.0	1.0

### ZEISS rotary table <sup>1)</sup> for ZEISS DuraMax

#### Dimensions and weight

Weight for rotary table / rotary box		in kg		ca. 8 /12
Measuring system	Interpolated resolution	in "		0.07
Working range	B15 <sup>2)</sup>	in mm		350
Height	h2	in mm		150
Faceplate	Diameter	in mm		190

#### Dynamics

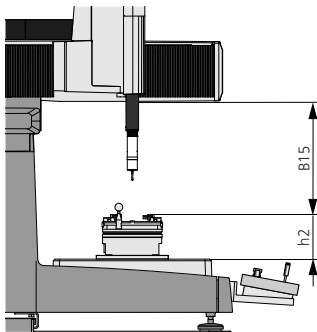
Max. angular velocity		in °/s		50
Rotation speed		in min <sup>-1</sup>		8.3

#### Load/torques

Torque		in Nm		max. 40
Max. central load capacity <sup>3)</sup>		in kg		max. 9
Tilt rigidity		in Nm/ "		1
Max. permissible tightening torque	M	in Nm		3

#### Accuracy <sup>4)</sup>

Repeatability of angular position		in "	18°C - 22°C	± 2
Axial four-axis error MPE complies with ISO 10360-3:2000	FA	in µm	18°C - 22°C	6
Radial four-axis error MPE complies with ISO 10360-3:2000	FR	in µm	18°C - 22°C	6
Tangential four-axis error MPE complies with ISO 10360-3:2000	FT	in µm	18°C - 22°C	6

