RK46C VarOS High Resolution

Retro-reflective photoelectric sensors

0.4 … 5.2m

250 Hz

10 - 30 V DC

HF A²LS

- Sensor with homogeneous light-band (red light)
- High resolution for gapless detection of small objects (≥ 2mm)
- Teachable, preset sensitivity levels for time-saving, optimum adaptation to object size, shape and form
- *Easy tune* – calibration of the sensor to e.g. transparent, perforated or small objects
- Precise alignment thanks to the special shape and form of the light-band
- Reliable detection even with depolarizing media (e.g. foil packaging)
- Light/dark switching via the teach button

CE

c UL us LISTED

IP 69K IP 67

ECOLAB

IEC 60947...

IEC 60947...

III

Accessories:

(available separately)

- Mounting systems (BT 46, BTU 300M, BTU 900M)
- M12 connectors (KD …)
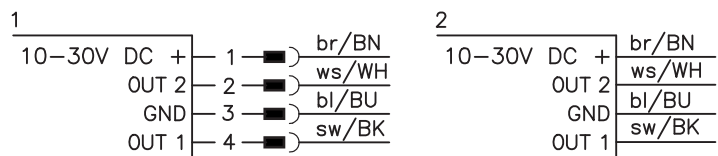- Ready-made cables (KD …)
- Reflectors

Dimensioned drawing
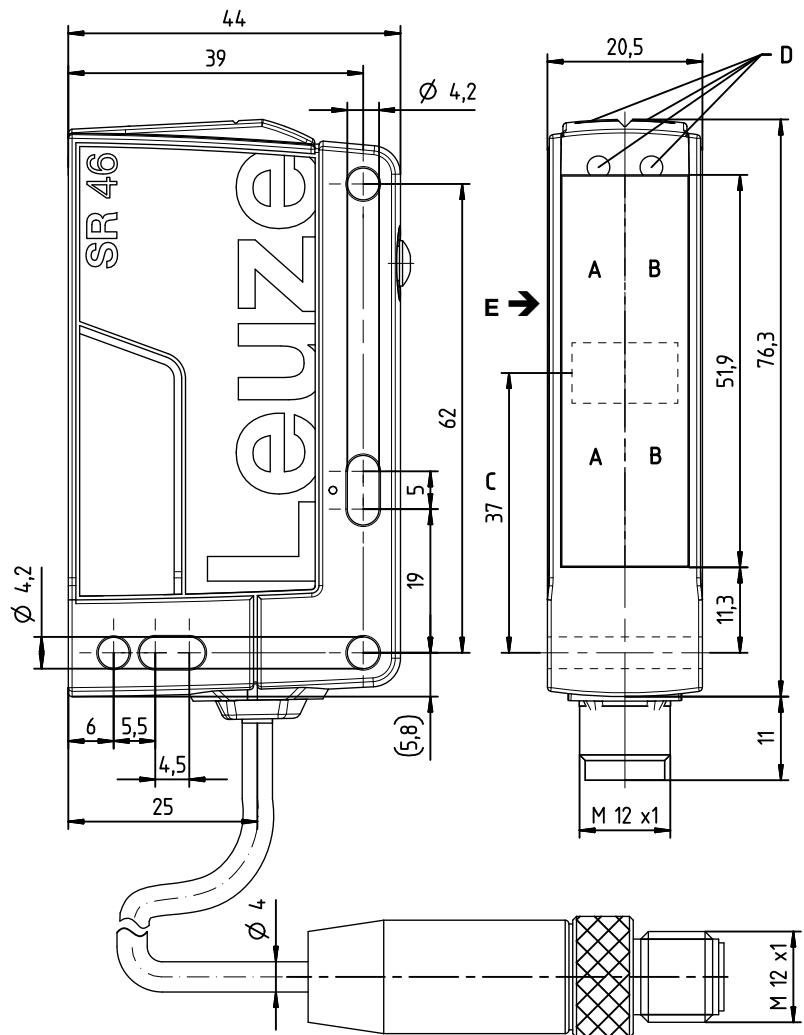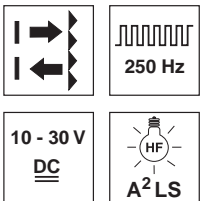

A   Transmitter side
B   Receiver side
C   Center of light-band
D$_A$ Green indicator diode
D$_B$ Yellow indicator diode
E   Preferred entry direction for precise positioning

Electrical connection

1		
10–30V DC +	1	br/BN
OUT 2	2	ws/WH
GND	3	bl/BU
OUT 1	4	sw/BK

2	
10–30V DC +	br/BN
OUT 2	ws/WH
GND	bl/BU
OUT 1	sw/BK

Technical data

Optical data

Typ. op. range limit (TK(S) 100x100) [1]	0.4 … 5.2 m
Operating ranges [2]	See tables
Teach range	0.4 … 4.0 m
Light source [3]	LED (modulated light)
Wavelength	620 nm (visible red light)
Detection range	Light-band approx. 50 … 24 mm[4] (see diagrams)
Resolution	≥ 2 mm [5]

