



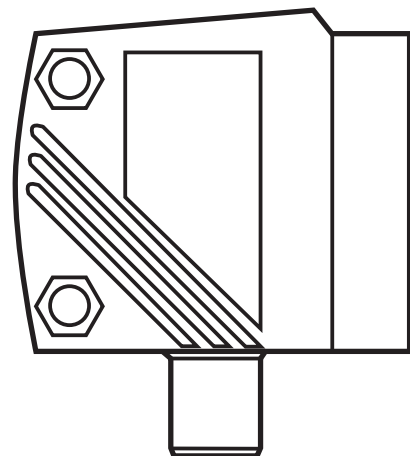
Operating instructions
Diffuse reflection sensor with
background suppression

O1D101

O1D104

UK

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1 Preliminary note

1.1 Symbols used

▶ Instruction

> Reaction, result

[...] Designation of pushbuttons, buttons or indications

→ Cross-reference



Important note

Non-compliance can result in malfunction or interference.



Information

Supplementary note.

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1.2 Warning signs used

WARNING

Warning of serious personal injury.

Death or serious irreversible injuries may result.

2 Safety instructions

- Please read this document prior to set-up of the unit. Ensure that the product is suitable for your application without any restrictions.
- Improper or non-intended use may lead to malfunctions of the unit or to unwanted effects in your application. That is why installation, electrical connection, set-up, operation and maintenance of the unit must only be carried out by qualified personnel authorised by the machine operator.
- In case of malfunction of the unit please contact the manufacturer. If the unit is tampered with and/or modified, any liability and warranty is excluded.

! WARNING

Visible laser light; laser protection class 2.

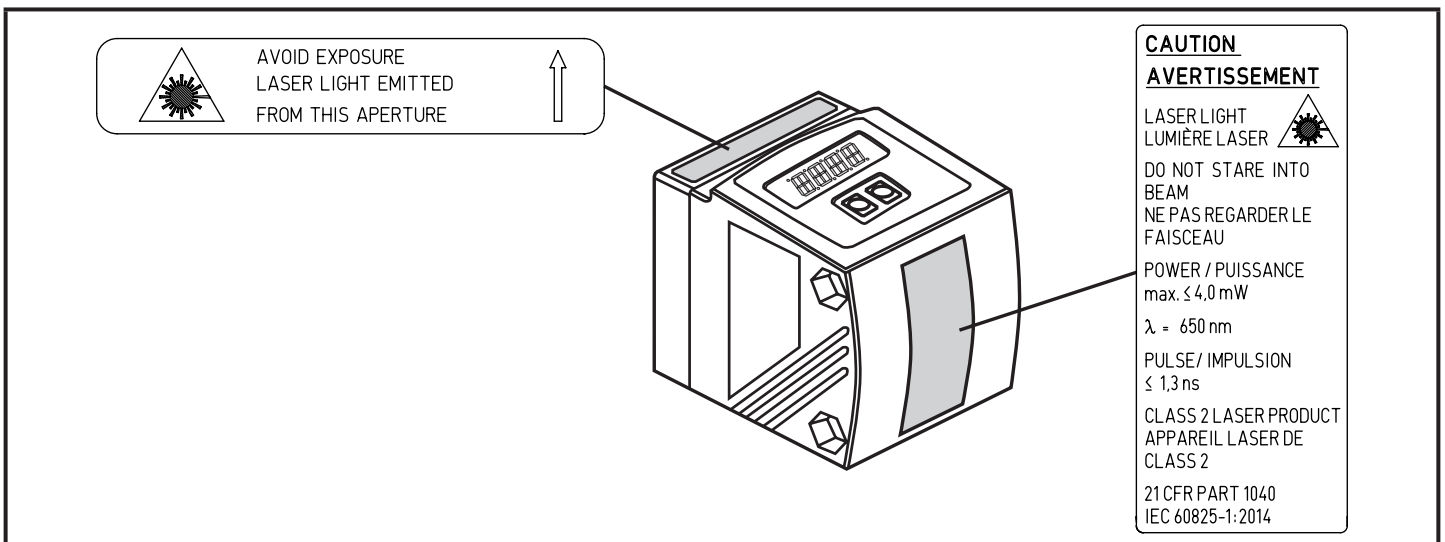
Use of controls or adjustments other than those specified herein may result in hazardous radiation exposure. Damage to the retina is possible.

