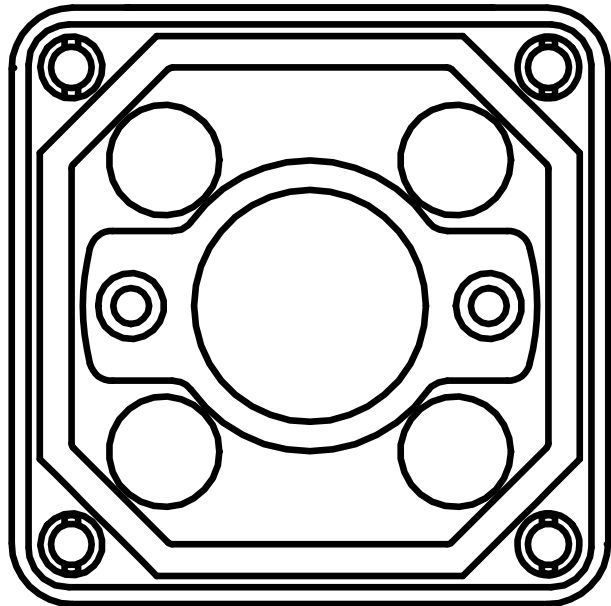


Operating instructions
Multicode reader

O2I5xx

UK

80282344 / 00 03 / 2019



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1 Preliminary note

Technical data, approvals, accessories and further information → www.ifm.com.

1.1 Symbols used

- ▶ Instructions
- > Reaction, result
- [...] Designation of keys, buttons or indications
- Cross-reference
-  Important note
Non-compliance may result in malfunction or interference.
-  Information
Supplementary note

1.2 Warnings used



CAUTION!

Kind and source of the hazard

- > Damage to property and slight reversible injuries may result.
- ▶ Actions to refrain from.
- ▶ Measures to take.

NOTE!

Kind and source of the hazard

- > Damage to property may result.
- ▶ Actions to refrain from.
- ▶ Measures to take.

1.3 Copyright and trademarks

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For binaries that are licensed under any version of the GNU General Public License (GPL) or the GNU LGPL you may obtain the complete corresponding source code of the GPL software from us by sending a written request to: opensource@ifm.com or to ifm electronic gmbh, Friedrichstraße 1, 45128 Essen, Germany.

We charge €30 for each request. Please write “source for product Y” in the memo line of your payment. Your request should include (i) the name of the covered binary, (ii) the name and the version number of the ifm product, (iii) your name and (iv) your return address.

This offer is valid to anyone in receipt of this information. This offer is valid for at least three years (from the date you received the GLP/LGPL covered code).

2 Safety instructions

- The device described is a subcomponent for integration into a system.
 - The manufacturer is responsible for the safety of the system.
 - The system manufacturer undertakes to perform a risk assessment and to create a documentation in accordance with legal and normative requirements to be provided to the operator and user of the system. This documentation must contain all necessary information and safety instructions for the operator, the user and, if applicable, for any service personnel authorised by the manufacturer of the system.
- Read this document before setting up the product and keep it during the entire service life.
- The product must be suitable for the corresponding applications and environmental conditions without any restrictions.
- Only use the product for its intended purpose (→ 3 Functions and features).
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property may occur.
- The manufacturer assumes no liability or warranty for any consequences caused by tampering with the product or incorrect use by the operator.
- Installation, electrical connection, set-up, operation and maintenance of the product must be carried out by qualified personnel authorised by the machine operator.
- Protect units and cables against damage.

2.1 Laser protection class



CAUTION!

Exposure to radiation

The use of operating and adjusting devices not indicated here may lead to dangerous exposure to radiation.

- ▶ Only use the operating and adjusting devices indicated in the operating instructions.



Visible laser light; LASER CLASS 1.

EN/IEC 60825-1:2007 and EN/IEC 60825-1:2014 complies with 21 CFR 1040 except for deviations pursuant to Laser Notice No. 50, dated June 2007.

