



Assembly Instructions

surfaceCONTROL 3D 3500 / 3510

1. Warnings

Do not look directly into the light source of the sensor.

- > Risk of injury, damage to the eyes and skin

Connect the power supply and the display/output device according to the safety regulations for electrical equipment.

- > Risk of injury
- > Damage to or destruction of the sensor

Avoid shocks and impacts to the sensor.

The supply voltage must not exceed the specified limits.

Avoid constant exposure of the sensor to dust or splashes of water by appropriate methods such as blowing or using a protective housing.

The sensor housing may only be opened by authorized persons.

- > Damage to or destruction of the sensor

Do not touch the protective windows of the optics. Wipe off any fingerprints immediately with pure alcohol and a clean cotton cloth with no streaks. Protect the cables against damage.

- > Failure of the measuring device

Do not plug or unplug devices during the operation.

2. Notes on Product Marking

The product meets the requirements of CE and UKCA.

All specifications and safety instructions described in the operating instructions must be observed.

3. Proper Environment

- Protection class
 - Sensor: IP67 (only applies in the case of connected output connectors and/or installed protective caps)

Optical paths during operation are excluded from the protection class. Contamination of the paths causes impairment or failure of the function.

The IP67 protection class is a specification that is limited to protection from dust and water. Oil, steam and emulsion effects are not included in this protection class and must be evaluated separately.

- Temperature range
 - Operation: 0 ... +45 °C ¹ (+32 ... +113 °F)
 - Storage: -20 ... +70 °C (-4 ... +158 °F)
- Humidity: 20 ... 80 % (non condensing)
- Ambient pressure: Atmospheric pressure

1) Max. permissible operating temperature depends on installation scenario, thermal connection and operating mode. If necessary, external heat dissipation must be used to ensure that the sensor's internal temperature of 60 °C is not exceeded.

4. Delivery surfaceCONTROL 3D 35xx

- 1 Sensor surfaceCONTROL 3D 35xx
- 1 Assembly instructions
- 1 Calibration final inspection
- 3 Protective caps
- 1 ECR3000-5 supply cable 5 m
- 1 SCR3000X-5 Ethernet interface cable 5 m

- ➡ Carefully remove the components of the measuring system from the packaging and ensure that the goods are forwarded in such a way that no damage can occur.
- ➡ Check the delivery for completeness and shipping damage immediately after unpacking.
- ➡ If there is damage or parts are missing, immediately contact the manufacturer or supplier.

5. Light Source

The surfaceCONTROL 3D 35xx sensor works with an LED lighting unit. Measurement is performed using blue light at the dominant 459 nm wavelength. The sensor is included in risk group 2 according to EN 62471: 2008.



Do not look into the lens. Consciously close your eyes or immediately turn away if the optical radiation enters the eye.

The warning sign below is attached to the sensor housing on the top and bottom:



Fig. 1 LED warning sign

i If both warning labels are covered over when the unit is installed, the user must ensure that supplementary labels are applied.

6. Electrical Connections



Fig. 2 Arrangement of connections

Power	Supply voltage
Data	Gigabit Ethernet connection
I/O	Multi-function connection

Supply Voltage (Power)

The power supply connection in the form of a 4-pin M12 round connector has a current carrying capacity of up to 2 A per pin.

Designation	Pin no.	Cable color ECR3000-x	Notes	Connection view
+U _B	1	Brown	18 V ... 30 V DC (rated value 24 V)	
+U _B	2	White		
GND	3	Blue	0 V	
GND	4	Black		
Screen	Housing			View: Plug on housing side

Fig. 3 Pin assignment of the power supply connection

Use only shielded lines or original cables from the accessories program for the power supply connection or the outputs.

Micro-Epsilon recommends the ECR3000-x shielded supply cable.

Multi-Function Connection I/O

Interfaces and signals for external control of the sensor or for outputting sensor states and data are provided via the multi-function connection. The four connections operate either as inputs or outputs.

