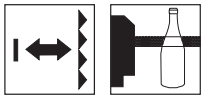
IPRK 18 Retro-reflective photoelectric sensors with polarization filter

en 05-2014/05 50110546-01

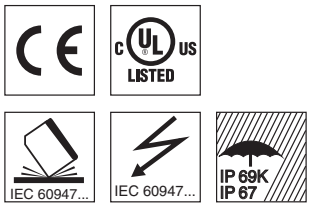




0 ... 3m



- Intelligent sensor for detection of transparent objects (e.g. clear glass, PET, foil) with integrated AS-i slave
- Automatic contamination compensation (tracking function) for longer intervals between cleanings
- Sensor adjustment via bus line and teach-in directly at sensor

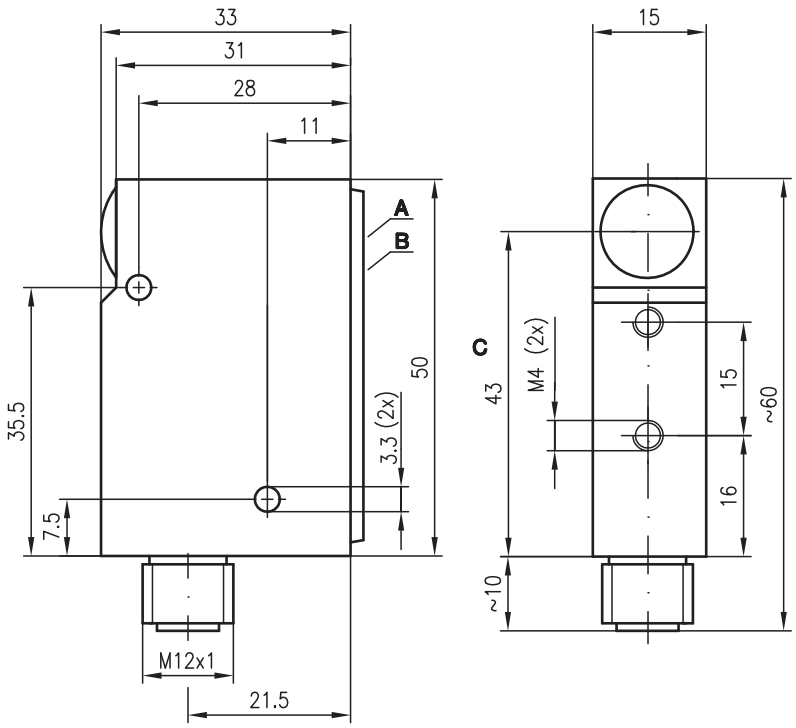


Accessories:

(available separately)

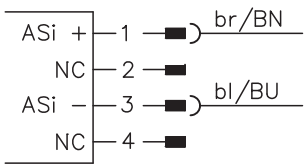
- Mounting system (BT 95)
- M12 connectors (KD ...)
- Reflectors

Dimensioned drawing



A Step switch for object adjustment
B Indicator diodes
C Optical axis

Electrical connection



We reserve the right to make changes • DS_IPRK18AL46_en_50110546_01.fm

Specifications

Optical data

Typ. operating range limit (TK(S) 100x100) [1]	0 … 3m
Operating range [2]	see tables
Recommended reflector	MTKS 50x50.1
Light source	LED (modulated light)
Wavelength	660nm (visible red light, polarized)

Timing

Switching frequency (sensor)	according to AS-i specifications (500Hz internally)
Response time (sensor)	according to AS-i specifications (1ms internally)
Delay before start-up	≤ 300ms

Electrical data

Operating voltage U_B [3]	26.5V … 31.6V (according to AS-i specification)
Open-circuit current	≤ 35mA
Sensitivity	changeover: PET/clear glass/colored glass

Switch positions

Position **teach-in**	activation of the teach event
Position **1** (PET bottle)	operating point PET bottle
Position **2** (clear glass bottle)	operating point clear glass bottle
Position **3** (colored glass bottle)	operating point colored glass bottle
Position **Auto**	Tracking ON/OFF

Indicators (see also Controls and indicators)

Green LED, continuous light	ready
Green LED, flashing	teach mode active with performance reserve
LED, red/green continuous light	operation without performance reserve
LED, red continuous light/green flashing	teaching without performance reserve
Green/red LED flashing	device defective
LED 1, yellow	light path free
LED 2, yellow	tracking ON
LED 3, yellow	AS-i ON = step switch OFF

Mechanical data

Housing	diecast zinc
Optics cover	glass
Weight	150g
Connection type	M12 connector, 4-pin, stainless steel

Environmental data

Ambient temp. (operation/storage)	-25°C … +55°C/-40°C … +70°C
Protective circuit [4]	2, 3
VDE safety class	III
Protection class	IP 67, IP 69K [5]
Light source	free group (in accordance with EN 62471)
Standards applied	IEC 60947-5-2
Certifications	UL 508, C22.2 No.14-13 [3] [6]

AS-i data

I/O code	7
ID code	A.F
Address	programmed by the user in the range of 1 to 62 (default=0)
Cycle time acc. to AS-i specification	max. 10ms for 62 slaves
AS-i standard according to profile	S-7.A.F (A/B-operation, user defined)

1) Typ. operating range limit: max. attainable range without performance reserve
2) Operating range: recommended range with performance reserve
3) For UL applications: for use in class 2 circuits according to NEC only
4) 2=polarity reversal protection, 3=short circuit protection for all outputs
5) IP 69K test acc. to DIN 40050 part 9 simulated, high pressure cleaning conditions without the use of additives, acids and bases are not part of the test
6) 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)

Operate in accordance with 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 the intended use.