- ▶ Do not stare into the laser beam!
- ▶ Apply the enclosed labels (laser warning) in the immediate vicinity of the unit.
- ▶ Adhere to the caution and warning notes on the product label.
- ▶ Use the enclosed label for the power supply cable.
- ▶ 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

Label for supply cable



Product label



3 Functions and features

The diffuse reflection sensor detects objects and materials without contact and indicates their presence by a switching signal. In addition, the distance to the object is indicated.

3.1 Applications

- Range 0.2...10 m (on white paper 200 x 200 mm, 90 % remission).
- Background suppression >10...100 m.

- The measured value is shown in a 10-segment display.



The distance between the sensor and the background must be limited to max. 100 m by the customer. Otherwise measured values can be ambiguous.

4 Installation

- ▶ Align the diffuse reflection sensor to the object to be detected.
- ▶ Secure it to a bracket.

The unambiguity range of the sensor is fixed to 100 m. Objects within a range >10...100 m are suppressed.



Reflecting objects in the direct beam path of the sensor - also in the range > 100 m – are to be avoided by the customer. Otherwise the measured values can be ambiguous.

5 Electrical connection



The unit must be connected by a qualified electrician.

- ▶ The national and international regulations for the installation of electrical equipment must be adhered to.
- ▶ Ensure voltage supply according to EN 50178, SELV, PELV.O1D101 and O1D104: cULus, Supply Class 2

The device shall be supplied from an isolating source and protected by an overcurrent device such that the limited voltage requirements in accordance with UL 508 are met.

- ▶ Disconnect power.
- ▶ Connect the unit as follows:

	O1D101 PNP	O1D104 NPN

Core colours of ifm sockets:

1 = BN (brown), 2 = WH (white), 3 = BU (blue), 4 = BK (black), 5 = GR (grey).

5.1 Operation with IO-Link master

The unit is compatible with IO-Link master port class A (type A).



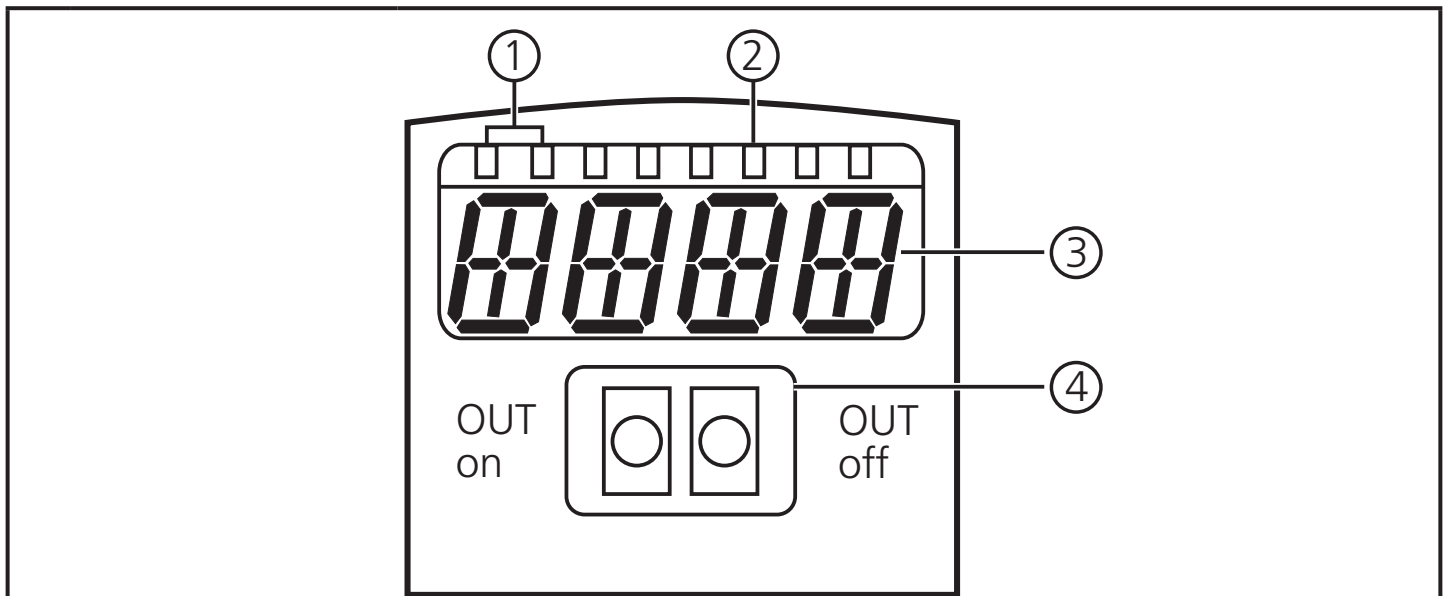
For operation with IO-Link master port class B (type B) observe the following:

As a standard, the unit is not compatible with master port class B (type B). Pin 5 (IN1) is used for manufacturer-specific functions. That means that the main supply voltage of the unit and the additional voltage supply (master port class B on pin 5) are not electrically isolated.

