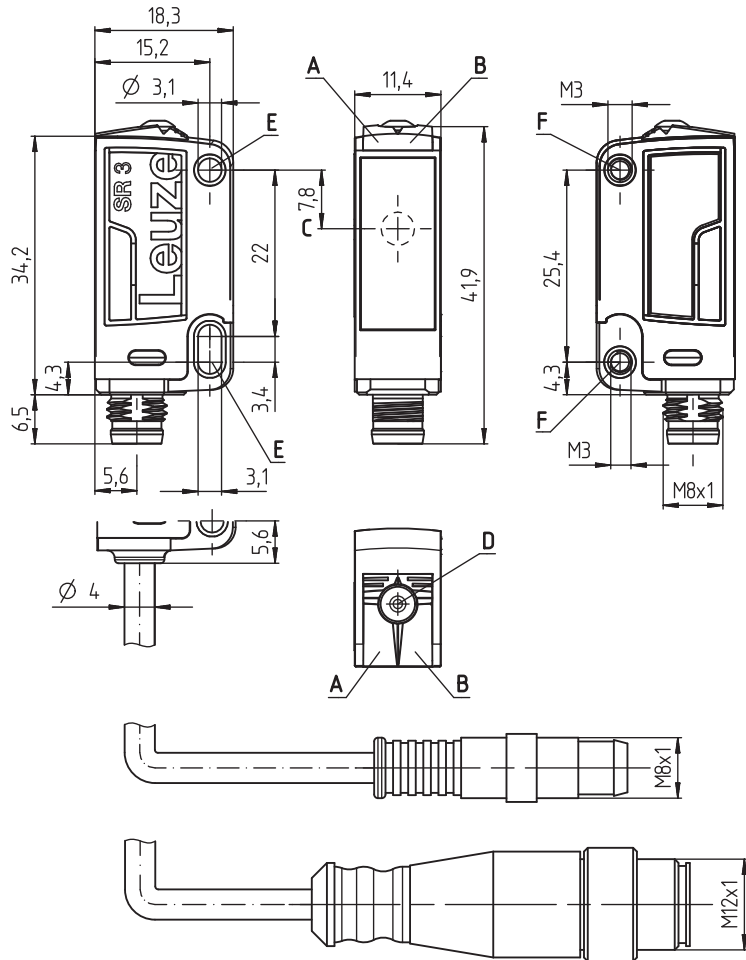


PRK3CL autocollimation Laser retro-reflective photoel. sensor with polariz. filter

en 02-2017/02 50130054



Dimensioned drawing



- A Green indicator diode
- B Yellow indicator diode
- C Optical axis
- D Teach button
- E Mounting sleeve (standard)
- F Threaded sleeve (PRK3CL....B...)

↔

3 kHz

0 ... 3m

10 - 30 V
DC

- Polarized laser retro-reflective photoelectric sensor with autocollimation optics and visible red light
- Short response time, low jitter and high switching frequency for detection of fast events
- Small and compact construction with robust plastic housing, degrees of protection IP 67 and IP 69K, tested in accordance with Ecolab for industrial application
- **NEW:** Variant with a second switching output in place of the teach input
- **NEW:** Housing variant with two integrated M3 metal threaded sleeves
- **NEW:** Housing variant with integrated slotted-hole mounting sleeve made of metal

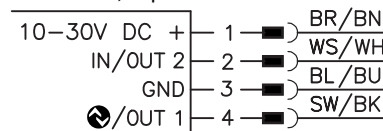
Accessories:

(available separately)

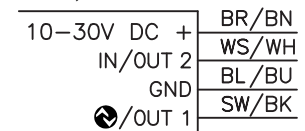
- Mounting systems (BT ...)
- Cables with M8 or M12 connector (KD ...)
- Reflectors
- Reflective tapes
- IO-Link master set
SET MD12-US2-IL1.1 + accessories - diagnostics set (part no. 50121098)

Electrical connection

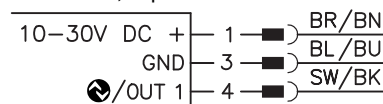
Connector, 4-pin



Cable, 4 wires



Connector, 3-pin



We reserve the right to make changes

Technical data

Optical data

Typ. operating range limit (MTKS 50x50)¹⁾

Operating range²⁾
Light beam diameter
Squint angle
Light source³⁾
Laser class
Wavelength
Max. output power
Pulse duration

Laser class 1

0 ... 3m
see tables
approx. 1 mm, consistent
typ. ± 2°
laser (pulsed)
1 acc. to IEC 60825-1:2007
655nm (visible red light, polarized)
≤ 1.7mW
≤ 5.3µs