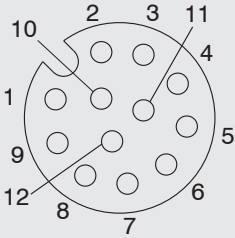
Designation	Pin no.	Cable color PCR3000-x	Notes	Connection view
reserved	9	Red		 <p>View: Socket, housing side</p>
reserved	2	Blue		
reserved	3	White		
reserved	1	Brown		
reserved	12	Red-blue		
reserved	11	Gray-pink		
reserved	10	Purple		
GPIO1	4	Green	General purpose IO 1 hardware trigger	
GPIO2	6	Yellow	General purpose IO 2	
GPIO3	8	Gray	General purpose IO 3	
GPIO4	5	Pink	General purpose IO 4	
GND GPIO	7	Black	Ground connection GPIO	
Screen	Housing		Not electrically connected to GND GPIO	

Fig. 4 Pin assignment of the multi-function connection

The multi-function connection is a 12-pin M12 round connector. The connecting line is intended to be up to 35 m long; however, the cable must be shielded at any length. Micro-Epsilon recommends using the PCR3000-x multi-function cable.

Digital Signals

The four digital connections of the multi-function interface provided can operate optionally as inputs or outputs. They are configured using the software. All digital ports share a joint ground GND GPIO. External auxiliary power (max. 30 V) is required to use the outputs.

The digital signals are not suitable for brief signal pulses or time-critical signals. The exception is port 1, which, when configured correctly, can be used as a hardware trigger to start a measurement and is directly connected to the sequence control in the sensor.

The functionality of the digital signals can be programmed, see Fig. 5. In addition to direction, polarity can also be switched for the inputs and outputs. Internal sensor signals can be assigned to the digital outputs, for example, to control additional connected devices.

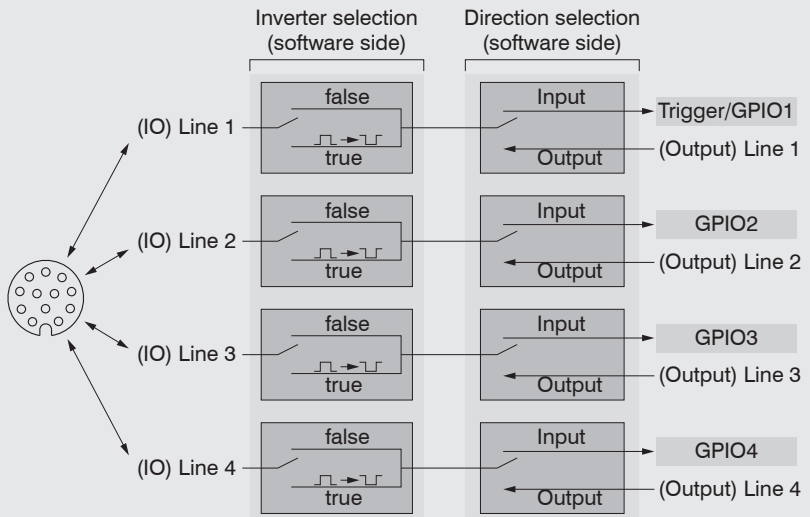
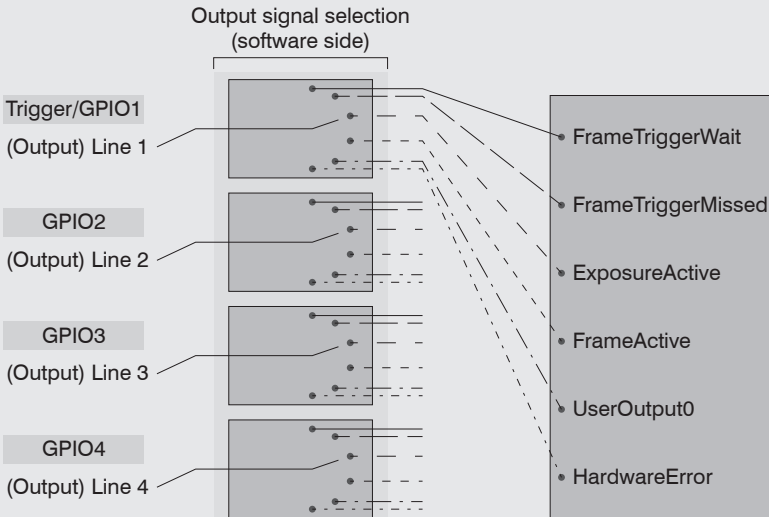


