Leuze

Laser retro-reflective photoelectric sensors for bottles

PRK3CLT Autokollimation

PRK3CLTT Autokollimation

We reserve the right to make changes – 2020/02/13 – 50137134-02

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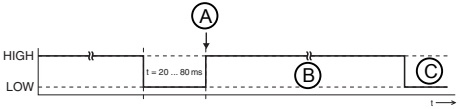
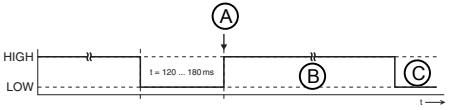
ПРОМЭЛЕКТРОНИКА / sales@prom-elec.com

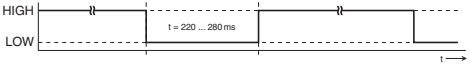
1


A
HIGH
LOW
t = 20 ... 80 ms
B
C
t

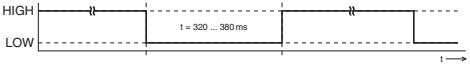
2


A
HIGH
LOW
t = 120 ... 180 ms
B
C
t

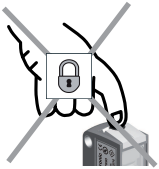
3


HIGH
LOW
t = 220 ... 280 ms
t

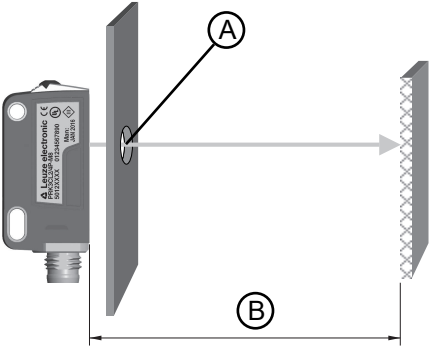
4


HIGH
LOW
t = 320 ... 380 ms
t

5



6


A
B
Leuze electronic
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JAN 2018

General information

- The laser retro-reflective photoelectric sensors PRK3CL… have an optimized light beam propagation in the typical range of application of 0 … 0.4 m (not to be confused with the operating range limit, which is 0 … 0.5 m in combination with a reflective tape REF6). This permits the reliable recognition of the smallest of parts or the positioning of objects with maximum precision across the entire area.
- For reflective tape REF6, 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 3 mm.
- 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)	1.5 mm
Standard teach (low sensitivity)	1 mm
Sensitive teach (increased sensitivity)	0.1 … 0.2 mm

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

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Sensor adjustment (teach) via teach button

The sensor is factory-adjusted for maximum operating range. After the sensor has been commissioned, it is essential to perform a teach procedure on the reflector with clear light path.

	(1) High sensitive teach (maximum sensitivity) for the detection of a highly transparent object (e.g. filled single bottle, glass pane or film)		**(2) Sensitive teach (increased sensitivity) for the detection of a transparent object (e.g. empty single bottle)**
	Clear the light path before teaching!		
1	Hold down the teach button (2 to 7 s) until the yellow and green LEDs flash simultaneously.	1	Hold down the teach button (7 to 12 s) until the yellow and green LEDs flash alternately.
2	Release teach button – ready.	2	Release teach button – ready.
The sensor switches reliably when a highly transparent object (e.g. filled single bottle, glass pane or film) is transported through the light beam.		The sensor switches reliably when a transparent object (e.g. empty single bottle) is transported through the light beam.	
	Device settings are stored fail-safe.		

NOTICE

With the *high sensitive teach* setting, the sensor can always detect empty or filled highly transparent bottles reliably. The sensor then reacts sensitively to contamination or moisture condensation.

↳ If necessary, check whether the *sensitive teach* setting would provide adequate sensitivity. The advantage of this setting is the slightly lower sensitivity to contamination and moisture condensation.

(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 inverted relative to the previously set state.	
1	Hold down the teach button (2 to 7 s) until the yellow and green LEDs flash simultaneously.	1	Hold down the teach button longer than 12 s until only the green LED flashes.
2	Release teach button – ready.	2	Release teach button – ready.
The sensor now operates with the maximum function reserve/operating range.		Behavior of the yellow LED in this operating mode: After releasing the teach button, the yellow LED indicates the set switching behavior for 2 s and then reverts back to the light path. Switching behavior with reflectors: – Yellow LED on continuously: switching output now dark switching – Yellow LED remains off for 2 s and is then on continuously: switching output now light switching Switching behavior without reflector: – Yellow LED switches on for 2 s and then remains off: switching output now dark switching – Yellow LED remains off: switching output now light switching	
		Note: The yellow LED is not dependent on the switching behavior setting and always indicates the light path in normal operation.	
Device settings are stored fail-safe.			

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

This device setting is only available for sensors in the PRK3CL…T3/…T… or PRK3CL…TT3/…T… variant.