Timing

Switching frequency	250 Hz
Response time	2 ms
Readiness delay	< 300 ms

Electrical data

Operating voltage U_B [6]		10 … 30 VDC (incl. residual ripple)
Residual ripple		≤ 15% of U_B
Open-circuit current		≤ 20 mA
Switching outputs/functions	/4P	2 PNP switching outputs, antivalent
	/4X	1 PNP switching output, light switching
	/PX	1 PNP switching output, dark switching
	/2N	2 NPN switching outputs, antivalent
Signal voltage high/low		≥ (UB-2V)/≤ 2V
Output current		Max. 100 mA
Sensitivity		Adjustment via teach button

Indicators

Green LED	Ready
Yellow LED	Light path free
Flashing green/yellow LEDs	Feedback during teach procedure

Mechanical data

Housing	Plastic (PC-PBT)
Connector	Plastic (PBT)
Optics	Plastic (PMMA)
Operation	Teach button
Weight	With M12 connector: approx. 60 g
	With 200 mm cable and M12 connector: approx. 80 g
	With 2000 mm cable: approx. 100 g
Connection type	M12 connector, 4-pin
	Cable 200 mm with M12 connector, 4-pin
	Cable 2000 mm, 4 x 0.20 mm²

Environmental data

Ambient temp. (operation/storage)	-40°C … +60°C/-40°C … +70°C
Protective circuit [7]	1, 2, 3
VDE safety class [8]	III
Degree of protection	IP67, IP 69K
Light source	Exempt group (in acc. with EN 62471)
Standards applied	IEC 60947-5-2
Chemical resistance	Tested in accordance with ECOLAB
Certifications	UL 508, C22.2 No.14-13 [6] [9]

1) Typ. operating range limit: max. attainable range without function reserve
2) Operating range: recommended range with function reserve
3) Average life expectancy 100,000h at an ambient temperature of 25°C
4) Depending on the object size and the set sensor sensitivity
5) Depending on the teach-in, see diagrams (sensitivity **Standard** ≥ 2 mm)
6) For UL applications: for use in class 2 circuits only
7) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all transistor outputs
8) Rating voltage 50V
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)

Notes

- Function reserve decreases as sensitivity increases.
- Max. resolution: approx. 2 mm.
- Further applications:
  - Detection of transparent media
  - Detection of depolarizing media, e.g. foil packaging
  - Detection of small parts/objects
  - Detection of containers with openings
- Multiple sensors can be operated in a small area
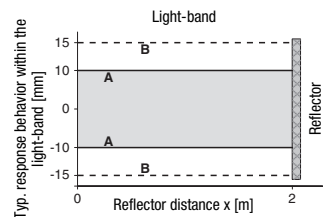
Tables

Plastic reflectors:

	Reflectors		Operating range
1	TK(S)	100x100	0.4 … 4.0 m
2	TK(S)	40x60	0.4 … 3.0 m

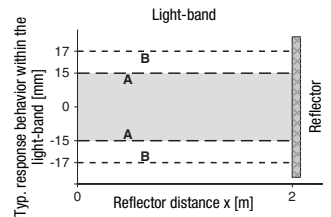|			
1	0.4	4.0	5.2
2	0.4	3.0	3.9

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

TK … = adhesive
TKS … = screw type

Diagrams

Reference object for detection: Ø 2 mm with reflector TKS 100x100

Reference object for detection: Ø 5 mm with reflector TKS 100x100

A **Standard** sensitivity
B **Further increased** sensitivity with *Easy tune* (3x teach buttons, range depends on taught value)

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.

◬ Leuze electronic

Part number code

R	K	4	6	C	.	D	X	L	3	P	2	/	4	P	-	M	1	2

Operating principle
RK   Retro-reflective photoelectric sensor

Series
46C   46C series

Equipment
D   Depolarizing media

Optical characteristic
XL   Large light spot

Setting
3   Teach button

Design
P2   Resolution 2 mm

Pin assignment of OUT1 (connector pin 4 / black cable wire)
2   NPN, light switching
N   NPN, dark switching
4   PNP, light switching
P   PNP, dark switching

Pin assignment of OUT2 (connector pin 2 / white cable wire)
X   Not used
2   NPN, light switching
N   NPN, dark switching
4   PNP, light switching
P   PNP, dark switching

Connection technology
M12   M12 connector, 4-pin
200-M12   Cable 200 mm with M12 connector, 4-pin
Free   Cable 2000 mm

Order guide

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

|	Designation	Part no.
With M12 connector, 4-pin		
OUT1: PNP light switching, OUT2: PNP dark switching	RK46C.DXL3P2/4P-M12	50134568

Precise alignment of sensor

The special shape and form of the light-band allows precise alignment of the sensor with the object to be detected or with the reflector.

