Assembly Instructions

surfaceCONTROL 3D SC2500 / SC2510

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 and the controller. The supply voltage must not exceed the specified limits. Avoid constant exposure of the sensor to dust or splashes of water by taking suitable measures such as blowing off or using a protective housing. The sensor housing may only be opened by authorized persons.
> Damage to or destruction of the sensor and/or the controller

Do not touch the protective windows. Remove any fingerprints immediately using pure alcohol and a clean cotton cloth without leaving any streaks. Protect the cables against damage.
> Failure of the measuring device

Only plug in or disconnect devices when disconnected from the power supply.

2.   Notes on CE Marking

The following apply to the surfaceCONTROL 3D 25x0 measuring system:
- EU Directive 2014/30/EU
- EU Directive 2011/65/EU

Products which carry the CE mark satisfy the requirements of the EU directives cited and the relevant applicable harmonized European standards (EN). The measuring system is designed for use in industrial environments.
The EU Declaration of Conformity and the technical documentation are available to the responsible authorities according to the EU Directives.

3.　　　Proper Environment

- Protection class
  - Sensor, controller:　　IP40 (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 IP40 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
    - Sensor:　　　　5 ... +40 °C
    - Controller:　　　-10 ... +60 °C [1]
  - Storage
    - Sensor:　　　　-10 ... +50 °C
    - Controller:　　　-40 ... +85 °C
- Humidity:　　　　　20 ... 80 % (non-condensing)
- Ambient pressure:　Atmospheric pressure

1) Max. permissible operating temperature with 0.7 m/s air blow

4.　　　Unpacking, Included in Delivery

- 1 Sensor surfaceCONTROL 3D 25x0
- 1 Controller SC2500
- 1 Cable harness/5 m/standard for surfaceCONTROL
- 1 Assembly Instructions
- 1 Calibration protocol
- 1 Table power pack for sensor
- 1 Ethernet patch cable (Cat6A, gray, 5 m)
- 1 DIN-rail mounting kit for controller
- 1 Power supply cable (4-pin terminal strip to open ends)

➡ 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 25x0 sensor works with an LED lighting unit. Measurement is performed using blue light at the dominant 462 nm wavelength. The sensor is included in risk group 2 according to EN 62471: 2008.

⚠ CAUTION	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 front side:

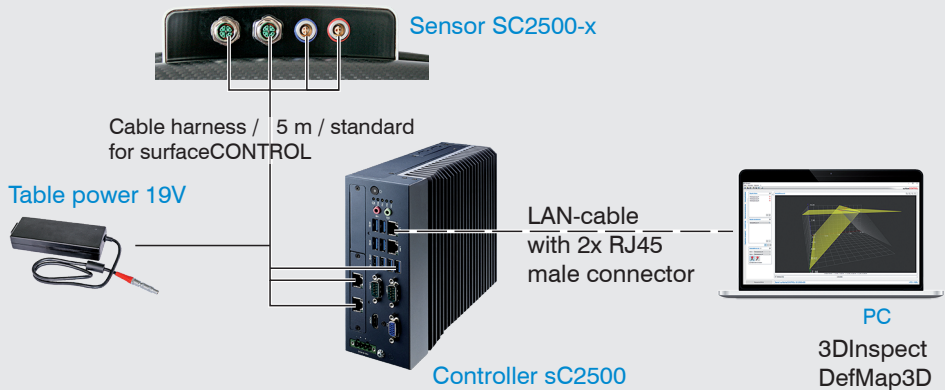*Fig. 1 LED warning sign*

i   If the information sign is covered over when the unit is installed, the user must ensure that a supplementary information sign is attached at the installation location.
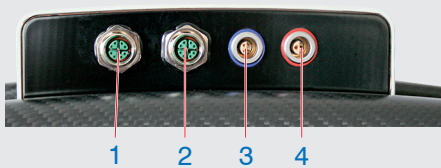
6.   Electrical Connections

Connection Diagram

Sensor SC2500-x

Cable harness / 5 m / standard
for surfaceCONTROL

Table power 19V

LAN-cable
with 2x RJ45
male connector

PC
3DInspect
DefMap3D

Controller sC2500

surfaceCONTROL 3D 2500 Sensor

All connectors of the sensor are located in the connector panel on the rear side.