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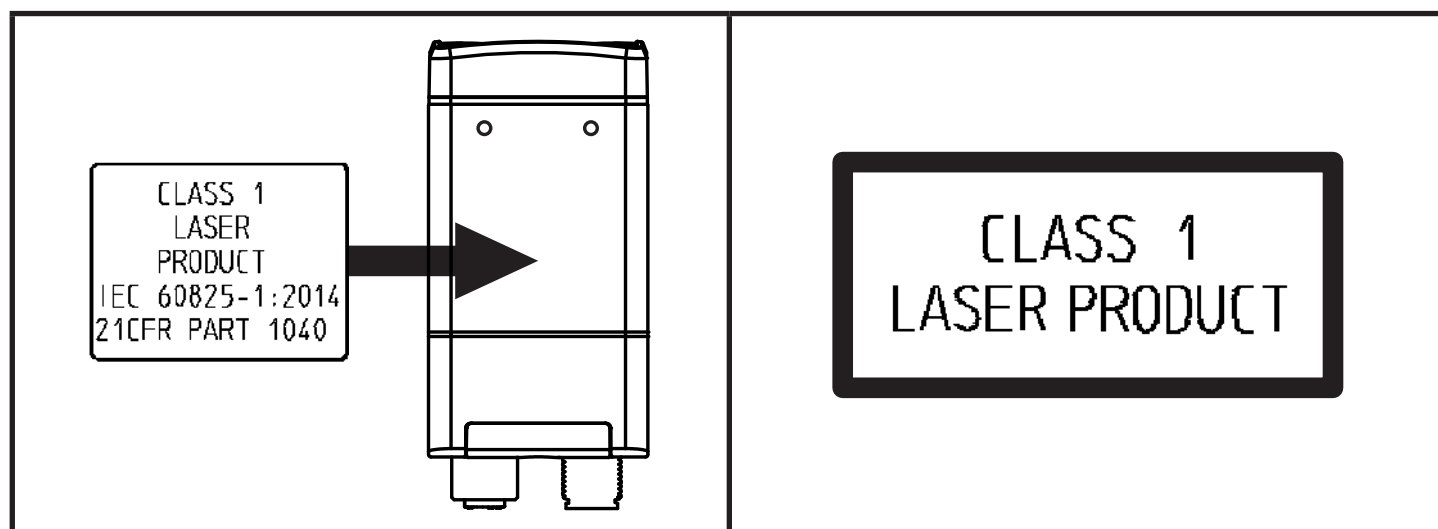


Abb. 1: Position of the product label

Abb. 2: Explanatory label

3 Functions and features

The device decodes labelled and directly marked 2D codes and 1D bar codes.

3.1 Characteristics

- integrated, configurable code evaluation
- process interfaces Ethernet TCP/IP and EtherNet/IP
- parameter setting interface Ethernet TCP/IP
- O2I500, O2I502, O2I504: internal illumination red light (617 nm) and integrated polarisation filter
- O2I501, O2I503, O2I505: internal illumination infrared light (850 nm)

- automatic setting of focus, illumination and code parameters during the configuration
- internal and external triggering
- read different code types with one application
- external selection of the switching outputs via the process interface (configurable via ifm Vision Assistant software)
- signal processing via logical connections in the device
- teaching directly on the device via button

3.2 Device safety

The device safety is rated for use under the following operating conditions:

- indoor use
- altitudes up to 4000 m
- relative air humidity up to max. 90%, non condensing
- pollution degree 2

Because of the requirements for electromagnetic interference emissions, the device is intended for use in industrial environments. The device is not suitable for use in domestic areas.

4 Items supplied

- O2I5xx multicode reader
- Operating instructions



► Only use accessories from ifm electronic.

Available accessories: www.ifm.com

The optimum function is not ensured when using components from other manufacturers.

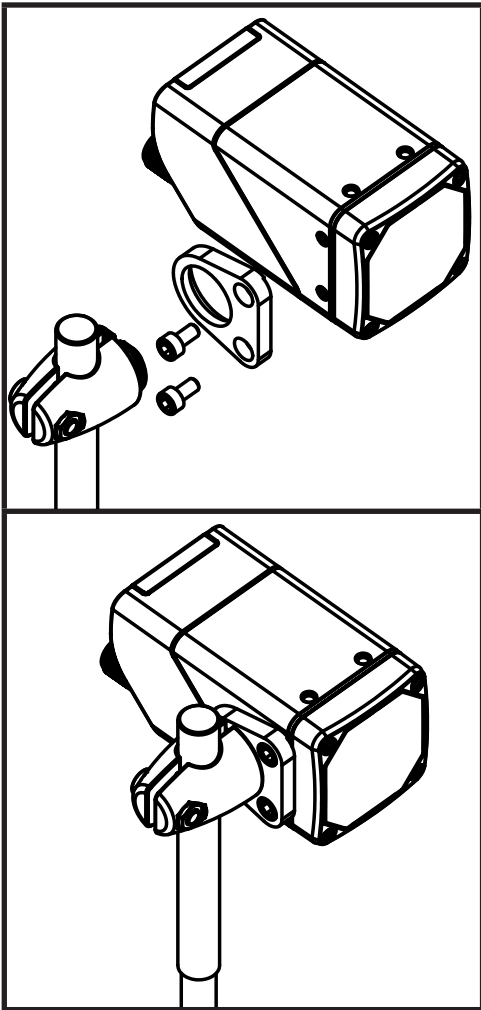


The device is supplied without installation and connection accessories.