Order guide

Designation	Part no.
IPRK 18/A L.46	50040278

Tables

Reflectors			Operating range
1	TK(S)	100x100	0 … 2.4m
2	MTKS	50x50.1	0 … 2.0m
3	TK(S)	30x50	0 … 0.8m
4	TK(S)	20x40	0 … 0.8m
5	Tape 6	50x50	0 … 1.8m

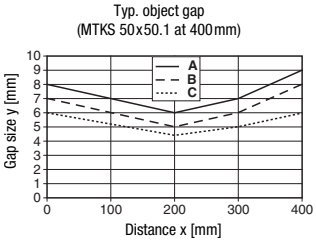
1	0		2.4	3.0
2	0		2.0	2.5
3	0	0.8		1.0
4	0	0.8	1.0	
5	0		1.8	2.0

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

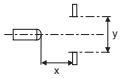
*) for sensitivity setting at switch position 3

TK … = adhesive
TKS … = screw type
Tape 6 = adhesive

Diagrams



A Switch position 1
B Switch position 2
C Switch position 3



Remarks

Objects	Switch position
Multilayer foil, PET bottles, transparent glass pane	1
Clear glass bottle	2
Colored glass bottle	3

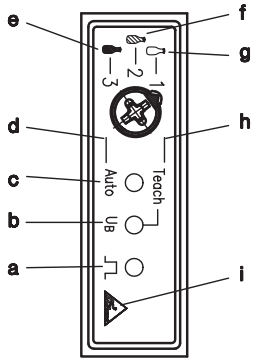
- Teach event may only be performed with free light path.
- A change of the operating point is always possible and does not require a new teach-in.
- Red LED signalizes unstable operating state.
- For activation of the single functions you have to remain in the respective switch position for approx. 2s.
- In switch positions "Teach" and "Auto" the switching outputs are inactive.
- The light spot may not exceed the reflector.
- Preferably use MTK(S) or tape 6.
- For foil 6 the sensor's side edge must be aligned parallel to the side edge of the reflective tape.

IPRK 18

1. Operating principle of contamination compensation (tracking function)

This transparency sensor (clear glass sensor) is a device which automatically compensates system contamination at the reflector and sensor by means of continuous measurement of the receiving level. The control rate depends on the number of gaps in the process. This tracking function increases the interval between cleaning sessions considerably.

2. Controls and indicators



a Light path free (LED 1 yellow)
b Operation and teach indicator (LED green/red)
c Tracking ON (LED 2 yellow)
d Tracking switch position ON/OFF
e Switch position 3 (colored-glass bottle)
f Switch position 2 (clear-glass bottle)
g Switch position 1 (PET bottle, glass pane, foil)
h Switch position Teach
i AS-i ON = step switch OFF (LED 3, yellow)

3. Sensor operation

The sensor can be operated via AS-i and also via the step switch. The step switch can be switched off partially via AS-i. In all cases the teach-in function of the step switch remains.

Enabling the step switch is signalized via the LED 3 = off behind the AS-i icon (DO0=0 and DO1=0). In this mode the AS-i has an influence only on the P_0 and P_1 parameters, as these functions directly affect the DI_0 switching output. The DO_2 and P_2 functions are not active (blocked) in this case. When the changeover from AS-i to the step switch occurs, the current step switch setting will be activated, i. e. changeover to the respective mode (1, 2, 3 or teach-in) takes place. The tracking function remains at the setting which was last set by the AS-i. The changeover of the performance reserve takes effect only after a teach event that had already been started (via AS-i and/or step switch), has been completed. If a changeover from step switch mode to AS-i mode occurs during a teach event, this particular teach event will start again after 2 seconds.