1	Ethernet port Camera 1
2	Ethernet port Camera 2
3	Sensor control
4	Power supply

Fig. 2 Rear view of sensor with connectors

Supply Voltage (Power)

Pin	Signal	Comment
1	V_+	18 VDC ±33 % max. current consumption 12.5 A
2	GND	0 V

Fig. 3 Pin assignment connector power port

The cable shield is connected to the connector housing.

A 2-pin LEMO PushPull connector is used on sensor side.

i   Only use the included table power pack for the power supply of the surfaceCON-
    TROL 2500 sensor.

Sensor Control (USB)

Pin	Signal	Pin	Signal	
1	USB D+	3	USB VCC	
2	USB D-	4	GND	

Fig. 4 Pin assignment connector USB port

The cable shield is connected to the connector housing.

The sensor is configured and controlled via the available USB 2.0 interface. Use only the supplied USB cable.

A 4-pin LEMO PushPull connector is used on sensor side.

The USB-A connector on controller side can be connected to a USB 2.0 or USB 3.0 port.

Image Data Transmission (Gigabit Ethernet)

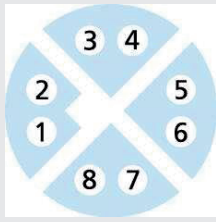| Pin	Signal	Pin	Signal	
1	Data1+	5	Data3-	
2	Data1-	6	Data2-	
3	Data2+	7	Data4+	
4	Data3+	8	Data4-	

Fig. 5 Pin assignment connector "Ethernet port"

For the image data output of the cameras via Gigabit Ethernet, the sensor has two Gigabit Ethernet interfaces. The sensor supports only the transmission with 1 Gbit. 8-pin, X-coded, M12 round connectors with screwed connections are used on sensor side. The connection and tightening of the Ethernet cable to the sensor can be done by hand and does not require any tools. Proceed as follows for this:

➡️ Carefully insert the cable connector into the port on the sensor.

➡️ Turn the cable connector until you feel the latching of the inner groove into the corresponding guide of the port.
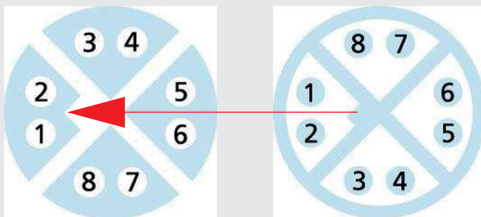
RJ45 connectors are used on the PC side.

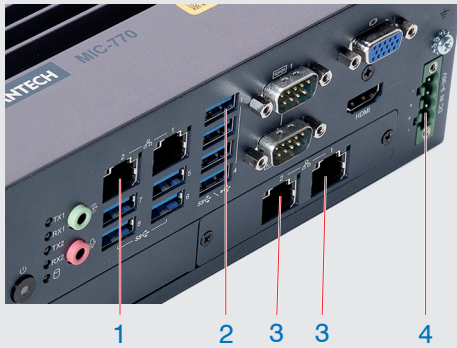ℹ️ Use only the Ethernet cable supplied in the scope of delivery.

Fig. 6 Connecting Ethernet connector to port

➡️ Tighten the cable connector.

surfaceCONTROL 3D 2500 Controller

General

All connections for the controller are located on the front.

1	Ethernet port, PC connection
2	Sensor control
3	Ethernet port Camera 1 and 2
4	Power supply

Fig. 7 Controller front view with connectors

Supply voltage (Power)

The power supply connection is a 4-pin plug connector.

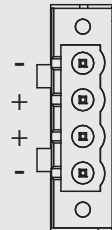| Pin/Designation	Comment
+	9 V ... 36 V DC (nominal value 24 V, max. power consumption 112 W)
−	0 V

Fig. 8 Pin assignment of the power supply connection, view: plug on housing side

The operating voltage is protected against polarity reversal. Use only shielded lines or original cables from the accessories program for the power supply connection or the outputs.

7. Mounting of the Sensor

The sensor can be mounted either on a lightweight tripod, on a robust column stand from the optional accessories or on a robot.

➡️ Mount the tripod according to its assembly instructions.