Fig. 5 Programmable inputs and outputs

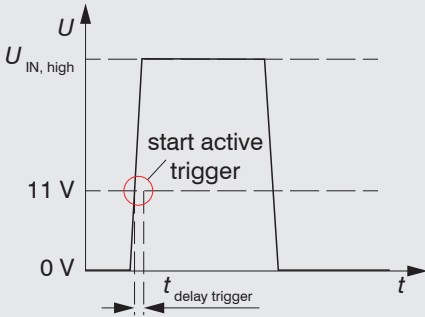
The outputs can optionally be assigned the internal signals below:

Internal signal	Description
UserOutput0	Digital output signal that can be set via Genicam
FrameTriggerWait	Sensor is ready for next measurement
FrameTriggerMissed	(External) trigger was missed (sensor was not yet ready for measurement)
FrameActive	3D measurement in sensor is active (start at exposure of first image, end at completion of data transmission via GigE)
ExposureActive	Image sequence recording is enabled for current frame (start at first image, end at last image transmission)
HardwareError	Critical error in sensor: Hardware error or sensor has become too hot.

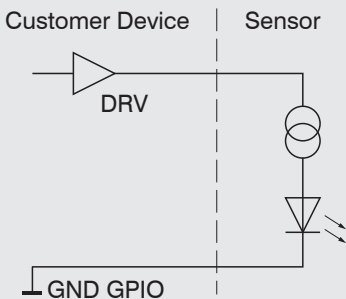
Fig. 6 Internal signal for digital output



Electrical Parameters of Digital Inputs, Multi-Function Connection



The switching levels of the digital inputs are defined based on HTL logic: Low 0 ... 3 V, High 11 ... 24 V (up to 30 V permitted). Maximum input current is internally limited to 5 mA. The GPIO_1 input can also be used as a trigger signal. The minimum pulse duration when used as a trigger signal is 50 μ s. Switching delay until a measurement is triggered is at most 10 μ s.



All inputs can be used as logical inputs, but not for time-critical tasks.

Electrical Parameters of Digital Outputs, Multi-Function Connection

The digital outputs require an external auxiliary voltage between 5 V and 30 V as well as a load resistance. They can be operated at a load current of at most 100 mA. This may occur, for example, by using an NPN-switching input module of a control.

The outputs are switched using a SolidState relay and are low active.

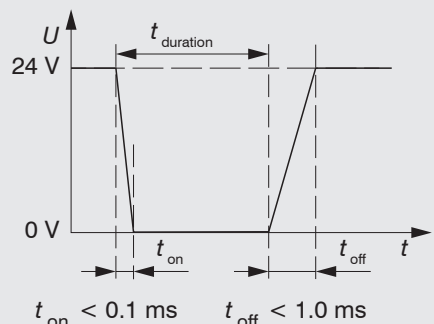
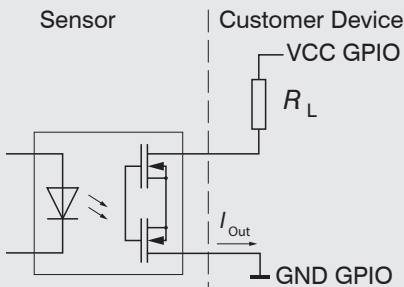


Fig. 7 Example for the timing behavior of an output at $VCC_{GPIO} = 24 \text{ V}$, $I_{Out} = 10 \text{ mA}$, $R_L = 2.4 \text{ k}\Omega$

Fig. 8 Switching times of digital output

7. LED Displays

LED LED	Meaning
Off	LED not active
Constant green	LED active

LED State	Meaning
Flashing orange	Initialization of sensor hardware
Flashing green	Initialization of communications interface
Constant green	Sensor is ready for operation
Flashing orange-green	Error during initialization of sensor hardware Communication with sensor possible
Constant red	Error during initialization No communication with sensor possible