	NOTICE
!	The following description applies to PNP switching logic! Signal level LOW ≤ 2V Signal level HIGH ≥ (U_B-2V) With the NPN models, the signal levels are inverted!

1

High sensitive teach (maximum sensitivity)

A High sensitive teach (maximum sensitivity) is performed
B Teach button is locked
C Teach button may now be operated again

2

Sensitive teach (increased sensitivity)

A Sensitive teach (increased sensitivity) is performed
B Teach button is locked
C Teach button may now be operated again

3

Dark switching logic

Switching outputs are dark switching, i.e., outputs are active, when there is an object currently in the light path.
With antivalent switching outputs: OUT 1 (pin 4) dark switching, OUT 2 (pin 2) light switching.

4

Light switching logic

Switching outputs are light switching, i.e., outputs are active, when there is no object currently in the light path.
With antivalent switching outputs: OUT 1 (pin 4) light switching, OUT 2 (pin 2) dark switching.

Locking the teach button via the teach input

5

This device setting is only available for sensors in the PRK3CL…T3/…T… or PRK3CL…TT3/…T… variant (teach input via pin 2).
A static high signal (≥ 20 ms) 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.

6

A Diaphragm diameter ≥ 3 mm
B Typ. application range 0 … 1 m

IO-Link interface

Sensors in the PRK3C…/L… variant have a dual-channel architecture. The IO-Link interface is available in accordance with specification 1.1.2 (July 2013) on pin 4 (OUT 1). You can easily, quickly and economically configure the devices via the IO-Link interface. Furthermore, the sensor transmits the process data via the IO-Link interface 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.

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

The sensors offer no data retention and no ISDU support. The device can only be identified via VendorID and DeviceID.

IO-Link identification

VendorID dec/hex	DeviceID dec/hex	Device
338/0x152	2115/0x000843	PRK3CL1.T3/LP
	2117/0x000845	PRK3CL1.TT3/LP

IO-Link process data

Device output data

Data bit	Assignment	Meaning
0	Switching output Q1 (OUT 1)	0 = inactive, 1 = active
1	Warning output autoCon-trol	0 = no warning, 1 = warning
2	Sensor operation	0 = off, 1 = on Sensor operation off when detection is not possible (e.g during the teach event).
3	Not assigned	Free
4	Not assigned	Free
5	Not assigned	Free
6	Not assigned	Free
7	Not assigned	Free

Device input data

Data bit	Assignment	Meaning
0	Deactivation	0 = transmitter active, 1 = transmitter in-active
1	Not assigned	Free
2	Not assigned	Free
3	Not assigned	Free
4	Not assigned	Free
5	Not assigned	Free
6	Not assigned	Free
7	Not assigned	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 parameters documentation

The complete description of the IO-Link parameters can be found in the *.html files. Double-click on a language variant:

- German: *IODD*-de.html
- English: *IODD*-en.html

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 *Sensor Studio* configuration software (in the download area of the sensor at www.leuze.com).

Function block	Function	Description
Configuration	Logical function of Q2	Q2 can optionally be configured as a warning output and, with active high signal, then indicates when the control limit for contamination compensation has been reached (tracking). The reflector must now be cleaned. 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.
	Easy Tune	Activates manual fine adjustment of the switching threshold at the sensor. To achieve a better function reserve, it can be advantageous to change the taught switching threshold. Used for this purpose is the *easyTune* function, which is similar in principle to a potentiometer. When activated, the switching threshold can be adapted by pressing the button (short or long button operation) on the sensor. Short operation of the teach button (2 ms to 200 ms) increases the sensitivity slightly; long operation of the button (200 ms to 2 s) reduces the sensitivity accordingly. The green LED on the sensor lights up briefly as confirmation each time the button is pressed. If the upper or lower end of the adjustment range is reached, the green and yellow LEDs flash rapidly.

Function block	Function	Description
Configuration	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.
	Tracking (only with PRK3CL…TT…)	Activates the *tracking* function. The sensor measures the received signal level continuously. System contamination at the reflector and/or sensor reduces the signal and can then be compensated automatically. The control rate depends on the number of gaps in the process. This *tracking* function increases the interval between cleaning sessions considerably.
	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.	**High sensitive teach** for the detection of a highly transparent object (e.g. filled single bottle, glass pane or film)	Clear the light path before activation.
	Sensitive teach for the detection of a transparent object (e.g. empty single bottle)	Clear the light path before activation.
	Switch on tracking (only with PRK3CL…TT…)	See configuration.
	Light switching	
	Dark switching	
	Switch the process data display mode to analog value	Activate to display diagrams on the *Process* tab when using *Sensor Studio* configuration software.

Laser safety notices - laser class 1

⚠ ATTENTION

LASER RADIATION – CLASS 1 LASER PRODUCT

The device satisfies the requirements of IEC/EN 60825-1:2014 safety regulations for a product of **laser class 1** and complies with 21 CFR 1040.10 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.

- 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.