Software manual and software: www.ifm.com.

5 Installation



During installation note the following:

- ▶ Use the E2D500 mounting set.
- ▶ Use 2 M4 screws to fix the device applying 2.1 Nm max.
- ⚠ The M4 drill holes are 7 mm deep.
- ▶ Depending on the surface of the object to be monitored, install the device in front or above the object.
- ▶ Avoid back light, scattered light and changing light conditions.
- ▶ Avoid installation in heavily polluting areas of the machine.
- ▶ Use strain reliefs for cables connected to the device.

Abb. 3: Installation with clamp and E2D500 mounting set.

⚠ If the device is permanently used in wet areas, the nut of the M12 Industrial Ethernet cable (e.g. E11898) may corrode. Use a cable with a high-grade stainless steel nut for permanent use in wet areas.

⚠ It is possible that the devices mounted side by side interfere due to simultaneous exposure.

ℹ Available accessories: www.ifm.com

6 Electrical connection

NOTE!

The unit must be connected by a qualified electrician.

Device of protection class III (PC III)

The electric supply must only be made via PELV circuits.

Electric supply must correspond to UL 61010-1, chapter 9.4 - Limited Energy:

The overcurrent protection device must switch off a current of 6.6 A in 120 s. For the correct rating of the overcurrent protection device take the technical data of the device and wiring into account.

The separation of external circuits must comply with UL 61010-2-201, Figure 102.

- ▶ Disconnect power before connecting the device.
- ▶ For cable lengths > 30 m use an additional protection against surge voltages to IEC 61000-4-5.

NOTE!

The IP rating indicated in the data sheet is only guaranteed if the M12 connectors are firmly screwed.

The device can be damaged by insufficiently tightened M12 connectors.

- ▶ Firmly screw the M12 connectors to the device.



For the scope of validity cULus: Minimum temperature rating of the cable to be connected to the field wiring terminals: 70 °C.



Cover the unused sockets with protective caps (E73004).
Tightening torque 0.6...0.8 Nm.



Available accessories: www.ifm.com

6.1 Wiring

	(1) Ethernet											
	M12 socket, D-coded, 4 poles											
		<table border="0"> <tr><td>1</td><td>TD +</td></tr> <tr><td>2</td><td>RD +</td></tr> <tr><td>3</td><td>TD -</td></tr> <tr><td>4</td><td>RD -</td></tr> <tr><td>S</td><td>screen</td></tr> </table>	1	TD +	2	RD +	3	TD -	4	RD -	S	screen
	1	TD +										
2	RD +											
3	TD -											
4	RD -											
S	screen											
(2) Power supply												
M12 connector, A-coded, 5 poles												
	<table border="0"> <tr><td>1</td><td>U+</td></tr> <tr><td>2</td><td>trigger input</td></tr> <tr><td>3</td><td>GND</td></tr> <tr><td>4</td><td>switching output 1 - ready</td></tr> <tr><td>5</td><td>switching output 2</td></tr> </table>	1	U+	2	trigger input	3	GND	4	switching output 1 - ready	5	switching output 2	
1	U+											
2	trigger input											
3	GND											
4	switching output 1 - ready											
5	switching output 2											

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Abb. 4: Wiring

6.1.1 Pin 1 (U+) / pin 3 (GND)

The permitted supply voltage is 18...30 V DC.

6.1.2 Pin 2 (trigger input)

The image capture of the device can be triggered with a switching signal via the trigger input.

The following trigger edges can be used:

- falling edge triggers image capture
- rising edge triggers image capture
- falling and rising edges trigger image capture
- rising edge starts and falling edge ends image capture (gated triggered). As long as the trigger is on "high", images are captured with a fixed frame rate.



Further possibilities to trigger the device:

- process interface command
- continuous image capture with fixed frame rate



The trigger input can be debounced internally (preset: internal debouncing deactivated). Internal debouncing prevents several short pulses from triggering. The pulse must be at least 2 ms long to be recognised as a trigger.

Depending on the electrical installation, debouncing is not necessary.

