

**RKR 53**

**Retro-reflective photoelectric sensor for foils**

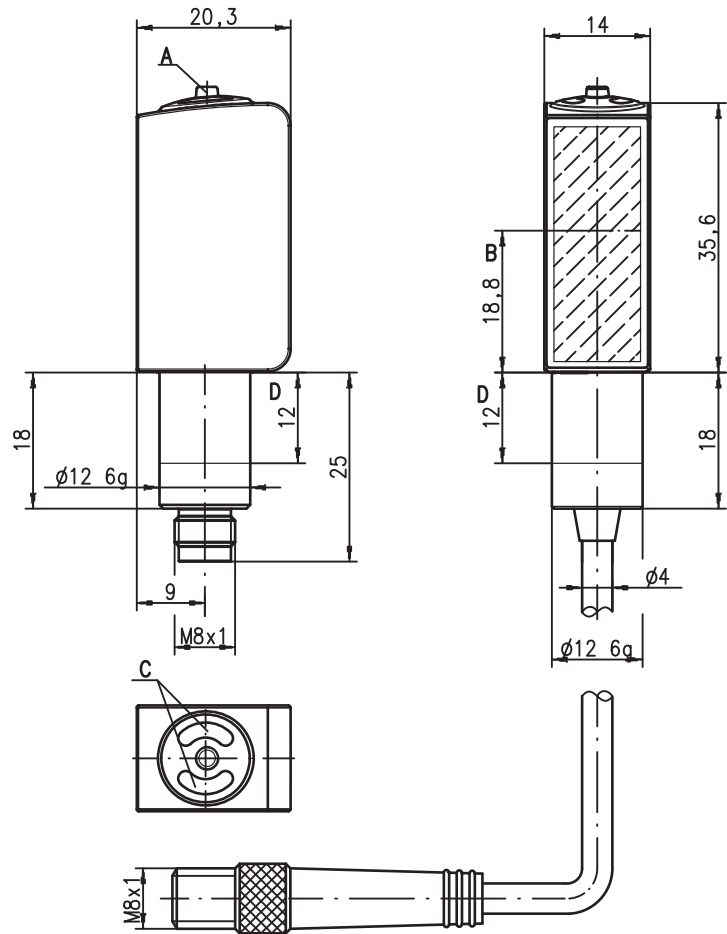
en 03-2010/01 50108252-01



**0 ... 1.8m**  
**1 kHz**  
**T<sub>i</sub>**  
**10 - 30 V DC**  
**stainless steel 316 L**

- Retro-reflective photoelectric sensor, autocollimation optics with visible red light
- Particularly suited for thin, highly transparent foils with thickness < 20 µm
- 316L stainless steel housing in HYGIENE-Design
- Enclosed optics design prevents bacterial carry-overs
- ECOLAB and CleanProof+ tested
- Paperless device identification
- Scratch resistant and non-diffusive plastic front cover
- High switching frequency for detection of fast events
- May also be used with glass reflectors (TG)
- Easy adjustment via lockable teach button or teach input

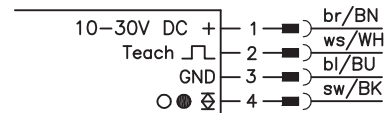
**Dimensioned drawing**



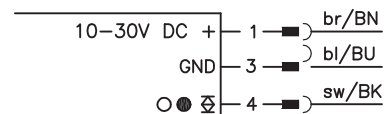
- A** Teach button
- B** Optical axis
- C** Indicator diode
- D** Permissible clamping range

**Electrical connection**

Plug connection, 4-pin (with/without cable)



Plug connection, 3-pin



**Accessories:**

(available separately)

- Cable with M8 or M12 connector (K-D ...)
- Cable for food and beverages
- Reflectors for the foods industry
- Reflectors for the pharmaceutical industry
- Reflective tapes
- Mounting devices

We reserve the right to make changes • DS\_RKR53\_6.42\_en.fm

## Specifications

### Optical data

|  |                           |
|--|---------------------------|
| Typ. op. range limit (TK(S) 100x100) <sup>1)</sup> | 0 ... 1.8m                |
| Operating range <sup>2)</sup>                      | see tables                |
| Light source <sup>3)</sup>                         | LED (modulated light)     |
| Wavelength   | 620nm (visible red light) |