Sensor operating modes

IO-Link
SIO
Configuration

COM2 (38.1 kBAud, Frame 2.5, Vers. 1.1, min. cycle time 2.3 ms)
is supported
direct configuration/system commands; no data storage

Timing

Switching frequency
Response time⁴⁾
Readiness delay

3,000Hz
0.17 ms
≤ 300ms

Electrical data

Operating voltage U_B ⁵⁾
Residual ripple
Open-circuit current
Switching output
Function
Signal voltage high/low
Output current
Operating range

10 ... 30VDC (incl. residual ripple)
≤ 15% of U_B
≤ 15mA
see part number code on page 3
light/dark switching, adjustable
≥ ($U_B - 2V$) / ≤ 2V
max. 100mA⁶⁾
setting via teach-in

Indicators

Green LED
Yellow LED
Yellow LED, flashing

ready
light path free
light path free, no function reserve

Mechanical data

Housing

Optics cover
Weight

plastic (high-strength PC-ABS);
2x diecast zinc mounting sleeves or
2x M3 brass threaded sleeves
plastic (PMMA)
with connector: 10g
with 200mm cable and connector: 20g
with 2m cable: 50g
cable 2m (cross section 4x0.20mm²),
connector M8, metal,
cable 0.2m with connector M8 or M12

Connection type

Environmental data

Ambient temp. (operation/storage)
Protective circuit⁸⁾
VDE safety class
Degree of protection
Standards applied
Certifications

-40 °C ... +55 °C⁷⁾ / -40 °C ... +70 °C
2, 3
III
IP 67 and IP 69K
IEC 60947-5-2
UL 508, CSA C22.2 No.14-13^{5) 9)}

Additional functions

Teach-in input/activation input

Transmitter active/not active
Activation/disable delay
Input resistance



≥ 0.65 * U_B / ≤ 0.35 * U_B
≤ 1 ms
20kΩ

- 1) Typ. operating range limit: max. attainable range without function reserve
- 2) Operating range: recommended range with function reserve
- 3) Average life expectancy 50,000h at an ambient temperature of 25 °C
- 4) For short decay times, an ohmic load of approx. 5kOhm is recommended
- 5) For UL applications: use is permitted exclusively in Class 2 circuits according to NEC
- 6) Sum of the output currents for both outputs, 50mA for ambient temperatures > 40 °C
- 7) Permissible operating temperature range during IO-Link operation: -10 °C to +40 °C
- 8) 2=polarity reversal protection, 3=short circuit protection for all transistor outputs
- 9) These proximity switches shall be used with UL Listed Cable assemblies rated 30V, 0.5A min, in the field installation, or equivalent (categories: CYJV/CYJV7 or PVVA/PVVA7)

Tables

Models of laser class 1:




Reflectors			Operating range	
1	MTKS	50x50.1	0 ... 2.0m	
2	MTKS	20x30	0 ... 1.6m	
3	MTKS	20x40.1	0 ... 1.0m	
4	REF 6-A-	50x50	0 ... 1.0m	
1	0		2.0	3.0
2	0		1.6	2.2
3	0	1.0	1.5	
4	0	1.0	1.4	

 Operating range [m]
 Typ. operating range limit [m]

MTKS ... = micro triple, screw type

Notes

Observe intended use!

-  This product is not a safety sensor and is not intended as personnel protection.
-  The product may only be put into operation by competent persons.
-  Only use the product in accordance with its intended use.

PRK3CL autocollimation Laser retro-reflective photoel. sensor with polariz. filter

Part number code

PRK3C . BA3 / 4 P - 200 - M12

Operating principle

PRK Retro-reflective photoelectric sensors with polarization filter

Construction/version

3C SR3C series

Light type

N/A Red light

Radiation source

N/A LED

L1 Laser class 1

Equipment

N/A Standard

B Housing model with two M3 threaded sleeves (brass)

A Autocollimation principle (single lens) for positioning tasks

Operating range adjustment

N/A Operating range not adjustable

3 Teach-in via button

6 Auto-teach

Switching output/function IN/OUT 1: Pin 4 or black conductor

2 NPN transistor output, light switching

N NPN transistor output, dark switching

4 PNP transistor output, light switching

P PNP transistor output, dark switching

L IO-Link

X Not connected (n. c.)

8 Activation input (activation with high signal)

Switching output/function IN/OUT 2: Pin 2 or white conductor

2 NPN transistor output, light switching

N NPN transistor output, dark switching

4 PNP transistor output, light switching

P PNP transistor output, dark switching

W Warning output

X Not connected (n. c.)