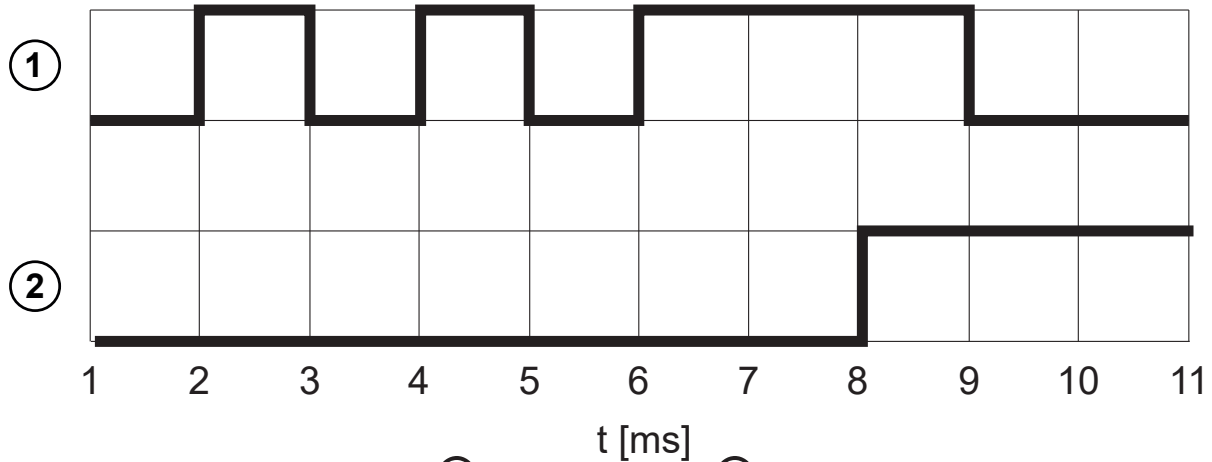


Abb. 5: Internal debouncing ①: Trigger input ② Image capture

6.1.3 Pins 4 / 5 (switching outputs)

Switching outputs 1 and 2 provide the device status and the comparison values necessary to solve the application. The electrical specifications of the switching outputs are indicated in the data sheet.

Switching output 1 provides the device status "Ready for trigger" as default setting.



"Switching output switched" means that the respective camera status has occurred.

The device status can have one of the following values:

- "Ready for trigger"
The device signals that a new image can be captured. Only with this device status are trigger operations processed. For the continuous image capture the status "Ready for trigger" is not output.
- "Image capture finished"
The device signals that the image capture is finished. The device status can be used for cascading devices.
- "Error"
The device signals an internal error. Detailed information about errors can be requested via Ethernet.

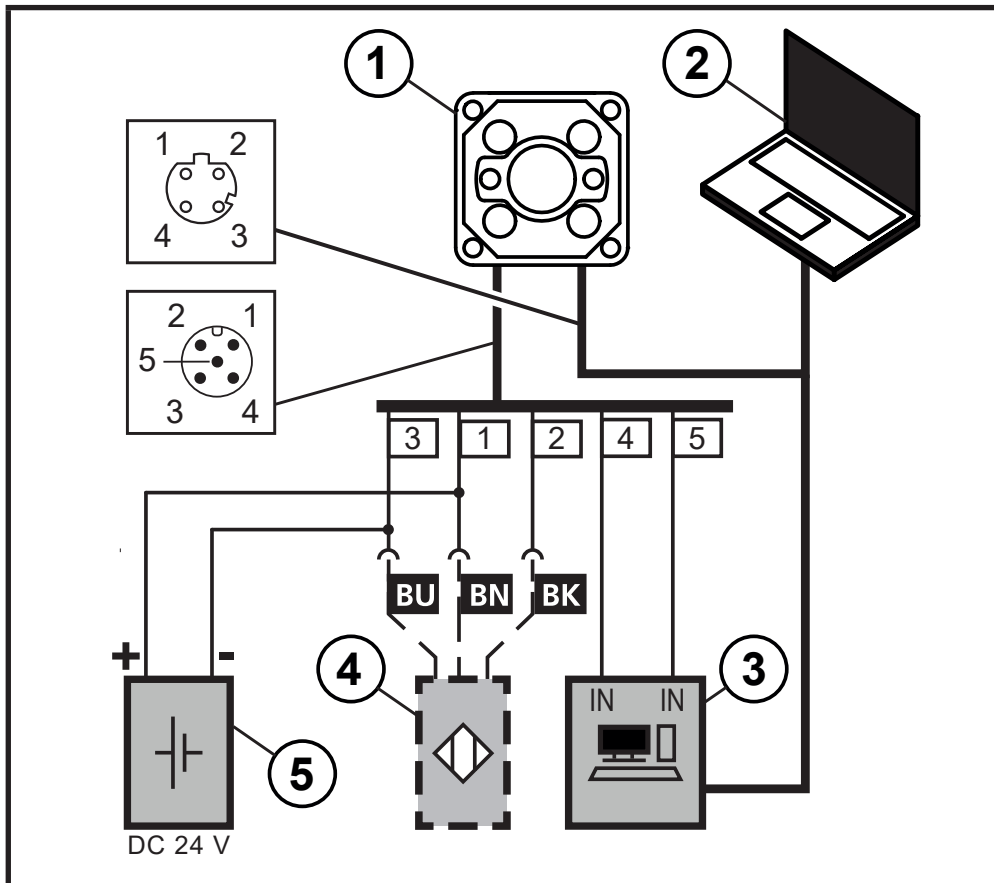
- "Controlled via process interface" (e.g. by PLC)
The device is controlled via the command "O" (→ software manual).
- "User-defined states"
The user-defined states are changed with the processing of codes (e.g. code found, code matches the reference, code quality outside the threshold level, etc.).