With the following configuration the unit can be used with master port class B:

- Connect unit and IO-Link master via 3 wires: Connect pins 1, 3 and 4 of the unit with the IO-Link master (do not connect pin 5).

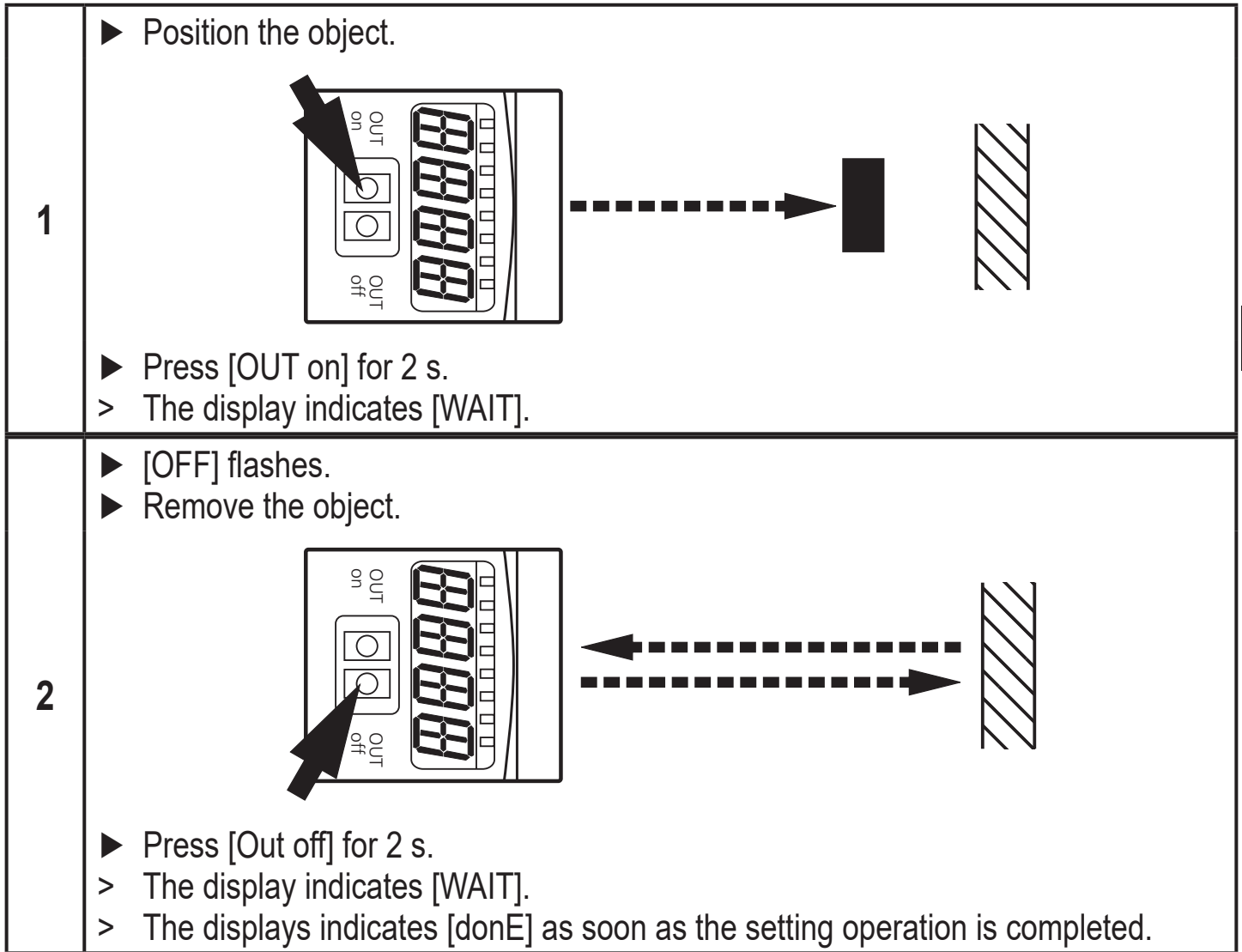
6 Operating and display elements



1: 2 x LED green	LED 1: unit is ready for operation LED 2: display unit for distance to the object (mm)
2: LED yellow	Indication of the switching status; lights when the corresponding output is switched.
3: 4-digit alphanumeric display	Indication of the distance to the object in mm; indications concerning the setting operation; error messages
4: Setting buttons	Setting of the sensing range and switching function.

