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SICK
Sensor Intelligence.

OL1

1 Intended use

The optical OL1 micrometer must be used in conjunction with evaluation unit AOD1.

Up to two sets of OL1 measurement sensors can be configured and controlled with the evaluation unit.

⚠ **CAUTION**

Optical radiation: Laser class 1

The accessible radiation does not pose a danger when viewed directly for up to 100 seconds. It may pose a danger to the eyes and skin in the event of incorrect use.

· Do not open the housing. Opening the housing may increase the level of risk.

· Current national regulations regarding laser protection must be observed.

2 About this document

The operating instructions are used to put the product into operation quickly and easily to get the first measurement results.

2.1 Supplementary and other relevant documents

• AOD1 Quickstart (no. 8019684)

• AOD1 operating instructions (no. 8020327)

You can download the documents in the Internet at **www.sick.com**. To do this, enter the part number of the publication.

Additional information (e.g. application examples, other documents, associated software) can be found at **www.sick.com/OL1**

3 Commissioning

Ensure that installation is done by a qualified person.

3.1 Scope of delivery

• OL1 in the version ordered

• Y-cable for connecting the OL1 sender and OL1 receiver

• Printed operating instructions (this document)

• Distance sensor safety notes (no. 8019331)

3.2 Mounting

1. Ensure that the device is not connected to a voltage supply.

2. Mount the AOD1 on the mounting rail.

3. Mount the OL1 over the fixing holes.

4. Align sensor heads in relation to the reference surfaces so that both top sides and both side surfaces lie in the same plane.

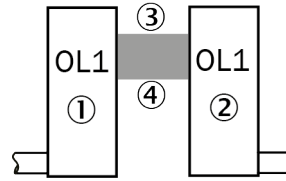
① Sender
② Receiver
③ Reference surface
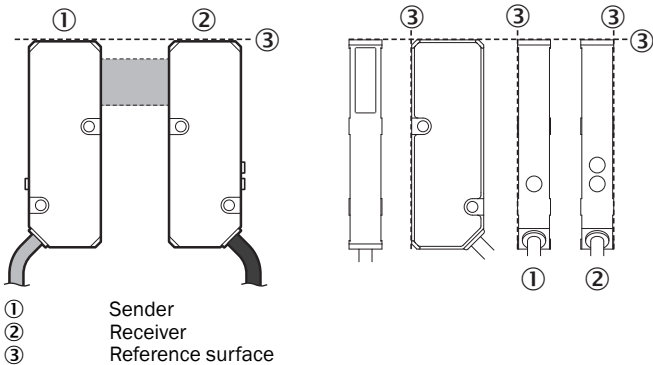
3.3 Alignment of sender - receiver ("direction checking")

The receiver has two alignment LEDs to correctly assembly and align the sensor heads. To use the alignment LEDs, the Direction Checking function in the AOD1 menu must be activated.

1. Keep pressing ▽ until an arrow appears in front of Head 1 or 2 (depending on where the OL1 is connected).

2. Press Ⓐ to get to the Top Menu.

3. Press △ to select Setup mode.

4. Press ◁ to display Direction Checking.

5. Press ▽ to select ON.

6. Complete with Ⓐ.

✓ ON is bracketed.

✓ The alignment LEDs are flashing.

7. Align sensor heads so that both LEDs light up, but do not flash.

  ° If no LED lights up on the receiver: Align sensor heads to one another.

  ° When the red LED flashes: Move receiver upwards until both LEDs light up.

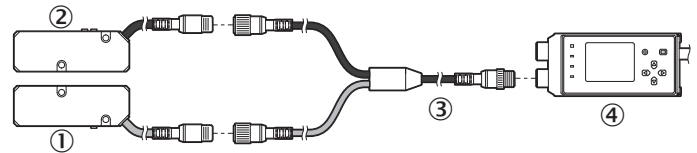 ° When the green LED flashes: Move receiver downwards until both LEDs light up.

① OL1 sender
② OL1 receiver
③ Upper
④ Lower

8. After alignment: End Direction Checking: Click on ▽, select Off and confirm with Ⓐ.
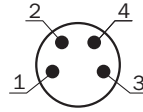
9. Hold Ⓑ to return to the basic screen.

