

# **ZEISS O-INSPECT**

## **Specifications**

Status: November 2017



## System description

|                                    |  |  |  |  |  |  |
|------------------------------------|--|--|--|--|--|--|
| Type according to ISO 10360-1:2000 | O-INSPECT 3/2/2: Column CMM, O-INSPECT 5/4/3 and 8/6/3: Fixed bridge CMM |  |  |  |  |  |
| Operating mode                     | motorized / CNC  |  |  |  |  |  |
| Sensor mounts                      | Fixed installation   |  |  |  |  |  |
| Sensors                            | ZEISS VAST XXT (contact)/ ZEISS Discovery.V12 (optical)                  |  |  |  |  |  |
| Software                           | ZEISS CALYPSO, ZEISS GEAR PRO (option)                                   |  |  |  |  |  |

|              |           |                      |              | 3/2/2        | 5/4/3       | 8/6/3       |
|--------------|-----------|----------------------|--------------|--------------|-------------|-------------|
| Travel speed | Motorized | in mm/s              | Axes         | 0 to 100     | 0 to 100    | 0 to 100    |
|              |           | CNC                  | in mm/s      | X, Y, Z axes | 300/300/100 | 300/300/100 |
|              |           | in mm/s              | Vector       | 435          | 435         | 350         |
| Acceleration |           | in mm/s <sup>2</sup> | X, Y, Z axes | 500/500/500  | 500/500/500 | 500/200/500 |
|              |           | in mm/s <sup>2</sup> | Vector       | 866          | 866         | 735         |

## Sensors and accuracy

The CMM specifications are only valid 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>



Scanning and single-point sensor. Measuring speed up to max. 2.5 seconds per point and up to 500 points/s by scanning. Axial stylus length 30-150 mm; radial stylus length up to 65 mm (star stylus); stylus tip diameter of 0,3 to 8 mm, maximum stylus weight = 15 g; max. stylus speed = 5 mm/s

|  |                    |       |               | 3/2/2       | 5/4/3       | 8/6/3       |
|--|--------------------|-------|---------------|-------------|-------------|-------------|
| Length measurement error <sup>2)</sup><br>MPE complies with ISO 10360-2:2009                                   | E0 X/Y/Z (1D)      | in µm | 18 °C - 22 °C | 1.6 + L/200 | 1.6 + L/250 | 1.9 + L/150 |
|  | E0 XY (2D)         | in µm | 18 °C - 22 °C | 1.9 + L/150 | 1.7 + L/250 | 2.0 + L/150 |
|  | E0 (3D)            | in µm | 18 °C - 22 °C | 2.4 + L/150 | 1.9 + L/250 | 2.2 + L/150 |
|  | TVA                | in µm | 18 °C - 26 °C | 2.7 + L/150 | 2.2 + L/100 | 2.5 + L/100 |
|  | TVA                | in µm | 18 °C - 30 °C | 2.9 + L/150 | 2.4 + L/80  | 2.7 + L/80  |
| Repeatability range<br>MPL complies with ISO 10360-2:2009  | R0                 | in µm |               | 1.2         | 1.2         | 1.2         |
| Scanning error<br>MPE complies with ISO 10360-4:2000   | THP                | in µm | 18 °C - 22 °C | 2.7         | 2.7         | 3.8         |
| Required measuring time MPT  | τ                  | in s  | 18 °C - 22 °C | 55          | 55          | 68          |
| Form measurement error <sup>6)</sup><br>MPE for roundness complies with ISO 12181<br>(VDI/VDE 2617, sheet 2.2) | RONt (MZCI)        | in µm | 18 °C - 22 °C | 2.4         | 2.4         | 2.4         |
| Single stylus form probing error<br>MPE complies with ISO 10360-5:2010   | PFTU               | in µm | 18 °C - 22 °C | 2.4         | 1.9         | 2.2         |
| Multi-stylus form probing error<br>MPE complies with ISO 10360-5:2010  | PFTM <sup>3)</sup> | in µm | 18 °C - 22 °C | 4.8         | 4.8         | 4.8         |
| Multi-stylus dimension probing error<br>MPE complies with ISO 10360-5:2010                                     | PSTM <sup>3)</sup> | in µm | 18 °C - 22 °C | 1.2         | 1.2         | 1.2         |
| Multi-stylus location probing error<br>MPL complies with ISO 10360-5:2010                                      | PLTM <sup>3)</sup> | in µm | 18 °C - 22 °C | 3.8         | 3.8         | 3.8         |