7 Settings

The sensor is to switch when the object is detected



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The sensor is not to switch when the object is detected

- ▶ Position the object (see figure 1) and press [OUT off].
- ▶ Remove the object (see figure 2) and press [OUT on].

The settings can also be carried out first without object (step 1) and then with object (step 2).

7.1 Setting of the maximum sensing range

- ▶ Align the sensor so that no light is reflected.
> The display indicates [--] or [FAR]

The sensor is to switch when the object is detected

- ▶ First press [OUT on], then [OUT off].

The sensor is to switch when the object is not detected

- ▶ First press [OUT off], then [OUT on].

7.2 Setting unsuccessful

> The display indicates [FAIL], the switch point is not adopted.

Possible causes

- Measured value difference is too small.
- Measurement not possible (e.g. due to a reflective surface).

7.3 Electronic lock

The unit can be locked electronically to prevent unauthorised setting. On delivery the unit is not locked.

Locking

- ▶ Make sure that the unit is in the normal operating mode.
- ▶ Keep [OUT On] + [OUT Off] pressed until [Loc] is displayed.
- > The unit is locked.

[Loc] is displayed briefly if you try to change parameter values on the locked unit during operation.

Unlocking

- ▶ Keep [OUT On] + [OUT Off] pressed until [Loc] is displayed.
- > The unit is unlocked.

7.4 Switch off the laser

For safety and maintenance purposes the laser of the unit can be temporarily switched off via the input on pin 5.

	Input signal at pin 5	Laser
PNP 01D101	Low / not connected	On
	High	Off
NPN 01D104	High / not connected	On
	Low	Off

8 Set-up / operation

- ▶ After installation, electrical connection and programming, check whether the unit operates correctly.
- > If the unit has been correctly set up, the distance to the object is indicated.



Lifetime of a laser diode: 50,000 hours

8.1 Error indications

Display	Possible cause
[++]	too much light, e.g. reflective surface
[- -]	not enough light, no object
[nEAr]	object to be measured outside the measuring range < 0.2 m
[FAr]	object to be measured outside the measuring range > 10 m
[ErrP]	plausibility (e.g. object too fast)
[SC]	short circuit at the switching output

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8.2 Table repeatability and accuracy

Values for sampling rate 15 Hz* - extraneous light on the object max. 40 klx

Distance in [mm]	Repeatability		Accuracy	
	white 90 % remission	grey 18 % remission	white 90 % remission	grey 18 % remission
200...1000	± 4.5 mm	± 6.0 mm	± 15.0 mm	± 16.0 mm
1000...2000	± 5.0 mm	± 8.0 mm	± 15.0 mm	± 18.0 mm
2000...4000	± 16.0 mm	± 19.0 mm	± 25.0 mm	± 30.0 mm
4000...6000	± 24.0 mm	± 33.0 mm	± 35.0 mm	± 45.0 mm
6000...10000	± 50.0 mm	—	± 65.0 mm	—

Values for sampling rate 15 Hz* - extraneous light on the object max. 40...100 klx

Distance in [mm]	Repeatability		Accuracy	
	white 90 % remission	grey 18 % remission	white 90 % remission	grey 18 % remission
200...2000	± 14.0 mm	± 14.0 mm	± 24.0 mm	± 24.0 mm
2000...4000	± 25.0 mm	± 30.0 mm	± 35.0 mm	± 40.0 mm
4000...6000	± 31.0 mm	± 45.0 mm	± 41.0 mm	± 55.0 mm
6000...10000	± 60.0 mm	—	± 70.0 mm	—

*Range referred to black (6 % remission) ≤ 4000 mm.

The values apply at:

- constant ambient conditions (23° C / 960 hPa)
- only after unit powered up for 10 minutes.

9 IO-Link

9.1 General information

This unit has an IO-Link communication interface which requires an IO-Link-capable module (IO-Link master) for operation.

The IO-Link interface enables direct access to the sensor values and parameters and provides the possibility to set the parameters of the unit during operation. In addition communication is possible via a point-to-point connection with a USB adapter cable.

You will find more detailed information about IO-Link at www.ifm.com.

9.2 Device-specific information

You will find the IODDs necessary for the configuration of the IO-Link device and detailed information about sensor values, diagnostic information and parameters in the overview table at www.ifm.com.