4 Electrical installation

1. Connect OL1 sensor heads without voltage to the AOD1 with the supplied Y-cable.

① OL1 sender (connected with gray cable)
② OL1 receiver (connected with black cable)
③ Y-cable
④ AOD1 (not included with delivery)

2. Connect AOD1 to the voltage supply (see AOD1 Quickstart).

Y-cable connection diagram to AOD1, M8, 4-pin

Pin	Description	Color
1	Vcc	Brown
2	B (RS-485)	White
3	0 V	Blue
4	A (RS-485)	Black

5 Device description

Dimensions

Dimensions: **A**

LED display OL1E (receiver)

Name	Color	Description
Power	Green	• Lights up: Supply voltage on • Flashing: Device is in Direction checking mode (Direction checking)
Alarm	Red	• Lights up: Device displaying an alarm • Flashing: Device is in Direction checking mode (Direction checking)

AOD1 display and OL1

ⓘ **NOTE**

See AOD1 Quickstart (no. 8019684) for an exact description of the operating elements and menu structure of the AOD1.

AOD1 display	Schematic image	Description	
9.999 background changes to white	OL1 [gap] OL1	There is no object in the measuring range.	
9.999 background remains black	OL1 [gap] OL1	The object is larger than the measuring range.	
-xxx	OL1 [gap] OL1	The object protrudes into the measuring range from above.	`Measure polarity` Set in a positive direction
+xxx			`Measure polarity` Set in a negative direction
+xxx	OL1 [gap] OL1	The object protrudes from below into the measuring range.	`Measure polarity` Set in a positive direction
-xxx			`Measure polarity` Set in a negative direction

6 OL1 menu

1. Keep pressing ▽ until an arrow appears in front of `Head 1 or 2` (depending on where the OL1 is connected).
2. Press Ⓐ to get to the `Top menu`.

Top menu

| Num-ber	Function	Parameter	Comment
1	`Top Menu`	`Teach mode`	–
		`Setup mode`	–
		`Back`	Return to basic screen

6.1 OL1 "Setup mode" configuration menu

1. Starting from the `Top Menu`, press △ to get to the configuration menu.

Adjustment options

Num-ber	Function	Parameter	Comment
1	`Sensitivity`	`Mini Sense`	–
		`2nd Sense`	–
		`3rd Sense`	–
		`4th Sense`	–
		`Max Sense`	–
		`Adjusted`	Is set via `Translucent Teach` see OL1 "Teach mode" teach-in menu, page 2
2	`Measure polarity`	`Positive`	see "Measure polarity" direction function, page 2
		`Negative`	
3	`Moving averaging`	`1` to `128`	–
4	`Zeroing value`	`–5.000` Up to `9.999` `(0.000)`	–
5	`Measure Type`	`Edge`	–
		`Width`	–
6	`Measure direction`	`Top`	Object comes into light band from above
		`Bottom`	Object comes into light band from below
7	`Direction Checking`	`OFF`	see Alignment of sender - receiver ("direction check-ing"), page 1
		`ON`	
8	`Reset Settings`	`Not Reset`	–
		`Execute by` Ⓐ	–

"Measure polarity" direction function

Direction function only works with edge measurement (`Edge`).

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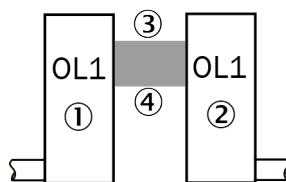
① OL1 sender
② OL1 receiver
③ Upper
④ Lower

How the measured values are displayed from the top or bottom (cable side) is set here.

Positive: Top -5.000 mm, bottom +5.000 mm
Negative: Top +5.000 mm, bottom -5.000 mm

## 6.2 OL1 "Teach mode" teach-in menu

Teach-in option

Number	Function	Comment
1	`Zeroing`	–
2	`Reset Zeroing`	–
3	`Translucent Teach`	Adapts the sensitivity value. `Translucent Teach` is recommended for semi-transparent materials to improve the detection results. It is only possible to use the `Translucent Teach` if the sensitivity is set to `Adjusted` in the Setup mode see OL1 "Setup mode" configuration menu, page 2. The `Translucent Teach` is run without an object in the measuring range.

7 Application examples

1. Keep pressing ▽ until an arrow appears in front of `Head 1 or 2` (depending on where the OL1 is assembled).
2. Press Ⓐ to get to the `Top Menu`.
3. Press △ to select `Setup mode`.
4. Press ◁ until `Measure Type` is displayed.
5. Press ▽ or △ to select `Edge` or `Width`.
6. Press Ⓐ to confirm.
7. Hold Ⓑ to return to the basic screen.
8. Press Ⓑ to leave the `AOD1`, `Head 1`, `Head 2` selection mode in the basic screen.