### ZEISS Discovery.V12 <sup>4)</sup>



Optical 2D camera sensor with image processing functionality and autofocus, 12x zoom, 10 fixed zoom levels, CMOS measuring camera chip, measuring speed up to 30 frames/s, max. probing speed 10 mm/s (Z axis), working distance 87 mm, laser pointer. Illumination: outside 8-segment ring light (blue and red), inside ring light (blue and red), coaxial light (blue and red), transmitted light.

|  |                           |       |               | 3/2/2       | 5/4/3       | 8/6/3       |
|--|---------------------------|-------|---------------|-------------|-------------|-------------|
| Length measurement error <sup>2)</sup><br>MPE complies with ISO 10360-7:2011       | EU X/Y (1D) <sup>5)</sup> | in µm | 18 °C - 22 °C | 1.6 + L/200 | 1.6 + L/250 | 1.9 + L/150 |
|  | EU XY (2D) <sup>5)</sup>  | in µm | 18 °C - 22 °C | 1.9 + L/150 | 1.7 + L/250 | 2.0 + L/150 |
| Repeatability range<br>(of EU - MPL complies with ISO 10360-7:2011)                | RU XY <sup>5)</sup>       | in µm | 18 °C - 22 °C | 1.2         | 1.2         | 1.2         |
| Repeatability range<br>(of EUZ L = 0 mm - MPL complies with ISO 10360-7:2011)      | RUZ <sup>5)</sup>         | in µm | 18 °C - 22 °C | 1.9         | 1.9         | 1.9         |
| Probing error<br>MPE complies with ISO 10360-7:2011                                | PF2D <sup>5)</sup>        | in µm | 18 °C - 22 °C | 1.9         | 1.7         | 2.0         |
| Probing error of the image processing system<br>MPE complies with ISO 10360-7:2011 | PFV2D <sup>5)</sup>       | in µm | 18 °C - 22 °C | 1.2         | 1.2         | 1.2         |

- 1) ZEISS VAST XXT: acceptance test with TL3 module; stylus length of 70 mm and stylus tip diameter of 8 mm.
- 2) Measuring length L in mm with acceptance testing plate from ZEISS.
- 3) Measuring location near the calibration position to document sensor properties.
- 4) Laser class 1: EN (IEC) 60825-1:2002
- 5) 6.3x magnification
- 6) Filter used: 50 W/U; scanning speed for roundness: 5 mm/s, value valid XY direction

### Optical confocal white light distance sensor <sup>1)</sup> for ZEISS O-INSPECT 3/2/2, 5/4/3, 8/6/3

#### Measuring range 2 mm



Working distance 61 mm, resolution 0.07 µm, measurable surface inclination to beaming direction 90°±15° <sup>2)</sup>, measuring spot diameter 12.5 µm

|  |                         |       |               |             |
|--|-------------------------|-------|---------------|-------------|
| <b>Unidirectional length measurement error</b><br>MPE complies with ISO 10360-8:2013 | E[Uni:Tr:ODS]<br>Z axis | in µm | 18 °C - 22 °C | 1.9 + L/250 |
|--|-------------------------|-------|---------------|-------------|

|  |                                  |       |               |   |
|--|----------------------------------|-------|---------------|---|
| <b>Total dimension probing error</b><br>MPE complies with ISO 10360-8:2013 | P[Size.Sph.All:Tr:ODS]<br>Z axis | in µm | 18 °C - 22 °C | 5 |
|--|----------------------------------|-------|---------------|---|