LED Power	Meaning
Off	No supply voltage or supply voltage too low
Constant green	Supply voltage applied
Constant red	Error, supply voltage too high

LED Data (Link / Act)	Meaning
Link LED (left):	
Constant orange	Gigabit Ethernet connection established
Constant green	100 Mbit Ethernet connection established
Off	10 Mbit Ethernet connection established
Act LED (right):	
Green	Active data transmission
Off	No data transmission

LED I/O	Meaning
	reserved



Fig. 9 LED displays

8. Operation

Commissioning

NOTICE

The sensor may only be connected to peripherals when it does not carry power, that is, only when the supply voltage has been switched off.

- Mount the sensor according to the installation instructions.
- Connect the sensor to the Ethernet cable.
- Connect the Ethernet cable to the PC.
- Connect the sensor to the power supply.

Read the detailed operating instructions before operating the sensor. These instructions are available online at www.micro-epsilon.com.

Turning On

- Turn on the external DC voltage supply (24 VDC).

The Power LED is constantly illuminated green if sufficient supply voltage is applied. The State LED flashes orange and green during hardware connection and initialization. After completion, it is constantly illuminated green. For more information, see the “LED Displays” section, see Chap. 7.

i The surfaceCONTROL 3D 35xx sensor requires a warm-up time of typically 60 minutes for precise measurements.

Operating Programs

Various programs are provided for operation of the sensor.

- 3D View visualizes in space three-dimensional point data that have been detected with surfaceCONTROL 3D 35xx.
- 3DInspect solves industrial 3D measurement tasks.
- You can use surfaceCONTROL DefMap3D 7.0 for the analysis of individual surfaces with surfaceCONTROL 3D 35xx.

9. Installation

Requirements

The following minimum system requirements are necessary for the operation of the operating programs:

- Windows 8 or 8.1 (64 bit), Windows 10 (64 bit)
- 1-GHz or higher processor (64 bit) with 4 GB RAM
- Screen resolution: 1280 x 1024
- Graphic card / GPU with OpenGL 3.1 or higher

i Connect the sensor directly to the PC. Do not use hubs.

10. Positioning of Sensor and Test Object

General

i Note the following instructions for optimum positioning of the sensor and test object.

- Observe an optimum distance between the sensor and the surface of the test object, see Operating instructions, Chap. 3.2.
- Align the sensor with predominantly diffusely reflecting surfaces almost perpendicular to the surface. To avoid direct reflection, we recommend that you tilt the sensor by a few degrees.
- In the case of partially glossy surfaces, reflections from the test object can be reduced by inclining the sensor by up to 30° with respect to the surface of the test object.

Alignment with Crosshair

You will achieve the best results in the mid of the measuring range (focal range of cameras).

➡ Use the positioning pattern to easily and optimally align the sensor in the mid of the measuring range. Align the pattern of the projection with the superimposed pattern.

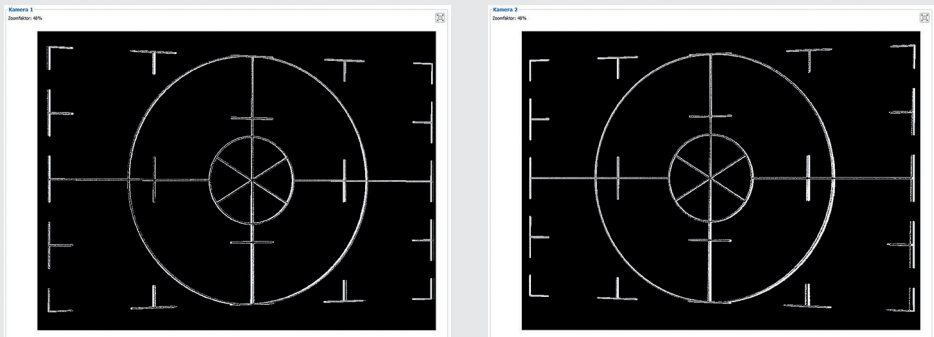


Fig. 10 Result of camera images when aligned with crosshair

You will find further details

- in the respective operating instructions of the software provided by Micro-Epsilon,
- or in the sensors operating instructions, chapter GenICam parameter description.