8 Activation input (activation with high signal)

9 Deactivation input (activation with high signal)

T Teach-in via cable

Electrical connection

N/A Cable, PVC, standard length 2000mm, 4-wire

M8 M8 connector, 4-pin (plug)

M8.3 M8 connector, 3-pin (plug)

200-M8 Cable, PVC, length 200mm with M8 connector, 4-pin, axial (plug)

200-M8.3 Cable, PVC, length 200mm with M8 connector, 3-pin, axial (plug)

200-M12 Cable, PVC, length 200mm with M12 connector, 4-pin, axial (plug)

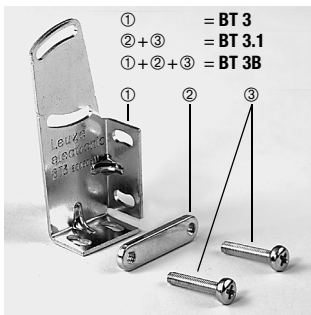
Order guide

The sensors listed here are preferred types; current information at www.leuze.com

Sensors with through-holes		Sensors with threaded sleeves		Accessories mounting systems	
Order code	Part no.	Order code	Part no.	Order code	Part no.
PRK3CL1.A3/4T-M8	50129411	PRK3CL1.BA3/4T-M8	50133747	For sensors with through-holes:	
PRK3CL1.A3/4-M8.3	50133738	PRK3CL1.BA3/4T	50133748	BT 3	50060511
PRK3CL1.A3/4T	50129412	PRK3CL1.BA3/4T-200-M12	50133749	BT 3.1 ¹⁾	50105585
PRK3CL1.A3/4T-200-M12	50129413	PRK3CL1.BA3/4T-200-M8	50133750	BT 3B	50105546
PRK3CL1.A3/4P-M8	50129414	PRK3CL1.BA3/4P-M8	50133751	For sensors with threaded sleeves:	
PRK3CL1.A3/4P-M8	50133739	PRK3CL1.BA3/4P	50133752	BT 200M.5	50118542
PRK3CL1.A3/4P	50133740	PRK3CL1.BA3/4P-200-M12	50133753	BT 205M ¹⁾	50124651
PRK3CL1.A3/4P-200-M12	50133741	PRK3CL1.BA3/4P-200-M8	50133754	BTU 200M-D10	50117256
PRK3CL1.A3/4P-200-M8	50133742	PRK3CL1.BA3/LP-M8	50133755	BTU 200M-D12	50117255
PRK3CL1.A3/LP-M8	50133743	PRK3CL1.BA3/LP	50133756	BTU 200M.5-D12	50120426
PRK3CL1.A3/LP	50133744	PRK3CL1.BA3/LP-200-M12	50133757	BTU 200M-D14	50117254
PRK3CL1.A3/LP-200-M12	50133745	PRK3CL1.BA3/LP-200-M8	50133758		
PRK3CL1.A3/LP-200-M8	50133746				

1) Packaging unit: PU = 10 pcs.

Mounting systems



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Laser safety notices - laser class 1



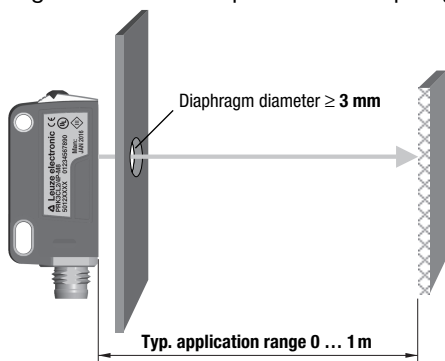
ATTENTION, LASER RADIATION – LASER CLASS 1

The device satisfies the requirements of IEC 60825-1:2007 (EN 60825-1:2007) safety regulations for a product of **laser class 1** as well as the U.S. 21 CFR 1040.10 regulations with deviations corresponding to "Laser Notice No. 50" from June 24, 2007.

- ↳ Observe the applicable statutory and local laser protection regulations.
- ↳ The device must not be tampered with and must not be changed in any way.
There are no user-serviceable parts inside the device.
Repairs must only be performed by Leuze electronic GmbH + Co. KG.