#### Measuring range 3 mm



Working distance 22.5 mm, resolution 0.1 µm, measurable surface inclination to beaming direction 90°±30° <sup>2)</sup>, measuring spot diameter 12 µm

|  |                         |       |               |             |
|--|-------------------------|-------|---------------|-------------|
| <b>Unidirectional length measurement error</b><br>MPE complies with ISO 10360-8:2013 | E[Uni:Tr:ODS]<br>Z axis | in µm | 18 °C - 22 °C | 2.2 + L/250 |
|--|-------------------------|-------|---------------|-------------|

|  |                                  |       |               |   |
|--|----------------------------------|-------|---------------|---|
| <b>Total dimension probing error</b><br>MPE complies with ISO 10360-8:2013 | P[Size.Sph.All:Tr:ODS]<br>Z axis | in µm | 18 °C - 22 °C | 5 |
|--|----------------------------------|-------|---------------|---|

#### Measuring range 10 mm



70 mm working distance, 0.3 µm resolution  
Measurable surface inclination to beaming direction 90° ±20° <sup>2)</sup>  
Measuring spot diameter 24 µm

|  |                         |       |               |             |
|--|-------------------------|-------|---------------|-------------|
| <b>Unidirectional length measurement error</b><br>MPE complies with ISO 10360-8:2013 | E[Uni:Tr:ODS]<br>Z axis | in µm | 18 °C - 22 °C | 3.9 + L/250 |
|--|-------------------------|-------|---------------|-------------|

|  |                                  |       |               |   |
|--|----------------------------------|-------|---------------|---|
| <b>Total dimension probing error</b><br>MPE complies with ISO 10360-8:2013 | P[Size.Sph.All:Tr:ODS]<br>Z axis | in µm | 18 °C - 22 °C | 5 |
|--|----------------------------------|-------|---------------|---|

### Rotary table <sup>1)</sup> for ZEISS O-INSPECT 5/4/3 and 8/6/3

#### Dimensions and weight

|       |  |       |               |             |
|-------|--|-------|---------------|-------------|
| Masse |  | in kg | 18 °C - 22 °C | approx. 6.3 |
|-------|--|-------|---------------|-------------|

|                  |            |      |               |      |
|------------------|------------|------|---------------|------|
| Measuring system | Resolution | in " | 18 °C - 22 °C | 0,07 |
|------------------|------------|------|---------------|------|

|               |                         |       |  |     |
|---------------|-------------------------|-------|--|-----|
| Working range | B12                     | in mm |  | 165 |
|               | With a vertical RT axis | in mm |  |     |

|       |                         |       |  |     |
|-------|-------------------------|-------|--|-----|
| Hight | h2                      | in mm |  | 135 |
|       | With a vertical RT axis | in mm |  |     |

#### Dynamics

|                       |  |        |               |    |
|-----------------------|--|--------|---------------|----|
| Max. angular velocity |  | in °/s | 18 °C - 22 °C | 50 |
|-----------------------|--|--------|---------------|----|

|                |  |                      |               |     |
|----------------|--|----------------------|---------------|-----|
| Rotation speed |  | in min <sup>-1</sup> | 18 °C - 22 °C | 8.3 |
|----------------|--|----------------------|---------------|-----|

#### Load/moment

|                |  |       |            |         |
|----------------|--|-------|------------|---------|
| Moment of tilt |  | in Nm | horizontal | 2       |
|                |  | in Nm | vertical   | centric |
|                |  | in kg | vertical   | 9       |

|                                       |  |  |  |  |
|---------------------------------------|--|--|--|--|
| Max. centering capacity <sup>3)</sup> |  |  |  |  |
|---------------------------------------|--|--|--|--|

|               |  |         |  |   |
|---------------|--|---------|--|---|
| Tilt rigidity |  | in Nm/° |  | 1 |
|---------------|--|---------|--|---|

|                  |   |       |               |   |
|------------------|---|-------|---------------|---|
| Available torque | M | in Nm | 18 °C - 22 °C | 3 |
|------------------|---|-------|---------------|---|

|                           |                  |       |               |     |                   |
|---------------------------|------------------|-------|---------------|-----|-------------------|
| Max. distance of the load | to the jaw chuck | in mm | 18 °C - 22 °C | 100 | by approx. 1.5 kg |
|---------------------------|------------------|-------|---------------|-----|-------------------|

|                         |  |       |               |             |
|-------------------------|--|-------|---------------|-------------|
| Max. workpiece diameter |  | in mm | 18 °C - 22 °C | approx. 150 |
|-------------------------|--|-------|---------------|-------------|