Advantages:
- Maximum utilization of the light-band
- Reliable detection even with shocks/vibrations

Light-band
Object
Gaps approx. 2mm

Align center of light-band with center of object/reflector!
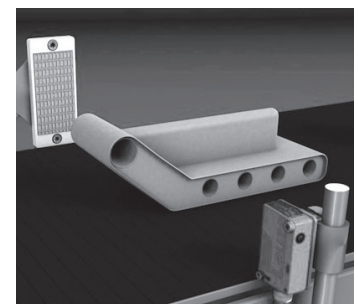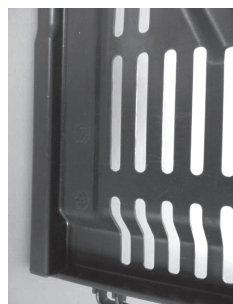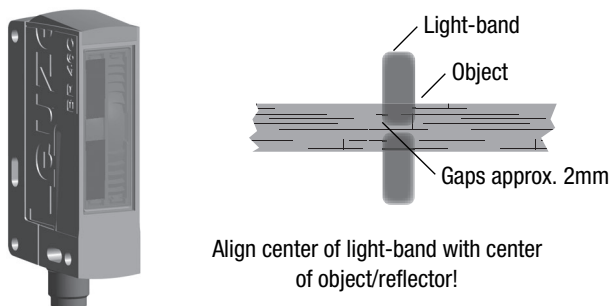
Reliable detection of small objects and/or objects with openings, e.g. transport containers, small parts.
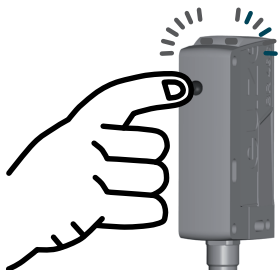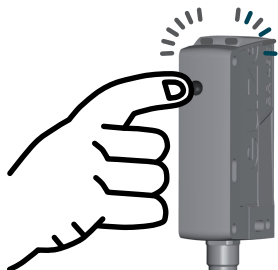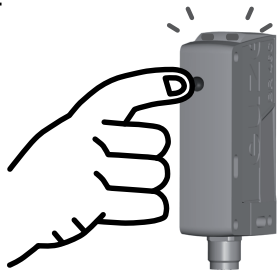
Teach procedure for sensor

> **Note**
>
> It is essential to teach the sensor before it is used for the first time!
> The sensor is factory-set to the maximum operating range.
>
> Before starting the teach procedure, align the light-band of the sensor with the center of the object and reflector!
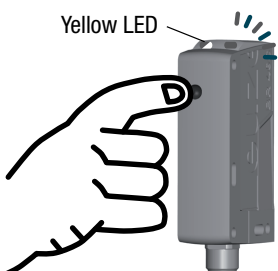
	Teach	
Sensor sensitivity	Standard – Teach 1	Reduced – Teach 2
Switching behavior	Sensor switches when 11 % of light-band is covered by object.	Sensor switches when 14 % of light-band is covered by object.
Typical application	Reliable detection of objects with a diameter of ≥ 2mm	Detection of containers with openings / transparent objects
Setting	**Clear light path to reflector!** **Press teach button** (2 to 7s) until both LEDs (green/yellow) **flash synchronously**. Release teach button – ready.	**Clear light path to reflector!** **Press teach button** (7 to 12s) until both LEDs (green/yellow) **flash alternately**. Release teach button – ready.
Acknowledgment	Teach successful: Both LEDs (green/yellow) remain lit.	
	Teach not successful: Yellow LED flashes. Repeat teach procedure.	

Easy tune – Fine adjustment of sensor sensitivity (switching threshold)

Easy tune allows you to adjust the sensor sensitivity in small steps using the teach button during normal operation.

Increase sensitivity (reduce switching threshold)	**Briefly press teach button (2 to 200ms)**, sensitivity is increased slightly and switching threshold is reduced slightly.	The sensor **confirms button actuation** by **brief illumination (1x flash)** of both LEDs.
Reduce sensitivity (increase switching threshold)	**Press and hold teach button (200 ms to 2s)**, sensitivity is reduced slightly and switching threshold is increased slightly.	

Light/dark switching – Adjustment of switching behavior of switching outputs

Light switching **Dark switching**	**Press teach button** (> 12s) until **green LED flashes**. The **yellow LED** indicates the **current setting of the switching outputs**[1]: **ON** = Output OUT1 **light switching** Output OUT2 **dark switching** **OFF** = Output OUT1 **dark switching** Output OUT2 **light switching** Release teach button – switchover is complete. 1)For factory settings, see part number code	Yellow LED