6.2 Wiring example

In the wiring example, the image capture is triggered with a proximity sensor.

The device can be triggered externally:

- via Ethernet
- via a proximity sensor connected to the trigger input



- ①: O2I5xx device
- ②: notebook for parameter setting
- ③: industrial PC for evaluation and triggering
- ④: proximity sensor
- ⑤: voltage source

Abb. 6: Wiring example of a trigger circuit



An adapter cable (Y cable) is available for external trigger sensors:
www.ifm.com

6.3 External illumination unit

The external illumination unit is connected to switching output 2 of the device. The illumination unit is active as long as switching output 2 is in the "high" state.

Example	Article number
Illumination unit, transmitter red light 630 nm	O2D909



An adapter cable (Y cable) is available for external illuminations: www.ifm.com

6.4 External trigger source

An external trigger source is connected to the trigger input of the device (e.g. diffuse reflection sensor).

6.4.1 Timing diagram

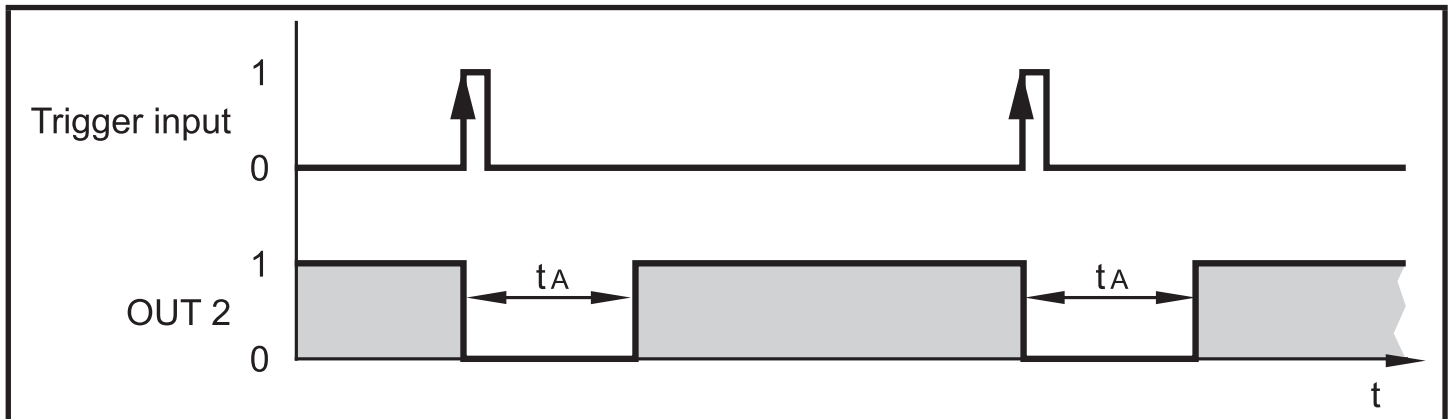
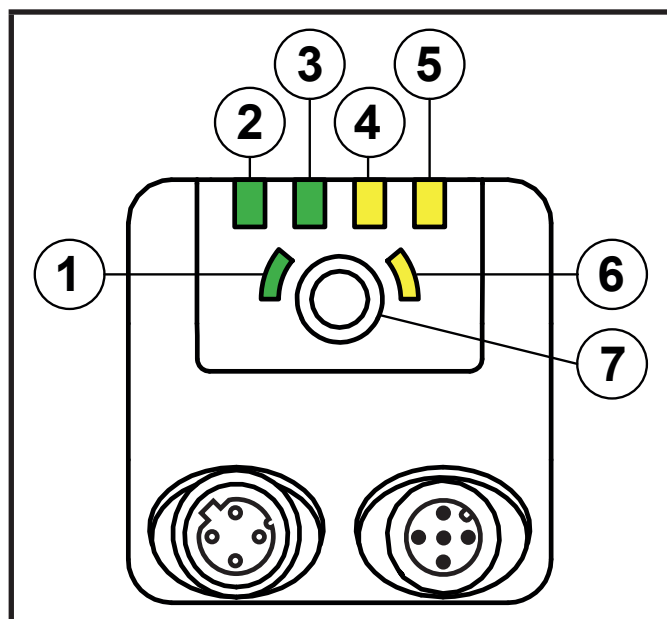