### Timing

|                       |         |
|-----------------------|---------|
| Switching frequency   | 1000Hz  |
| Response time         | 0.5ms   |
| Delay before start-up | ≤ 300ms |

### Electrical data

|                                       |   |
|---------------------------------------|---|
| Operating voltage $U_B$ <sup>4)</sup> | 10 ... 30VDC (incl. residual ripple)  |
| Residual ripple                       | ≤ 15% of $U_B$  |
| Open-circuit current                  | ≤ 15mA  |
| Switching output                      | .../6.42<br>1 push-pull switching output<br>pin 4: PNP light switching, NPN dark switching<br>pin 2: teach input<br>light/dark reversible |
| Function characteristics              | ≥ ( $U_B - 2V$ )/≤ 2V   |
| Signal voltage high/low               | max. 100mA  |
| Output current                        | setting via teach-in  |
| Operating range                       |   |

### Indicators

|            |                 |
|------------|-----------------|
| Green LED  | ready           |
| Yellow LED | light path free |

### Mechanical data

|                                 |  |
|---------------------------------|--|
| Housing                         | AISI 316L stainless steel, DIN X2CrNiMo17132, W.No1.4404                     |
| Housing design                  | HYGIENE-Design   |
| Housing roughness <sup>5)</sup> | Ra ≤ 2.5   |
| Connector                       | AISI 316L stainless steel, DIN X2CrNiMo17132, W.No1.4404                     |
| Optics cover                    | coated plastic (PMMA), scratch resistant and non-diffusive                   |
| Operation                       | plastic (TPV - PE), non-diffusive  |
| Weight                          | with M8 connector: 50g<br>with 200mm cable and M8 connector: 60g             |
| Connection type                 | M8 connector, 4-pin or 3-pin   |
| Fastening                       | 0.2m cable with M8 connector, 4-pin  |
| Max. tightening torque          | via fit (see "Remarks")<br>3 Nm (permissible range, see dimensioned drawing) |

### Environmental data

|   |   |
|---|---|
| Ambient temp. (operation/storage) <sup>6)</sup> | -30°C ... +70°C/-30°C ... +70°C   |
| Protective circuit <sup>7)</sup>                | 2, 3  |
| VDE safety class <sup>8)</sup>                  | III   |
| Protection class                                | IP 67, IP 69K <sup>9)</sup>   |
| Environmentally tested acc. to LED class        | ECOLAB, CleanProof+   |
| Standards applied                               | 1 (acc. to EN 60825-1)  |
| Certifications                                  | IEC 60947-5-2   |
| Chemical resistance                             | UL 508 <sup>4)</sup><br>tested in accordance with ECOLAB and CleanProof+<br>(see remarks) |

### Options

|  |           |
|--|-----------|
| <b>Teach-in input/activation input</b> |           |
| Transmitter active/not active          | ≥ 8V/≤ 2V |
| Activation/disable delay               | ≤ 1ms     |
| Input resistance                       | 30kΩ      |

- 1) Typ. operating range limit: max. attainable range without performance reserve
- 2) Operating range: recommended range with performance reserve
- 3) Average life expectancy 100,000h at an ambient temperature of 25°C
- 4) For UL applications: for use in class 2 circuits according to NEC only
- 5) Typical value for the stainless steel housing
- 6) Operating temperatures of +70°C permissible only briefly (≤ 15min)
- 7) 2=polarity reversal protection, 3=short-circuit protection for all transistor outputs
- 8) Rating voltage 50V
- 9) Only with internal tube mounting of the M8 connector

## Approved purpose

The photoelectric sensors are optical electronic sensors for optical, contactless detection of objects.

This product may only be used by qualified personnel and must only be used for the approved purpose. This sensor is not a safety sensor and is not to be used for the protection of persons.

## Tables

| Reflectors in food quality |               | Operating range |
|----------------------------|---------------|-----------------|
| 1                          | TK(S) 100x100 | 0 ... 1.5m      |
| 2                          | TK 40x60      | 0 ... 1.0m      |
| 3                          | MTKS 50x50    | 0 ... 1.0m      |
| 4                          | Tape 6 50x50  | 0 ... 0.5m      |
| 5                          | TK 20x40      | 0 ... 0.5m      |

|   |   |     |     |
|---|---|-----|-----|
| 1 | 0 | 1.5 | 1.8 |
| 2 | 0 | 1   | 1.2 |
| 3 | 0 | 1   | 1.2 |
| 4 | 0 | 0.5 | 0.7 |
| 5 | 0 | 0.5 | 0.6 |