#### Accuracy

|                                |  |      |               |       |
|--------------------------------|--|------|---------------|-------|
| Angular position repeatability |  | in " | 18 °C - 22 °C | ±0.75 |
|--------------------------------|--|------|---------------|-------|

|  |    |       |               |   |
|--|----|-------|---------------|---|
| Axial runout<br>MPE complies with ISO 10360-3:2000 | FA | in µm | 18 °C - 22 °C | 6 |
|--|----|-------|---------------|---|

|   |    |       |               |   |
|---|----|-------|---------------|---|
| Radial runout<br>MPE complies with ISO 10360-3:2000 | FR | in µm | 18 °C - 22 °C | 6 |
|---|----|-------|---------------|---|

|  |    |       |               |   |
|--|----|-------|---------------|---|
| Wobble<br>MPE complies with ISO 10360-3:2000 | FT | in µm | 18 °C - 22 °C | 6 |
|--|----|-------|---------------|---|

1) Optionally available.

2) Depending on the reflection behavior of the surface.

**ZEISS O-INSPECT 3/2/2**

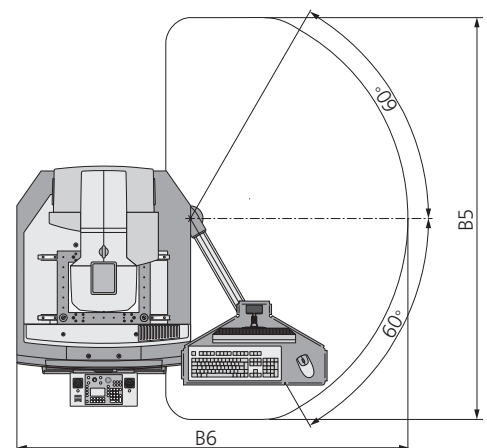
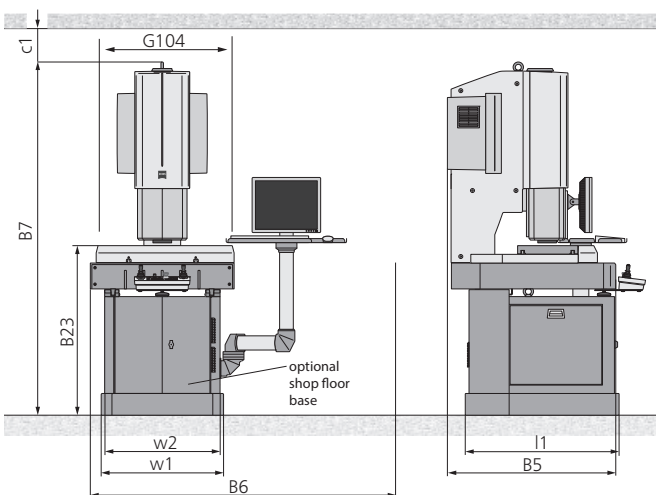
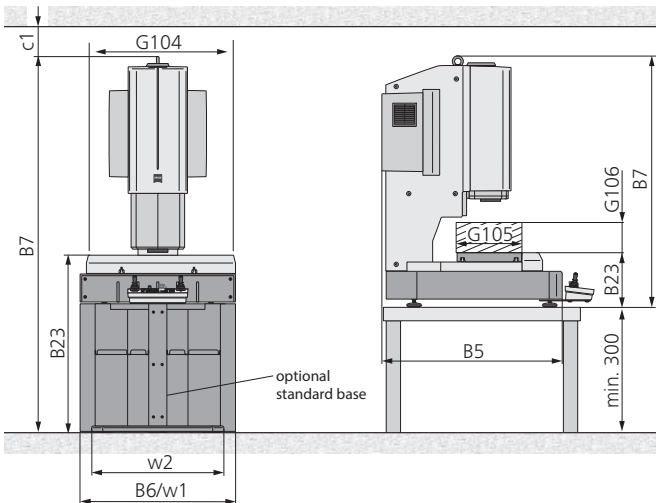
Dimensions in mm