When using the tripod, ensure that the tripod with the sensor has a stable position to avoid any tipping over of the system.

ℹ️ Ensure that you can hold the sensor securely during assembly. If necessary, have a second person assist.

NOTICE	Ensure careful handling during installation and operation.
	Damage to or destruction of the sensor.

ℹ️ Use the built-in spirit level for the tripod for adjustment of the tripod.

8. Dismantling

Proceed as follows if you would like to detach the sensor from the tripod again:

Only for column stand option with boom:

➡️ Secure the boom of the tripod with the help of the clamping lever or retract the boom all the way and secure it with the clamping lever, see also assembly instructions for the tripod.

⚠️ CAUTION	Risk of injury. Boom without sensor makes jerky upward movement due to the counterweight in the tripod. Secure the boom using the clamping lever.

➡️ Undo the upper knurled screw on the tilt head of the tripod.

➡️ Press the red locking pin on the tilt head of the tripod and pull the sensor with the tripod out in the longitudinal direction.

ℹ️ Ensure that you can hold the sensor securely while pulling out. If necessary, have a second person assist.

NOTICE	Ensure careful handling during installation and operation.
	Damage to or destruction of the sensor.

9. Operation

Initial Operation

NOTICE	The sensor and the controller may only be connected to peripherals when they do not carry power, that is, only when the supply voltage has been switched off.

➡ Mount the sensor according to the assembly instructions.

➡ Mount the controller as per the assembly instructions.

➡ Connect the sensor and the controller to the cable harness included in the delivery.

➡ Connect the controller to the PC. To do so, use a common Ethernet cable of category CAT5e or higher.

➡ Connect the sensor to the power supply.

➡ Connect the controller to the power supply

Turning On

Switch on the power supply (24 VDC) on the controller.

➡ Press the Power button on the controller.
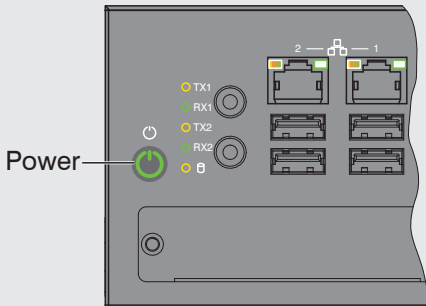
The Power LED on the controller is illuminated red if the power supply is sufficient, and green after pressing the Power button.

It starts when the supply voltage is applied.

ⁱ The surfaceCONTROL 3D 25x0 sensor requires a warm-up time of typically 60 minutes for precise measurements.

10.   Operating Programs

Various programs are provided for operation of the sensor.
- 3DInspect solves industrial 3D measurement tasks.
- You can use surfaceCONTROL DefMap3D, including the dongle which is subject to a charge, for the analysis of individual surfaces with surfaceCONTROL 3D 25x0.

11.   Installation

Requirements

The following minimum system specifications are necessary for the use of the operating programs:
- Windows 10 (64 bit)
- ≥ 2 GHz processor (64 Bit) or higher
- 4 GB RAM
- Screen resolution: 1280 x 1024
- Graphics card/GPU with OpenGL 3.1 or higher

The following procedure is necessary in order to install the software:
1. Install the hardware of the Ethernet interface(s) if not present.
2. Install the software.
3. With DefMap3D: use the USB dongle required for this.
4. Connect the controller of the surfaceCONTROL 3D 25x0 measuring system to the PC via Ethernet. Do not use hubs.

i   If your network card supports the VLAN option, this option must be disabled.

Connecting surfaceCONTROL 3D 25x0 to the PC

To connect surfaceCONTROL 3D 25x0 via Ethernet to the PC, proceed as follows:
1. Complete the installation of the software.
2. Connect surfaceCONTROL 3D 25x0 to the PC using the Ethernet interface.
3. Turn on the power supply.
3. Wait until the surfaceCONTROL 3D 25x0 measuring system is recognized by the PC. This takes about 1 minute.

i   To be able to operate the measuring system, the controller and the PC must be located in the same subnet.

The sensor starts in DHCP mode. If there is no DHCP server in the network or if no address has been assigned manually, the sensor and network adapter assign themselves an address (Link Local Address).