Abb. 7: Triggering on positive edge. Evaluation time t_A : 50...200 ms

Output	Standard	External illumination	Process interface
Switching output 1 (OUT 1)	ready signal 0: device busy 1: device ready for trigger signal	ready signal 0: device busy 1: device ready for trigger signal	selectable via command
Switching output 2 (OUT 2)	code evaluation 0: code evaluation not successful 1: code evaluation successful	trigger output	

7 Operating and display elements



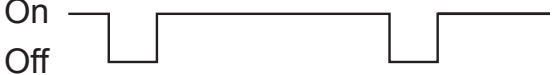
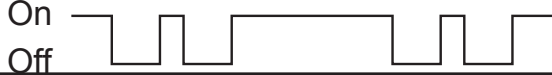
- ①: teach LED (green)
- ②: Ethernet LED (green)
- ③: power LED (green)
- ④: Out 1 LED (yellow)
- ⑤: Out 2 LED (yellow)
- ⑥: teach LED (yellow)
- ⑦: teach button

Abb. 8: Operating and display elements

Teach LED (green)	Teach LED (yellow)	Laser points (red)	Description
on		on	alignment mode active
on	flashes at 1 Hz	flashes at 1 Hz	set-up mode active
flashes at 2 Hz			configuration is saved
on for 2 s			configuration successfully saved
flashes at 8 Hz	flashes at 8 Hz		While both LEDs are flashing, the configuration is transferred by pressing the teach button (→ 9.1).
	flashes at 8 Hz		error: lock button is active
	flashes at 8 Hz	flashes at 8 Hz	error: configuration failed



The red laser points mark a zone on the surface in which the code is placed for the teach process (→ 7.1).

LED Ethernet	LED power	LED Out 1	LED Out 2	Description
	on			device is ready for operation, Ethernet is not connected
	flashes at 0.5 Hz			no parameters set or parameter setting was not loaded into the device  On Off
	flashes 2x at 0.5 Hz			device is in the parameter setting mode  On Off
	on	on		switching output 1 switched
	on	flashes at 8 Hz		switching output 1 shorted
	on		on	switching output 2 switched
	on		flashes at 8 Hz	switching output 2 shorted
on	on			device is ready for operation, Ethernet is connected
flashes	on			Ethernet transmitting data
off				Ethernet not connected
		flashes at 8 Hz	flashes at 8 Hz	device signals internal error
		flashes at 2 Hz	flashes at 2 Hz	device signals correctable error; the error information can be read via Ethernet
	running light ⇒			device booting
	running light ⇒			device carrying out firmware update

7.1 Teach device

Use the teach button to teach the device new codes.

Below the teach process for new codes using the teach button ⑦ is described:

- ▶ Avoid back light, scattered light and changing light conditions.
- > See notes on how to install the device (→ 5).
- ▶ Press the teach button for 3 seconds.
- > The green teach LED ⑥ is permanently on.
- > 2 red laser points can be seen on the surface.
- ▶ Place a code in the zone marked by the red laser points.
- > The code must be of high quality and of high contrast.
- > The device focusses the code better if the background looks uninteresting.
- > Several codes in the marked zone make the teaching process of a certain code more difficult.
- ▶ Press the teach button for 1 second.
- > The yellow teach LED ① flashes while the code is being taught.
- > The code is taught if the green teach LED briefly flashes and is then on for 2 seconds (→ 7).
- > The code is not taught if the yellow teach LED briefly flashes (→ 7).