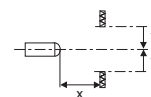
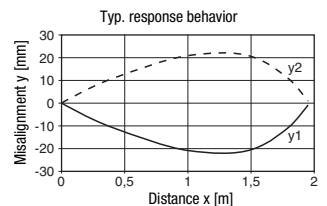
| Pharmaceutical reflectors |                | Operating range |
|---------------------------|----------------|-----------------|
| 1                         | TK(S) 40x60.P  | 0 ... 0.6m      |
| 2                         | TK BR53        | 0 ... 0.4m      |
| 3                         | TK(S) 20x40.P  | 0 ... 0.35m     |
| 4                         | TK(S) 20.P     | 0 ... 0.25m     |
| 5                         | MTK(S) 14x23.P | 0 ... 0.15m     |
| 6                         | TK 10.P        | 0 ... 0.1m      |

|   |   |      |      |
|---|---|------|------|
| 1 | 0 | 0.6  | 0.7  |
| 2 | 0 | 0.4  | 0.5  |
| 3 | 0 | 0.35 | 0.42 |
| 4 | 0 | 0.25 | 0.3  |
| 5 | 0 | 0.15 | 0.18 |
| 6 | 0 | 0.1  | 0.12 |

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

TK ... = adhesive  
 TK(S) ... = screw type  
 MTKS ... = micro triple, screw type

## Diagrams



## Remarks

A list of tested chemicals can be found in the first part of the product description.

Only secure in designated area using set screw. Max. tightening torque 3Nm.

# RKR 53

# Retro-reflective photoelectric sensor for foils

## Order guide

| Selection table    |  | Order code →                        |   |                                       |
|--------------------|--|-------------------------------------|---|---------------------------------------|
| Equipment ↓        |  | RKR 53/6.42-S8<br>Part No. 50107607 | RKR 53/6.42-200-S8<br>Part No. 50105790 | RKR 53/6.42-S8.3<br>Part No. 50107608 |
| Switching output   | 1 x Push-pull switching output                               | ●                                   | ●                                       | ●                                     |
| Switching function | light/dark switching configurable                            | ●                                   | ●                                       | ●                                     |
| Connection         | M8 connector, metal, 4-pin                                   | ●                                   |   |                                       |
|                    | cable 200mm with M8 connector, 4-pin                         |                                     | ●                                       |                                       |
|                    | M8 connector, metal, 3-pin                                   |                                     |   | ●                                     |
| Configuration      | teach-in via button (lockable) and teach input <sup>1)</sup> | ●                                   | ●                                       | ●                                     |
| Indicators         | green LED: ready   | ●                                   | ●                                       | ●                                     |
|                    | yellow LED: switching output                                 | ●                                   | ●                                       | ●                                     |
| Detection          | foils < 20µm thick   | ●                                   | ●                                       | ●                                     |
|                    | foil > 20µm thick  | ●                                   | ●                                       | ●                                     |
|                    | bottles (PET and glass)                                      | ●                                   | ●                                       | ●                                     |

1) Teach input not present with 3-pin connector

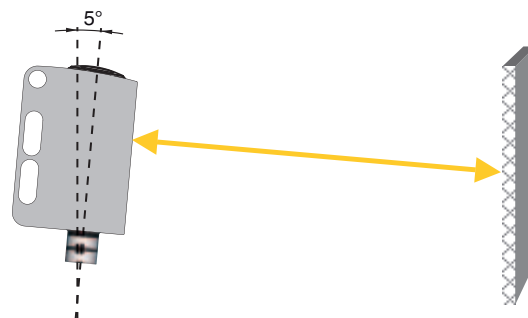
## General information

- The sensor is factory-adjusted for the detection of colored glass.  
Recommendation: teach only if the desired objects are not reliably detected.
- The light spot may not exceed the reflector.
- Preferably use MTKS 50x50 reflectors.
- For reflecting objects, the sensor has to be mounted approx. 5° angular towards the object.

## Sensor adjustment (teach) via teach button



- **Prior to teaching:**  
**Clear the light path to the reflector!**  
The device setting is stored in a fail-safe way. A reconfiguration following voltage interruption or switch-off is thus not required.