9.3 Parameter setting tools

You will find all necessary information about the required IO-Link hardware and software at www.ifm.com.

9.4 Extended functions

With IO-Link extended functions and measured data are available.

9.4.1 Object reflectivity

The object reflectivity is provided as process data value (PDV).



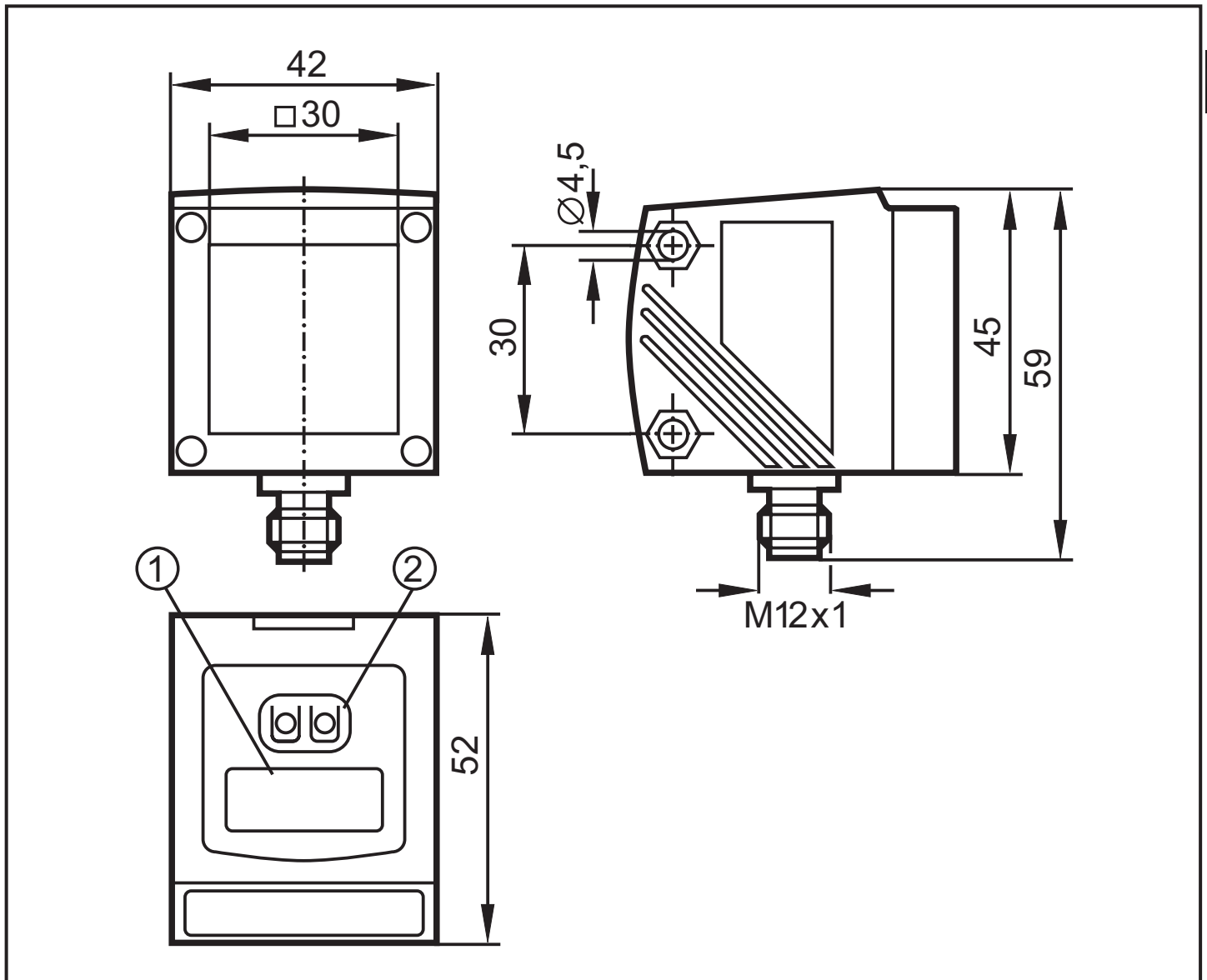
The object reflectivity can, for example, be used to detect sensor soiling.

10 Maintenance, repair, disposal

Faulty sensors must only be repaired by the manufacturer.

- ▶ Keep the front lens of the sensor clean.
- ▶ After use dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations.

11 Scale drawing



Dimensions in mm

- 1: 4-digit alphanumeric display / LED function display
- 2: Programming buttons