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7.1.1 Configure teaching

The teaching of codes is configured with the ifm Vision Assistant software. The recognition of codes can, for example, be restricted.



The ifm Vision Assistant software and the software manual are available on the internet: www.ifm.com

7.1.2 Teach app

The teach app is used for the following settings:

- trigger source
- process interface
- IP address
- reset of the device and restoration of the factory settings.

The teach app stores the settings in a data matrix code. The teach button is used to read the code from the device. Then the new settings are active.

The teach app is available for the following operating system:

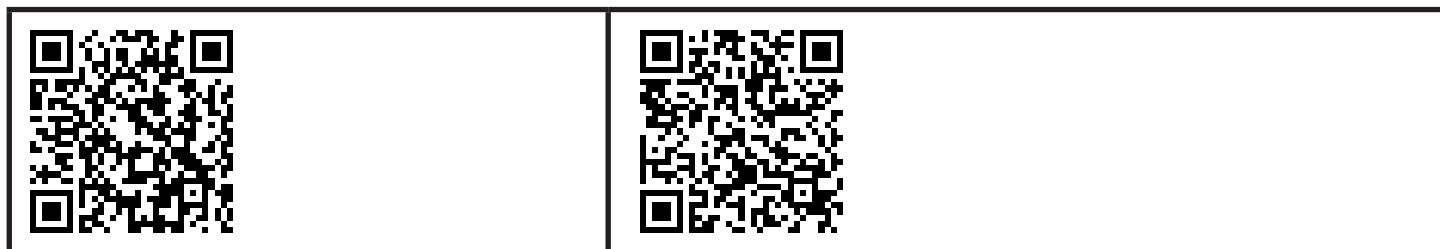


Abb. 9: Link to Android app

Abb. 10: Link auf iOS app

7.1.3 Lock teach button

The teach button can be locked using the ifm Vision Assistant (→ software manual). In the following situations, the teach button is automatically locked:

- The device is configured by the ifm Vision Assistant (exception: If the ifm Vision Assistant is in the monitor mode, the teach button is unlocked).
- The unit is protected by a password.

8 Set-up

After power on, the device is put into operation. After 30 seconds, the device is in the evaluation mode where saved applications are executed. The indicators signal the current operating state (→ 7).



Up to 32 applications can be saved on the device. An application can be activated in two ways:

- ifm Vision Assistant software
- process interface command

8.1 Set parameters of the device

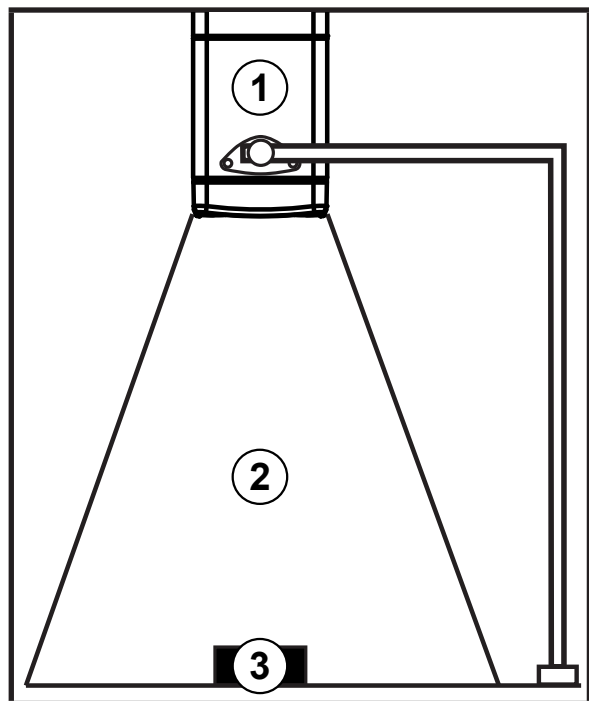
The device parameters can be set in two ways:

- ifm Vision Assistant software (→ see software manual)
- teach button (→ 7.1).



The ifm Vision Assistant software and the software manual are available on the internet: www.ifm.com

8.2 Detect object



The following recommendations increase the frame rate:

- ▶ place the object (3) in the field of view (2)
- ▶ remove other objects from the field of view
- ▶ for objects (3) with shiny surface:
 - slightly tilt the device (1) or
 - use the polarisation filter (only available in O2I500, O2I502 and O2I504),
- ▶ clean the front lens of the device (1).
- ▶ Observe the notes on the installation (→ 5).

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Abb. 11: Detect objects

9 Maintenance, repair and disposal

If used correctly, no maintenance and repair measures are necessary.