4. Programming via AS-i

AS-i data			
Profile	S-7.A.F (A/B-operation, user defined)	ID code	A.F
I/O code	7	Address	Programmed by the user in the range of 1 to 62 (default=0)

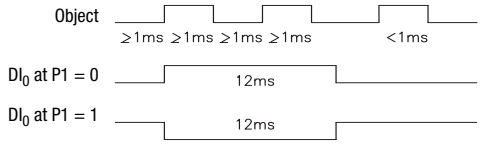
Data and parameter bit assignment (host-level programming)			
DO_0	Performance reserve L-bit	DI_2	Not assigned
DO_1	Performance reserve H-bit	DI_3	Not assigned
DO_2	Tracking On/Off	P_0	Timer On/Off (pulse stretching 12 ms as for IPRK 18/A.1 L.4)
DO_3	Must not be used	P_1	Light/dark switching
DI_0	Switching output	P_2	Teach-in
DI_1	Warning output (soiling/tracking controller at limit stop)	P_3	Must not be used

Data content (host-level programming)		
DO_0	**DO_1**	**Performance reserve**
0	0	Step switch enabled (selection possible via step switch 1, 2, 3, via teach-in, via tracking On/Off) => AS-i tracking On/Off and AS-i teach-in are not active (blocked) => AS-i timer On/Off and AS-i light/dark switching are active
0	1	PET setting => Selection via step switch 1, 2, 3 blocked and tracking On/Off blocked => Teach-in possible via step switch
1	0	Clear glass setting => Selection via step switch 1, 2, 3 blocked and tracking On/Off blocked => Teach-in possible via step switch
1	1	Colored glass setting => Selection via step switch 1, 2, 3 blocked and tracking On/Off blocked => Teach-in possible via step switch

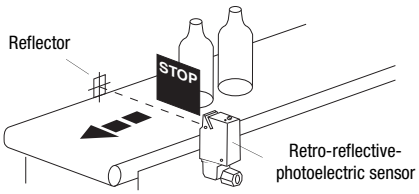
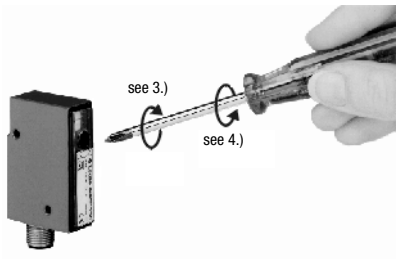
DO_2	**Tracking On/Off** **(only if DO_0 = 1 or DO_1 = 1)**	**DI_0**	**Switching output**	**DI_1**	**Warning output** **(Soiling/tracking controller at limit stop)**
0	Tracking Off	0	No reflection	0	Prefailure message as for standard tracking sensor
1	Tracking On	1	Reflection	1	o.k.

Parameter content (host-level programming)					
Po	**Timer On/Off**	**P_1**	**Light/dark switching**	**P_2**	**Teach-in** (only if $DO_0 = 1$ **or** $DO_0 = 1$)
0	Function as for IPRK 18/A L.4 (Timer off)	0	Dark switching	0	Carry out teach-in
1	Function as for IPRK 18/A.1 L.4 (Timer on)	1	Light switching	1	Not active

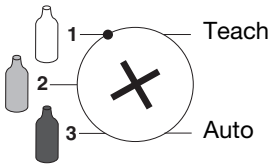
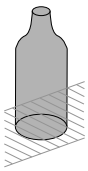
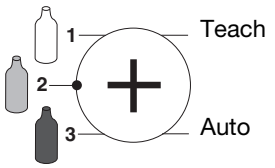
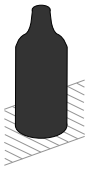
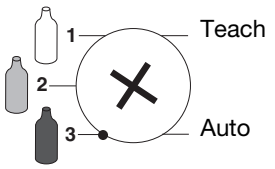
Minimal switching pulse for $P_0 = 1$ (Timer on)



5. Adjustment procedure (teach-in) via step switch

	Correct adjustment procedure:	Important to note:
 **Important during teach-in: free light path!**	**1.** There must be no objects in the beam path between the retro-reflective photo-electric sensor and the reflector during the adjustment procedure.	The teach-in procedure must be conducted without any objects!
	2. Align the sensor with the reflector so that the light spot is visible in the middle of the reflector.	The light spot must not fall outside the reflector area. The mounted reflector should always be larger than the visible light spot!
	**3.** Turn the step switch to the "Teach" switch position for about 2 s. **4.** Turn the step switch back to switch positions 1, 2 or 3.	The adjustment procedure must be conducted without objects!
	5. To turn the tracking function on/off, turn the step switch to the "Auto" switch position for about 2 s. **6.** Turn the step switch back to switch positions 1, 2 or 3.	The step switch must be turned to switch positions 1, 2 or 3 during operation!

6. Setting operating mode

Object to be detected	Material, e.g.:	Switch position	Correct adjustment procedure:
① Transparent objects 	● PET bottle ● PEN bottle ● Clear plate glass ● Foil		**1.** Turn the step switch to the "Teach" switch position for about 2 s **2.** Turn the step switch back to switch position 1 Tracking can be turned on or off by switching to the "Auto" switch position
✍ Less transparent objects 	● Clear glass bottle ● Colored plate glass		**1.** Turn the step switch to the "Teach" switch position for about 2 s **2.** Turn the step switch back to switch position 2 Tracking can be turned on or off by switching to the "Auto" switch position
✍ Opaque objects 	● Colored glass bottle ● Opaque objects		**1.** Turn the step switch to the "Teach" switch position for about 2 s **2.** Turn the step switch back to switch position 3 Tracking can be turned on or off by switching to the "Auto" switch position