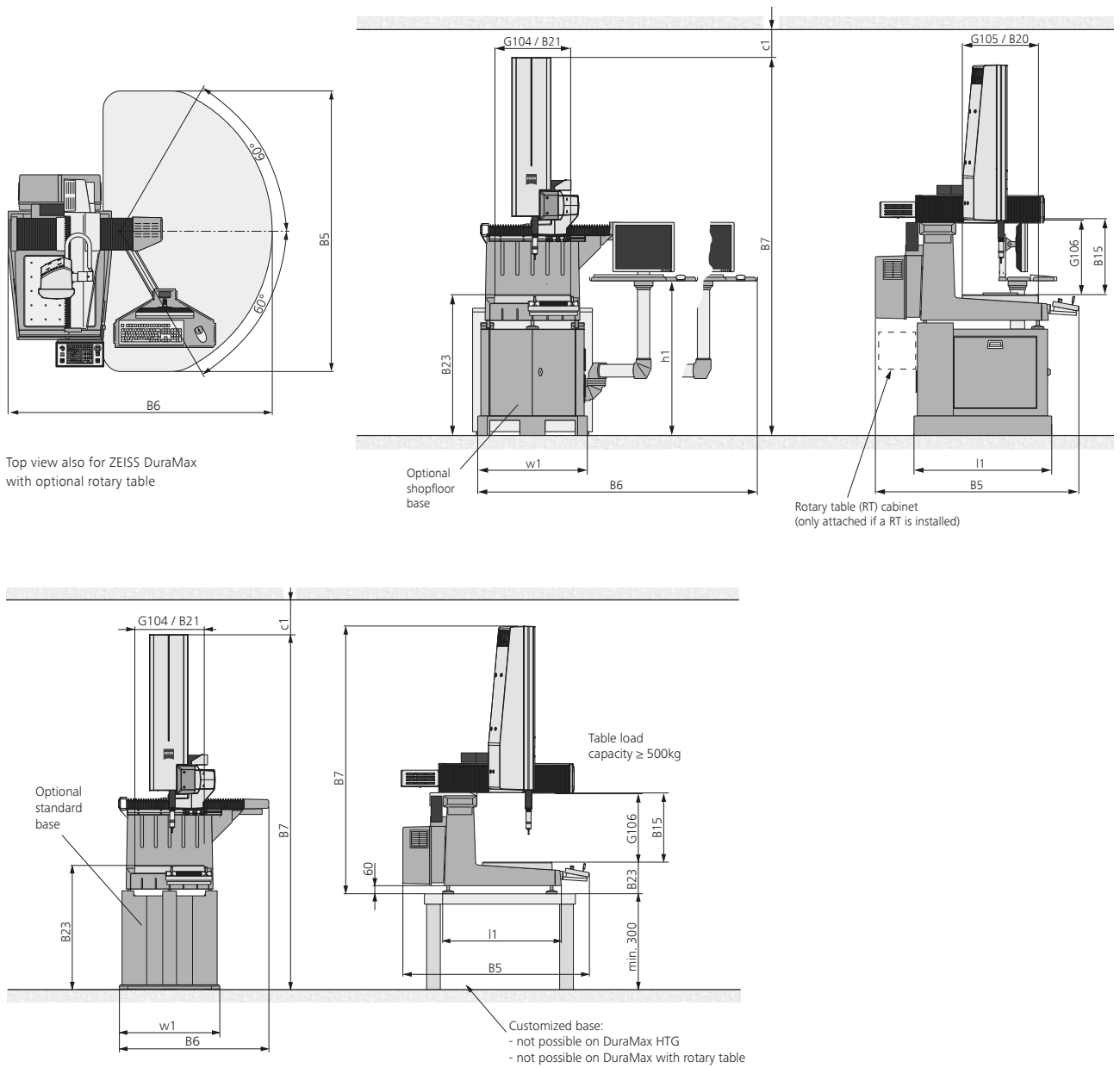


Note: the given dimensions and weights are approximate values. Dimensions in mm. Subject to change. Dimensioning based on DIN 4000-167:2009.

- 1) Available as an option. We offer it as retrofit of DuraMax with part number 636510-9280-000.
- 2) Dependent on the selected clamping equipment.
- 3) Load including exchangeable plate, clamping equipment and workpiece.
- 4) The rotary table specifications only apply when using original ZEISS 3D Alpha-Check for RT-RB-10-n,  $\Delta h = 25$  mm,  $r = 25$  mm. A standard according to the specifications of ISO 10360-3:2000 is not possible due to its design.

ZEISS DuraMax	Dimensions in mm						Weight in kg		
	Measuring range			Working range (max. workpiece size)			Max. load		
	X axis	Y axis	Z axis	Width	Length	Height			
	G104	G105	G106	B21	B20	B15			
	500	500	500	500	500	500		100	
	Overall CMM dimensions			Footprint		Working height		Assembly space	Measuring machine
	Width	Length	Height	Width	Length	Height	Height	Height	
	B6	B5	B7	w1	l1	B23	h1	c1	
Basic model	1080	1360	1803	670	870	230	-	≥200	350
With standard base	1089	1360	2478	732	910	905	-	≥200	445 / 465 <sup>1)</sup>
With shopfloor base	1870	1988	2511	732	920	940	1038	≥200	515 / 535 <sup>1)</sup>

1) When using a ZEISS rotary table on the ZEISS DuraMax, including rotary table box.



Note: the given dimensions and weights are approximate values. Dimensions in mm. Subject to change. Dimensioning based on DIN 4000-167:2009. If customers use their own base, then a locking mechanism must be used to prevent the DuraMax from slipping! If the ZEISS base is used, a locking mechanism is already integrated.

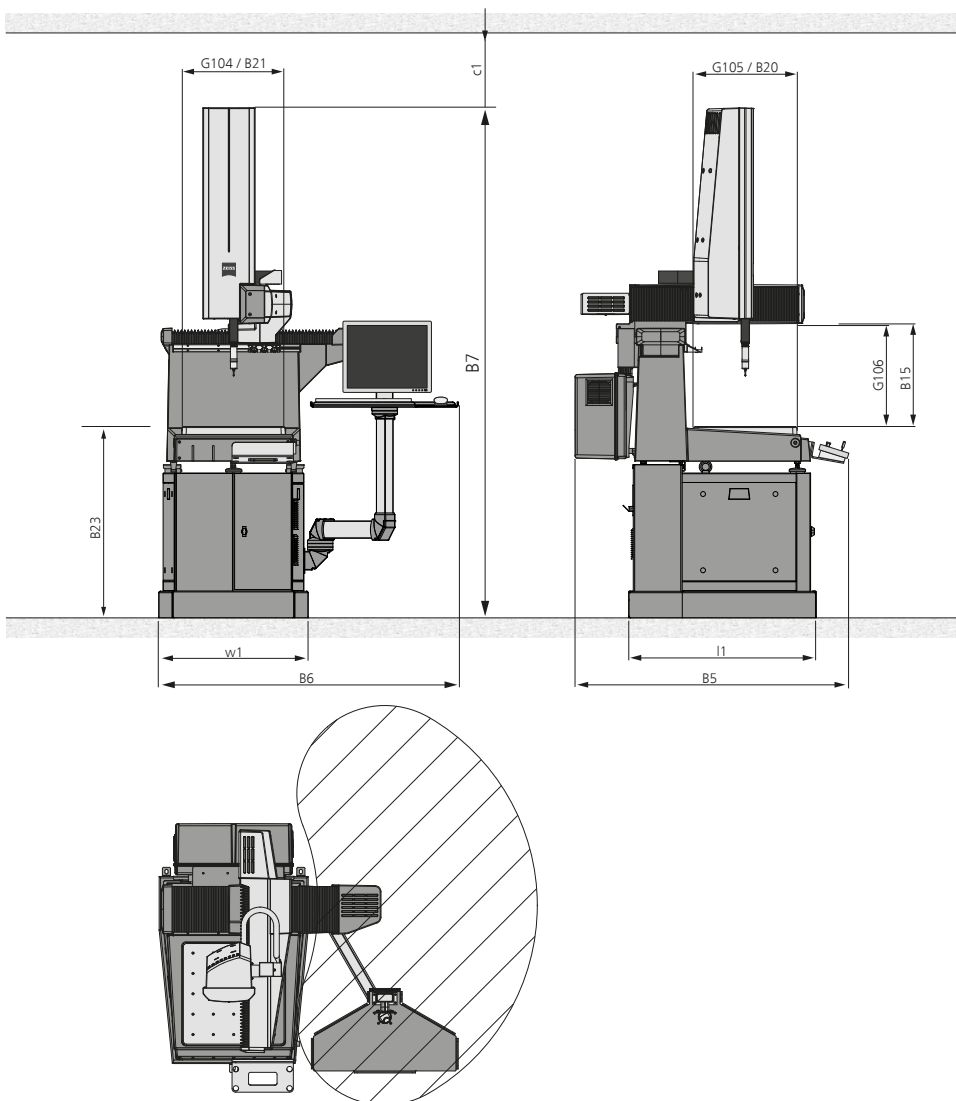
ZEISS DuraMax HTG with shopfloor base						Dimensions in mm		Weight in kg	
Measuring range			Working range (max. workpiece size)			Max. load			
X axis	Y axis	Z axis	Width	Length	Height				
G104	G105	G106	B21	B20	B15				
500	500	500	500	500	500			100	
Overall CMM dimensions			Footprint		Working height		Assembly space	Measuring machine	
Width	Length	Height	Width	Length	Height	Height	Height		
B6	B5	B7	w1	l1	B23	h1	c1		
1870	1988	2511	732	920	940	1038	≥200	545 (incl. shopfloor base)	