|                     | Measuring range |        |        | Stylus data geometry |   |                     |      |                             |      | Overall machine dimensions |                    |        | Working range (Max. workpiece size) |
|---------------------|-----------------|--------|--------|----------------------|---|---------------------|------|-----------------------------|------|----------------------------|--------------------|--------|-------------------------------------|
|                     | X axis          | Y axis | Z axis | ZEISS VAST XXT       |   | ZEISS Discovery.V12 |      | White light distance sensor |      | Width                      | Length             | Height | Width                               |
|                     | G104            | G105   | G106   | X                    | Y | X                   | Y    | X                           | Y    | B6                         | B5                 | B7     | B17                                 |
| Basic model         | 300             | 200    | 200    | 0                    | 0 | 74.0                | -1.0 | 170.5                       | 61.5 | 865 <sup>1)</sup>          | 1000 <sup>2)</sup> | 1405   | ∞                                   |
| With standard base  | 300             | 200    | 200    | 0                    | 0 | 74.0                | -1.0 | 170.5                       | 61.5 | 865 <sup>1)</sup>          | 1000 <sup>2)</sup> | 2080   | ∞                                   |
| With shopfloor base | 300             | 200    | 200    | 0                    | 0 | 74.0                | -1.0 | 170.5                       | 61.5 | approx. 1935               | 1960 <sup>2)</sup> | 2115   | ∞                                   |

Dimensions in mm

Weight in kg

|                     | Footprint |                  |        | Table height | Assembly clearance | Max. workpiece | Measuring machine |
|---------------------|-----------|------------------|--------|--------------|--------------------|----------------|-------------------|
|                     | Width     |                  | Length | B23          | c1                 |                |                   |
|                     | w1        | w2 <sup>3)</sup> | l1     |              |                    |                |                   |
| Basic model         | 865       | 765              | 1000   | 305          | ≥200               | 20             | 325               |
| with standard base  | 865       | 740              | 991    | 980          | ≥200               | 20             | 440               |
| With shopfloor base | 732       | -                | 920    | 1015         | ≥200               | 20             | 490               |



Note: the given dimensions and weights are approximate values. Subject to change. Actual appearance of specific sizes may vary from illustration. Dimensioning based on DIN 4000-167:2009.

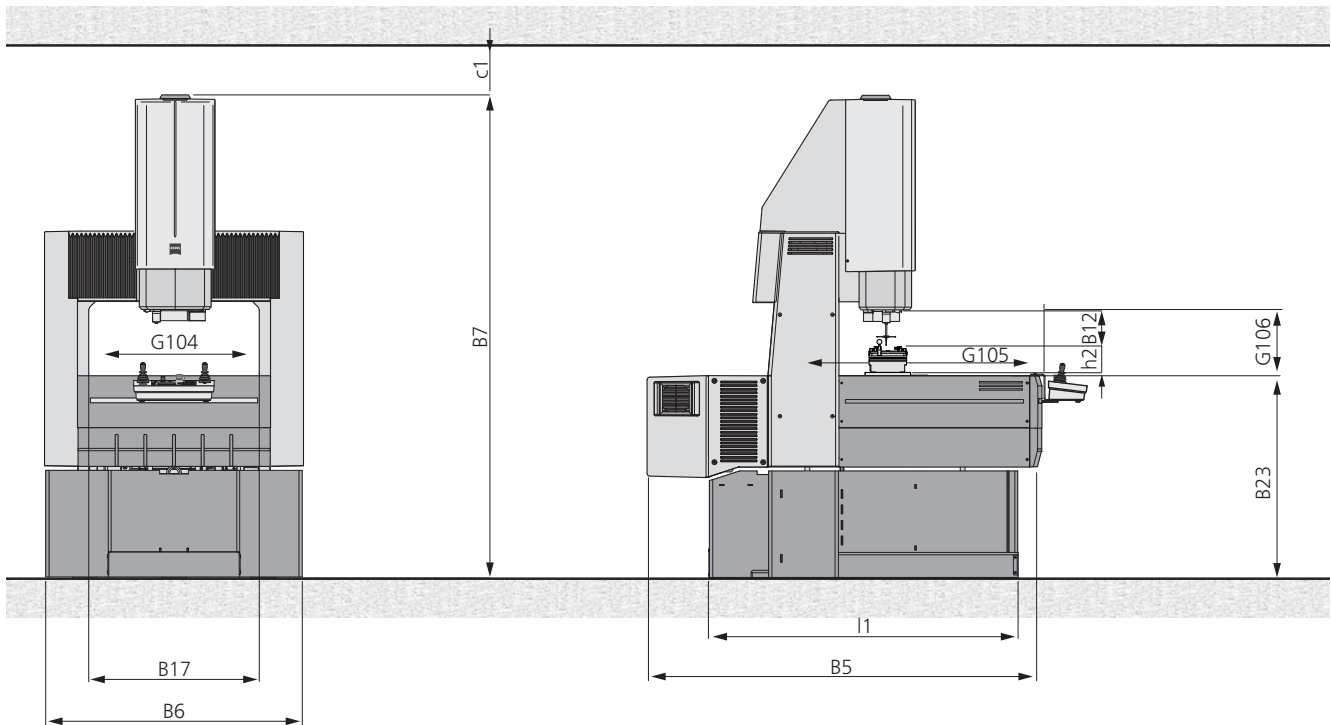
- 1) plus 2 x 500 mm assembly clearance.
- 2) plus 240 mm for control panel storage and 500 mm assembly clearance.
- 3) With disassembly of the cover parts during installation.