General information

- The laser retro-reflective photoelectric sensors PRK3CL... have an optimized light beam propagation in the typical range of application of 0 ... 1 m (not to be confused with the operating range, which is 0 ... 3m in combination with a reflector MTKS 50x50.1). This permits the reliable recognition of the smallest of parts or the positioning of objects with maximum precision across the entire area.
- For foil 6, the sensor's side edge must be aligned parallel to the side edge of the reflective tape.
- The sensor is constructed on the basis of the autocollimation principle, i.e., light being transmitted and light being received propagate along the same light axis. This permits the photoelectric sensor to be installed directly behind small holes or diaphragms. The smallest permissible diaphragm diameter for secure functioning is 3mm.



- The achievable resolution depends significantly on the device setting. Depending on the teach mode, the following values are possible:

Setting	Detection from object size ¹⁾
Max. operating range (factory setting)	1.5mm
Standard teach (low sensitivity)	1 mm
Sensitive teach (increased sensitivity)	0.1 ... 0.2mm

1) All specifications are typical values and may vary by a small amount for each unit.

IO-Link interface

Sensors in the PRK3C.../L... variant have a dual-channel architecture. The IO-Link interface in accordance with specification 1.1.1 (October 2011) is provided on pin 4 (OUT 1). This allows the devices to be configured quickly and easily and, therefore, cost-effectively. Furthermore, the sensor transmits its process data and makes diagnostic information available through it.

Parallel to the IO-Link communication, the sensor can output the continuous switching signal for object detection on OUT 2. The IO-Link communication does not interrupt this signal.

Note: In Leuze Sensor Studio, the following applies with regard to the designations: **Q1 = OUT 1, Q2 = OUT 2.**

IO-Link process data

Output data device

Data bit								Assignment	Meaning
7	6	5	4	3	2	1	0		
								Switching output Q1 (OUT 1)	0 = inactive, 1 = active
								Warning output autoControl	0 = no warning, 1 = warning
								Sensor operation ¹⁾	0 = off, 1 = on
								Not used	Free
								Not used	Free
								Not used	Free
								Not used	Free
								Not used	Free

1) Sensor operation off when detection is not possible (e.g during the teach event)

Input data device

Data bit								Assignment	Meaning
7	6	5	4	3	2	1	0		
								Deactivation	0 = transmitter active, 1 = transmitter inactive
								Not used	Free
								Not used	Free
								Not used	Free
								Not used	Free
								Not used	Free
								Not used	Free
								Not used	Free

Device-specific IODD

At www.leuze.com in the download area for IO-Link sensors you will find the **IODD zip file** with all data required for the installation.

IO-Link parameter documentation

A complete description of the IO-Link parameters is given in the *.html files. Please double-click one of the two language variants: ***IODD*-de.html** for **German** or ***IODD*-en.html** for **English**.

PRK3CL autocollimation Laser retro-reflective photoel. sensor with polariz. filter

Functions configurable via IO-Link

PC configuration and visualization is performed comfortably with the USB-IO-Link Master SET US2-IL1.1 (part no. 50121098) and the Leuze Sensor Studio (in the download area of the sensor at www.leuze.com).

Function block	Function	Description
Configuration	Logical function of Q2	If the function Q2 = switching output is selected, the switching function corresponds to the current setting which was selected via the L/D changeover. If Q2 = inv. switching output is selected, the switching behavior of the output is inverted.
	Key Lock	On disables the teach button on the sensor.
	L/D switching	In the factory setting, outputs Q1 and Q2 are antivalent switching outputs: Light switching: Q1 = light switching, Q2 = dark switching. Dark switching: Q1 = dark switching, Q2 = light switching.
	Switching delay	On activates the internal time function .
	Function selection of the switching delay	Activation of a suitable switching delay is possible. It is not possible to combine switching delays.
	Time base of the switching delay	Possibility of selecting a time base.
	Factor for the time base of the switching delay	To adapt the time base, it is multiplied by the entered factor. Only whole-number factors from 1 to 15 are permitted.

Function block	Function	Description
Commands (The commands with a gray background correspond to the functions which can be performed at the sensor using the teach button or the remote teach function.)	Sensitive teach for the detection of a transparent object (e.g. empty single bottle)	Clear the light path before activation.
	Standard teach for the detection of a partially transparent object (e.g. bottle made of colored glass)	Clear the light path before activation.
	Light switching	
	Dark switching	
	Switch the process data display mode to analog value	Activate to display diagrams on the Process tab when using Leuze Sensor Studio .

Sensor adjustment (teach) via teach button

The sensor is factory-adjusted for maximum operating range. The teach procedure is only necessary if the sensor does not switch when an object enters the light beam.