#### DuraMax HTG with extended temperature gradients





Length measurement error 1) 2) 3)	Extended temperature range ZEISS TVA 4)	E0 / E40	in µm	2.7 + L/30	18 °C - 30 °C
	Extended temperature range ZEISS TVA 5)	E0 / E40	in µm	3.9 + L/30	15 °C - 40 °C

#### Temperature behavior

Temperature range			18 °C - 30 °C	15 °C - 40 °C
Temperature gradient	Per day	in K/d	10.0	10.0
	Per hour	in K/h	3.0	3.0
	Spatial	in K/m	1.0	1.0



- 1) Measuring length L in mm.
- 2) Measuring length on ZEISS DuraMax based on typical feature sizes.
- 3) In compliance with the given temperature behavior and not volatile temperature changes.

Technical features		
	DuraMax	DuraMax HTG
Length measurement system	Glas ceramic, resolution 0.2 µm, carrier material: Robax	Glas ceramic, resolution 0.2 µm, carrier material: Zerodur
Controller	Based on ZEISS C99L Protection class IP53	Based on ZEISS C99L Protection class IP53
Clamping device	Material: cast iron, mounts: 25 M10 threads, 100 mm hole spacing, flatness: in accordance with DIN 876-III	
Ambient conditions		
	DuraMax	DuraMax HTG
Relative humidity	40% - 70% (without condensation)	40% - 70% (without condensation)
Ambient temperature	18°C - 30°C	15°C - 40°C
Floor vibrations	ZEISS DuraMax, ZEISS DuraMax RT and ZEISS DuraMax HTG with passive vibration damping.	
Requirements for operational readiness		
	DuraMax	DuraMax HTG
Humidity	max. 70% (without condensation)	max. 70% (without condensation)
Ambient temperature	10°C - 35°C	10°C - 40°C
Electrical power rating	1/N/PE 100 - 240 V~ (±10%); 50-60 Hz Power consumption: max. 600 VA Typical power consumption: 150W / 160 W with rotary table Amount of heat generated: max. 2160 kJ/h	1/N/PE 100 - 240 V~ (±10%); 50-60 Hz Power consumption: max. 600 VA Typical power consumption: 150W Amount of heat generated: max. 2160 kJ/h
Approvals		
Regulations	ZEISS DuraMax complies with EC machine directive 2006/42/EC, the EMC directive 2014/30/EU and the RoHS directive 2011/65/EU.	
	    (for Russia)	
Disposal	ZEISS products and packaging returned to us are disposed of in accordance with applicable legal provisions.	
Certifications/accreditations		
Quality management system	ISO 9001:2015 VDA 6, parts 4, 3. Version 2017	
Environmental management system	ISO 14001:2015	
Occupational health & safety management systems	BS OHSAS 18001:2007	
Accredited	ISO/IEC 17025:2005	

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