"Edge" detection application

- Measure the edge position relating to the measuring range center of the light band with leading edge detection see AOD1 display and OL1, page 1.
- When more than one edge is in the measuring range, the device cannot measure and show the value `9.999` (background remains black).
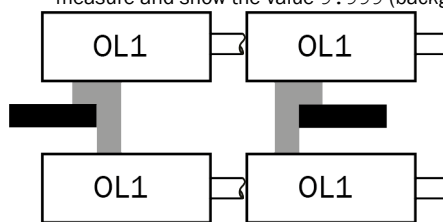
"Edge" detection application for transparent objects

ⓘ **NOTE**
Safe edge detection is not guaranteed for very transparent objects (in the range from about 80% transmission).

- The function works the same as for edge detection of non-transparent objects.
- The "Adjusted" value must be set in the "Sensitivity" setting for edge detection of transparent objects. For optimal sensitivity adjustment, there must be no measuring object between the sender and the receiver see OL1 "Setup mode" configuration menu, page 2.
- The direction from which the object protrudes into the measuring range must be specified in the "Measure polarity" menu item see "Measure polarity" direction function, page 2.

"Width" and diameter measurement application

- Measures the distance between two edges.
- In this measurement type, the device shows the measured value of 0.000 mm to 9.999 mm.
- The device distinguishes between light-dark and dark-light edges. Then the width function can measure both the width and the gap.
- In "Width" mode, there must always be exactly two edges inside the measuring range. If there are more than two edges inside the measuring range, the output measured values are not specified.

- If there is no or only one edge in the measuring range, the device shows an alarm or "cannot be measured".
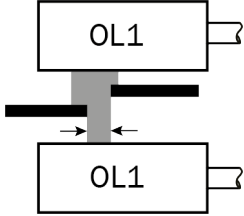- The direction function (`Measure polarity`) does not work for width measurement.

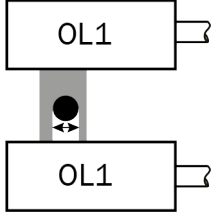*Figure 1: Measurement of the gap between two objects edges*

Figure 2: Measurement of object width

8 Cleaning

❗ NOTICE

Equipment damage due to improper cleaning.

Improper cleaning may result in equipment damage.

· Only use recommended cleaning agents.
· Never use sharp objects for cleaning.

▶ Clean the front screens at regular intervals and in the event of contamination with a lint-free lens cloth (part no. 4003353) and plastic cleaning agent (part no. 5600006). The cleaning interval essentially depends on the ambient conditions.

9 Technical data

Distance between sender and receiver	Max. 300 mm
Measuring range	10 mm
Light sender [1]	Laser, red
Laser class	1 (IEC 60825-1:2014, EN 60825-1:2014)

Typ. light spot size		3 mm x 14 mm
Linearity		±40 µm
Repeatability		10 µm
Measuring frequency [2]		≤ 2 kHz
Mounting		M3 screws
Connection type		Cable with M8 male connector, 4-pin, 30 cm
Status LEDs	Sender	Voltage supply: Green
	Receiver	Voltage supply: Green Alarm: Red
Voltage supply	Supply voltage	DC 12 V … DC 24 V
	Power Consumption	< 20 mA (12 V)
Ambient data	Protection	Reverse polarity protected
	Enclosure rating	IP50
	Ambient temperature, operation	–10 °C … +50 °C
	Ambient temperature, storage	–20 °C … +60 °C
	Min rel. air humidity (non-condensing)	35%
	Max rel. air humidity (non-condensing)	85%
	Vibration resistance	10 Hz … 55 Hz (amplitude 1.5 mm, x-, y-, z-axis, 2 hours each)
	Shock resistance	500 m/s² (x-, y-, z-axis, 3 times each)
Housing material		Aluminum
Weight	Sender	30 g
	Receiver	30 g

1   Wavelength: 660 nm
Max. pulse output: 0.39 W
Max. average power: 0.16 mW
Max. pulse length: 0.5 ms

2   The AOD1 does not communicate in sync with the measuring frequency. The AOD1 reaction after scanning the sensor head is delayed by a maximum 1.5 ms.

A

① Window
② Sender
③ Receiver
④ LED
⑤ Connecting cable