① Standard teach (low sensitivity)		② Sensitive teach (increased sensitivity)	
Clear the light path before teaching!			
1.	Hold down the teach button (2 to 7s) until the yellow and green LEDs flash simultaneously .	1.	Hold down the teach button (7 to 12s) until the yellow and green LEDs flash alternately .
2.	Release teach button – ready.	2.	Release teach button – ready.
After teaching for normal sensor sensitivity, the sensor switches for objects with a minimum size of 1 mm (see table under "General Information").		After teaching for increased sensor sensitivity, the sensor switches for objects with a minimum size of 0.1 ... 0.2mm (see table under "General Information").	
If both LEDs flash rapidly after the teach event, a teaching error has happened. Please check the alignment of the light beam onto the reflector and carry out another teach event.			
Device settings are stored fail-safe.			

③ Teach at max. operating range (factory setting)		④ Set switching behavior (light/dark switching)	
Obstruct the light path before teaching!		When the function is activated, the switching output is always inverted relative to the previously set state (toggle function).	
1.	Hold down the teach button (2 to 7s) until the yellow and green LEDs flash simultaneously .	1.	Hold down the teach button longer than 12s until only the green LED flashes . LED ON: Switching output now light switching (Output active if light path is free) LED OFF: Switching output now dark switching (Output active if there is an object in the light path)
2.	Release teach button – ready.	2.	Release teach button – ready.
The sensor now operates with the maximum function reserve/operating range.		Note: The yellow LED is not dependent on the switching behavior setting and always indicates light switching in normal operation.	
Device settings are stored fail-safe.			

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Sensor adjustment (teach) via teach input (pin 2)



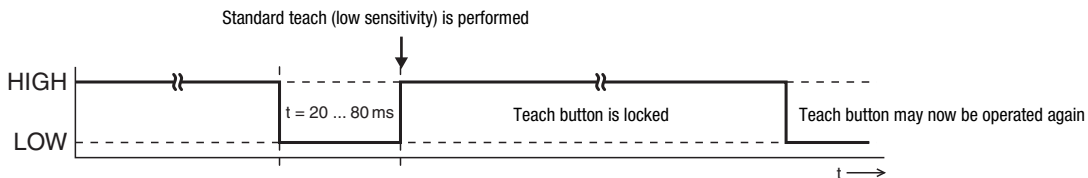
The following description applies to PNP switching logic!

Signal level LOW $\leq 2V$

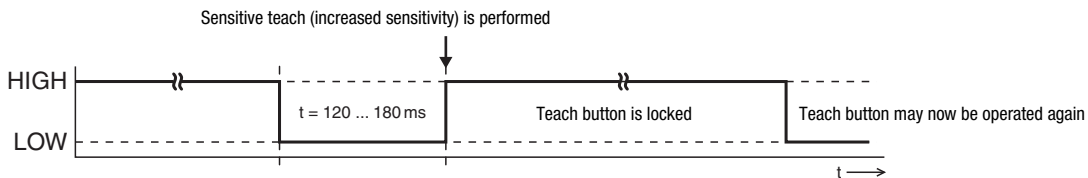
Signal level HIGH $\geq (U_B - 2V)$

With the NPN models, the signal levels are inverted!

Standard teach (low sensitivity)

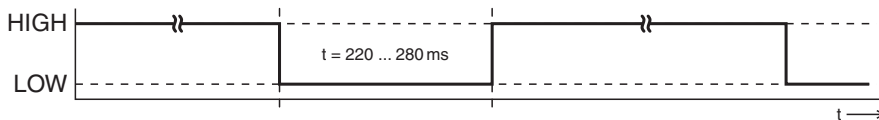


Sensitive teach (increased sensitivity)



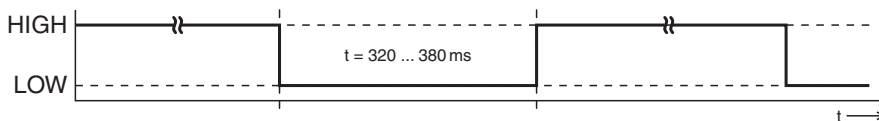
Light switching logic

Switching outputs light switching, this means outputs active when object is detected. In the case of complementary switching outputs, OUT1 (pin 4) light switching, OUT2 (pin 2) dark switching.



Dark switching logic

Switching outputs dark switching, this means outputs inactive when object is detected. In the case of complementary switching outputs, OUT1 (pin 4) dark switching, OUT2 (pin 2) light switching.



Locking the teach button via the teach input



A **static high signal** ($\geq 20ms$) at the teach input locks the teach button on the sensor if required, such that no manual operation is possible (e.g., protection from erroneous operation or manipulation).

If the teach input is not connected or if there is a static low signal, the button is unlocked and can be operated freely.