**ZEISS O-INSPECT 5/4/3** Dimensions in mm

| Measuring range  |        |              | Stylus data geometry |   |                     |              |                             |      | Overall machine dimensions |                    |        | Working range<br>(Max. workpiece size) |
|------------------|--------|--------------|----------------------|---|---------------------|--------------|-----------------------------|------|----------------------------|--------------------|--------|--|
| X axis           | Y axis | Z axis       | ZEISS VAST XXT       |   | ZEISS Discovery.V12 |              | White light distance sensor |      | Width                      | Length             | Height | Width                                  |
| G104             | G105   | G106         | X                    | Y | X                   | Y            | X                           | Y    | B6                         | B5                 | B7     | B17                                    |
| 500              | 400    | 300          | 0                    | 0 | 74.0                | -1.0         | 170.5                       | 61.5 | 1090 <sup>1)</sup>         | 1653 <sup>2)</sup> | 2030   | 700                                    |
| Dimensions in mm |        |              |                      |   |                     | Weight in kg |                             |      |                            |                    |        |  |
| Footprint        |        | Table height | Assembly clearance   |   | Max. workpiece      |              | Measuring machine           |      | Base                       |                    |        |  |
| Width            | Length |              |                      |   |                     |              |                             |      |                            |                    |        |  |
| B6               | l1     | B23          | c1                   |   |                     |              |                             |      |                            |                    |        |  |
| 1090             | 1295   | 850          | ≥200                 |   | 25                  |              | 600                         |      | 150                        |                    |        |  |

**ZEISS O-INSPECT 8/6/3** Dimensions in mm

| Measuring range  |        |              | Stylus data geometry |   |                     |              |                             |      | Overall machine dimensions |                    |        | Working range<br>(Max. workpiece size) |
|------------------|--------|--------------|----------------------|---|---------------------|--------------|-----------------------------|------|----------------------------|--------------------|--------|--|
| X axis           | Y axis | Z axis       | ZEISS VAST XXT       |   | ZEISS Discovery.V12 |              | White light distance sensor |      | Width                      | Length             | Height | Width                                  |
| G104             | G105   | G106         | X                    | Y | X                   | Y            | X                           | Y    | B6                         | B5                 | B7     | B17                                    |
| 800              | 600    | 300          | 0                    | 0 | 74.0                | -1.0         | 170.5                       | 61.5 | 1440 <sup>1)</sup>         | 2144 <sup>2)</sup> | 2030   | 1060                                   |
| Dimensions in mm |        |              |                      |   |                     | Weight in kg |                             |      |                            |                    |        |  |
| Footprint        |        | Table height | Assembly clearance   |   | Max. workpiece      |              | Measuring machine           |      | Base                       |                    |        |  |
| Width            | Length |              |                      |   |                     |              |                             |      |                            |                    |        |  |
| B6               | l1     | B23          | c1                   |   |                     |              |                             |      |                            |                    |        |  |
| 1440             | 1591   | 850          | ≥200                 |   | 100                 |              | 1000                        |      | 200                        |                    |        |  |



Note: the given dimensions and weights are approximate values. Subject to change. Actual appearance of specific sizes may vary from illustration. Dimensioning based on DIN 4000-167:2009.