You can now operate the surfaceCONTROL 3D 25x0 measuring system using the operating programs listed above.

12.   Positioning of Sensor and Test Object

General

ℹ️   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.
- 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 measurement area (focal range of cameras)

➡️ In the main view, switch from the `3D View` to the `Image data`.

➡️ Switch to the `Data acquisition` tab.

➡️ Select `Sensor settings > Pattern projection > Positioning`.

The positioning pattern is displayed in the image data.

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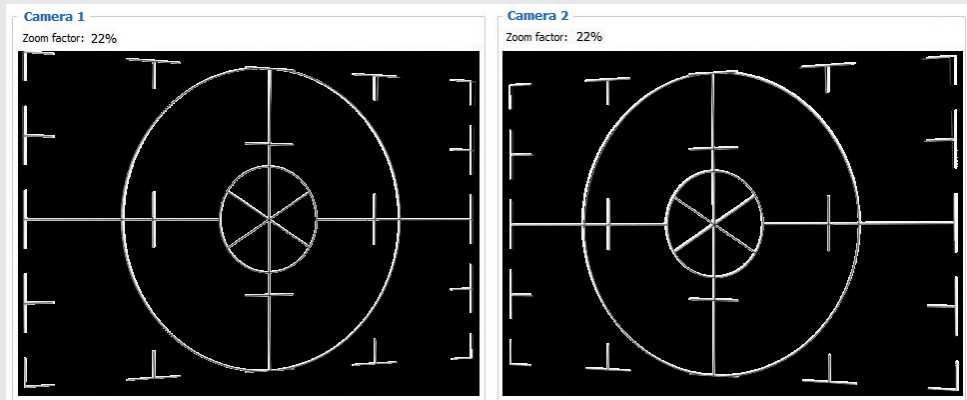

Fig. 9 Result of camera images when aligned with crosshair

For further details, please refer to
- the respective operating instructions of the software provided by Micro-Epsilon,
- or the operating instructions of this sensor in GenICam parameter description section.

13.   Exposure

The projected fringe pattern should be well recognizable over the entire measurement plane (not too light/dark). This way, you obtain as few overdriven or underdriven pixels as possible.

The `Exposure time` parameter enables you to adjust the exposure.

➡️ In the main view, switch from the `3D View` to the `Image data`.

➡️ Switch to the `Data acquisition` tab.

➡️ Select `Sensor settings > Pattern projection > Pattern`.

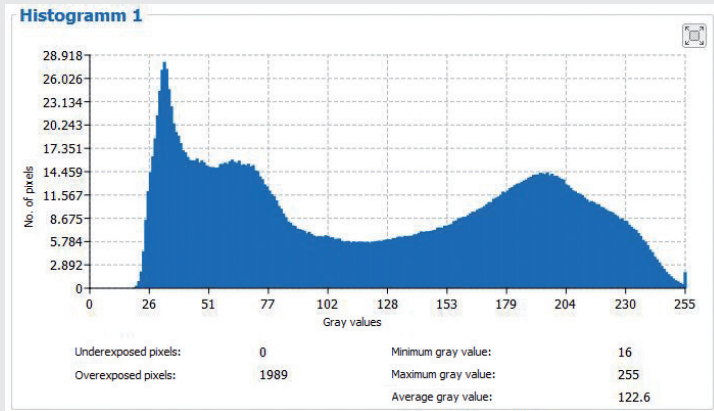➡️ Select a suitable exposure time in `Sensor settings > Exposure`.

Fig. 10 Example of an optimally selected exposure time

The distribution of gray values in the histogram should be approximately uniform with the projected pattern. The number of overexposed and underexposed pixels should be reduced to a minimum. The screens shown were created with the 3DInspect software from Micro-Epsilon.

14.   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/.

For translations into other languages, the German version shall prevail.

15.　Service, Repair

If the sensor, controller or cable harness is defective:
- If possible, save the current sensor settings in a parameter set to reload them 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:

INB Vision AG
Brenneckestraße 20, ZENIT II
39118 Magdeburg / Germany

Tel. +49 (0) 391 / 6117-300
Fax +49 (0) 391 / 6117-301

info@inb-vision.com
www.inb-vision.com

16.　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