- ▶ The device must only be repaired by the manufacturer.
- ▶ After use dispose of the device in an environmentally friendly way in accordance with the applicable national regulations.
- ▶ Keep the front lens free from soiling.
 - > Soiling reduces the contrast and the recognition performance.
- ▶ Use glass cleaner as cleaning agent.
 - > Cleaning agents containing solvents can damage the front glass.
- ▶ Do not open the device.
 - > The device must only be used by the manufacturer. To replace the device, the service lid may be opened by the user (→ 9.1).

9.1 Replace device

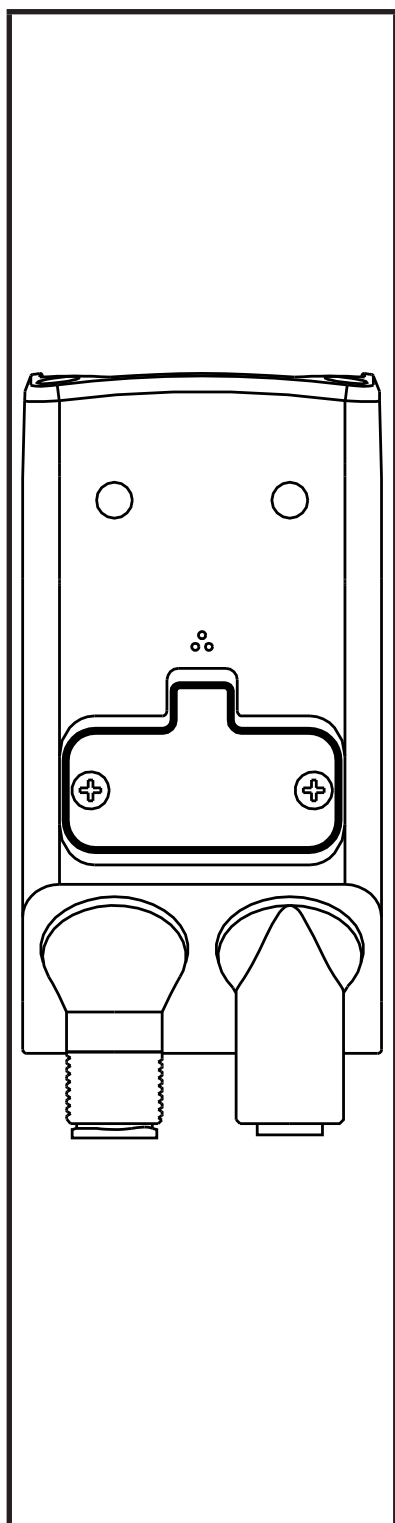
When the device is replaced, the saved configuration can be transferred to the new device. The internal ifm mass storage device of the old device is inserted in the new device.



The service lid may only be opened for the transfer of the configuration.



The ifm mass storage device must not be inserted in a PC, notebook etc. The ifm flash drive must only be used for the O2I5xx devices.



Below the transfer of the configuration to a new device is described. The internally installed ifm mass storage device contains the configuration.

Replace the ifm mass storage device:

- ▶ Remove the cables connected to the devices.
- > The devices must be disconnected before the service lids are opened.
- ▶ Loosen the screws of the service lids.
- ▶ Remove the service lids from the devices.
- > The sealing rubber on the inside of the service lid must not be damaged.
- ▶ Remove the ifm mass storage device from the old device.
- ▶ Insert the ifm mass storage device in the new device.
- ▶ Place the service lids on the devices.
- ▶ **Tighten the screws applying max. 0.2 Nm.**

Activate the configuration in the new device:

- ▶ Connect the new device to the voltage supply.
- ▶ While the green and yellow teach LEDs are flashing, press the teach button.
- > The configuration is transferred from the ifm mass storage device to the new device.

Abb. 12: Service lid

9.2 Update firmware

The firmware of the device can be updated using the ifm Vision Assistant software.



Configurations saved in the device get lost when the firmware is updated. Create a backup copy of the configurations before updating the firmware:

- ▶ Export configurations before updating the firmware.
- ▶ Import configurations after updating the firmware.



The ifm Vision Assistant software and the firmware updates are available on the web: www.ifm.com

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10 Web front end

The device has a front end via which the following information can be retrieved:

- device documentation
- device configuration
- fault patterns
- licences

To activate the web front end, the IP address of the device is entered in a web browser (preset: 192.168.0.69).

11 Approvals/standards

The EU Declaration of Conformity is available at www.ifm.com.