- 1) plus 2 x 500 mm assembly clearance.
- 2) plus 200 mm for control panel storage and 500 mm assembly clearance.

**Requirements for operational readiness**

|                           |   |   |   |
|---------------------------|---|---|---|
| Relative humidity         | 40 % - 70% (without condensation)   |   |   |
| Environmental temperature | 17°C - 35°C   |   |   |
| Electrical power rating   | <b>3/2/2</b>  | <b>5/4/3</b>  | <b>8/6/3</b>  |
|                           | 1/N/PE 100 - 240V~(+10%);<br>50-60 Hz max. power consumption<br>600 VA Typical power consumption<br>(thermal load): 170 W | 1/N/PE 100 - 240V~(+10%);<br>50-60 Hz max. power consumption<br>600 VA Typical power consumption<br>(thermal load): 170 W | 1/N/PE 100 - 240V~(+10%);<br>50-60 Hz max. power consumption<br>600 VA Typical power consumption<br>(thermal load): 170 W |



**Environmental requirements**

|   |  |               |               |
|---|--|---------------|---------------|
|   | <b>3/2/2</b>   | <b>5/4/3</b>  | <b>8/6/3</b>  |
| Permissible humidity (without condensation) | 40 % - 70 %  | 40 % - 70 %   | 40 % - 70 %   |
| Environmental temperature                   | 18 °C - 22 °C  | 18 °C - 22 °C | 18 °C - 22 °C |
| Temperature fluctuations                    |  |               |               |
| per day                                     | 2.0 K/d  | 2.0 K/d       | 2.0 K/d       |
| per hour                                    | 1.0 K/h  | 1.0 K/h       | 1.0 K/h       |
| spatial                                     | 1.0 K/m  | 1.0 K/m       | 1.0 K/m       |
| Floor vibrations                            | ZEISS O-INSPECT is equipped with an integrated vibration damping system and is therefore highly resistant to vibrations. |               |               |

**Technical features**

|                           |   |  |  |
|---------------------------|---|--|--|
|                           | <b>3/2/2</b>  | <b>5/4/3</b>   | <b>8/6/3</b>   |
| Length measurement system | Optical scales; reflected light system, photoelectric, resolution 0.2 µm  | Optical scales; reflected light system, photoelectric, resolution 0.2 µm   | Optical scales; reflected light system, photoelectric, resolution 0.2 µm   |
| Controller                | Type<br>Protection type   | based on ZEISS C99L<br>IP53  | based on ZEISS C99L<br>IP53  |
| Data technology           | Delivered with a fully equipped workstation.  |  |  |
| Accessories (optional)    | Star stylus kit, part clamping set, pallet frame, optical confocal white light distance sensor, workpiece temperature sensor, measuring lab illumination, standard base, ShopFloor base | Star stylus kit, part clamping set, pallet frame, rotary table, optical confocal white light distance sensor, workpiece temperature sensor, measuring lab illumination | Star stylus kit, part clamping set, pallet frame, rotary table, optical confocal white light distance sensor, workpiece temperature sensor, measuring lab illumination |

**Approvals**

|             |   |  |  |
|-------------|---|--|--|
| Regulations | ZEISS O-INSPECT complies with EC machinery directive 2006/42/EC and EMC directive 2014/30/EU.   |  |  |
|             |   |  |  |
| Disposal    | ZEISS products and packaging returned to us are disposed of in accordance with applicable legal provisions.   |  |  |

**Certifications/accreditations**

|   |  |
|---|--|
| Quality management system                       | ISO 9001:2008; VDA 6, Parts 4, 2. Issue 2005 |
| Environmental management system                 | ISO 14001:2004                               |
| Occupational health & safety management systems | BS OHSAS 18001:2007                          |
| Accredited                                      | ISO/IEC 17025:2005                           |

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