11. Further Information

For details on the individual programs or on setting the sensor parameters, please refer to the respective software operating manuals or the operating instructions of this sensor.

12. Disclaimer

All components of the device have been checked and tested for functionality in the factory. However, should any defects occur despite careful quality control, these shall be reported immediately to MICRO-EPSILON or to your distributor / retailer.

MICRO-EPSILON undertakes no liability whatsoever for damage, loss or costs caused by or related in any way to the product, in particular consequential damage, e.g., due to

- non-observance of these instructions/this manual,
- improper use or improper handling (in particular due to improper installation, commissioning, operation and maintenance) of the product,
- repairs or modifications by third parties,
- the use of force or other handling by unqualified persons.

This limitation of liability also applies to defects resulting from normal wear and tear (e.g., to wearing parts) and in the event of non-compliance with the specified maintenance intervals (if applicable).

MICRO-EPSILON is exclusively responsible for repairs.

It is not permitted to make unauthorized structural and / or technical modifications or alterations to the product.

In the interest of further development, MICRO-EPSILON reserves the right to modify the design.

In addition, the General Terms of Business of MICRO-EPSILON shall apply, which can be accessed under Legal details | Micro-Epsilon <https://www.micro-epsilon.com/impressum/>.

13. Service, Repair

If the sensor or sensor cable is defective:

- If possible, save the current sensor settings in a parameter set, see 3D-View, menu `Parameters > Save parameters to file`, in order to load the settings back again into the sensor after the repair.
- Please send us the affected parts for repair or exchange.

If the cause of a fault cannot be clearly identified, please send the entire measuring system to:

MICRO-EPSILON Optronik GmbH
Lessingstraße 14
01465 Langebrück / Germany


Tel. +49 (0) 35201 / 729-0
Fax +49 (0) 35201 / 729-90
optronic@micro-epsilon.de
www.micro-epsilon.com

14. Decommissioning, Disposal

In order to avoid the release of environmentally harmful substances and to ensure the reuse of valuable raw materials, we draw your attention to the following regulations and obligations:

- Remove all cables from the sensor and/or controller.
- Dispose of the sensor and/or the controller, its components and accessories, as well as the packaging materials in compliance with the applicable country-specific waste treatment and disposal regulations of the region of use.
- You are obliged to comply with all relevant national laws and regulations.

For Germany / the EU, the following (disposal) instructions apply in particular:

- Waste equipment marked with a crossed garbage can must not be disposed of with normal industrial waste (e.g. residual waste can or the yellow recycling bin) and must be disposed of separately. This avoids hazards to the environment due to incorrect disposal and ensures proper recycling of the old appliances. 
- A list of national laws and contacts in the EU member states can be found at https://ec.europa.eu/environment/topics/waste-and-recycling/waste-electrical-and-electronic-equipment-weee_en. Here you can inform yourself about the respective national collection and return points.
- Old devices can also be returned for disposal to MICRO-EPSILON at the address given in the imprint at <https://www.micro-epsilon.de/impressum/>.
- We would like to point out that you are responsible for deleting the measurement-specific and personal data on the old devices to be disposed of.
- Under the registration number WEEE-Reg.-Nr. DE28605721, we are registered at the foundation Elektro-Altgeräte Register, Nordostpark 72, 90411 Nuremberg, as a manufacturer of electrical and/or electronic equipment.

You can find more information about the sensor in the operating instructions. They are available online at:

<https://www.micro-epsilon.com/download/manuals/man--surfaceCONTROL-3D-35xx--en.pdf>



MICRO-EPSILON MESSTECHNIK GmbH & Co. KG
Koenigbacher Str. 15 · 94496 Ortenburg / Germany
Tel. +49 (0) 8542 / 168-0 · Fax +49 (0) 8542 / 168-90
info@micro-epsilon.com · www.micro-epsilon.com
Your local contact: www.micro-epsilon.com/contact/worldwide/



X9771423-A032093HDR