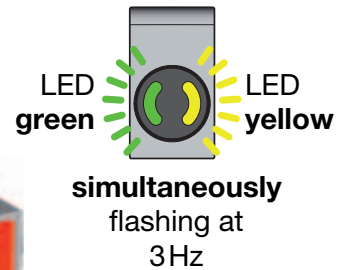
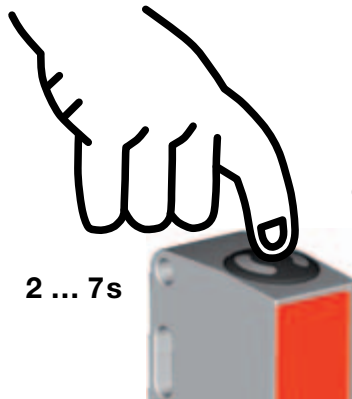


**Standard teaching for average sensor sensitivity (standard bottles)**

- Press teach button until both LEDs flash **simultaneously**.
- Release teach button.
- Ready.



If the receive signal from the reflector is too weak, the sensor indicates the error status by means of fast and simultaneous flashing of the green and yellow LEDs. Please check the alignment, operating range, and soiling and carry out another teaching.

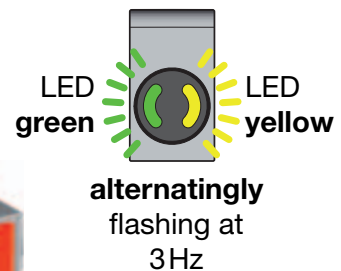
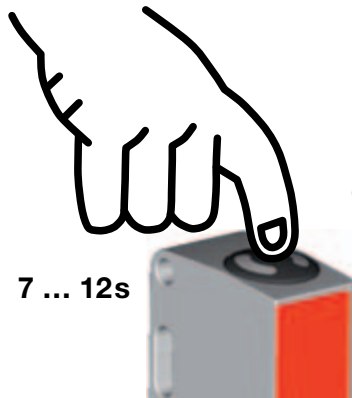


**Teach for increased sensor sensitivity (highly transparent bottles and foils with thickness < 20µm)**

- Press teach button until both LEDs flash **alternatingly**.
- Release teach button.
- Ready.

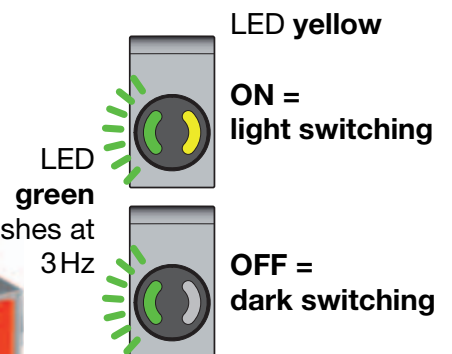
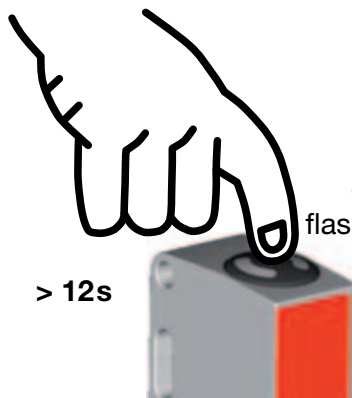


If the receive signal from the reflector is too weak, the sensor indicates the error status by means of fast and simultaneous flashing of the green and yellow LEDs. Please check the alignment, operating range, and soiling and carry out another teaching.



**Adjusting the switching behavior of the switching output – light/dark switching**

- Press teach button until the green LED flashes. The yellow LED displays the current setting of the switching output:  
ON = output switches on light  
OFF = output switches on dark
- Continue to press the teach button in order to change the switching behavior.
- Release teach button.
- Ready.

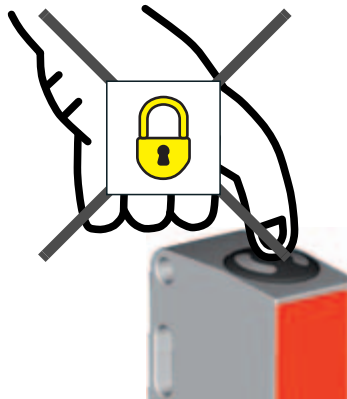


### Locking the teach button via the teach input



A **static high signal** ( $\geq 4\text{ms}$ ) at the teach input locks the teach button on the device 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.



### Sensor adjustment (teach) via teach input



The following description applies to PNP switching logic!

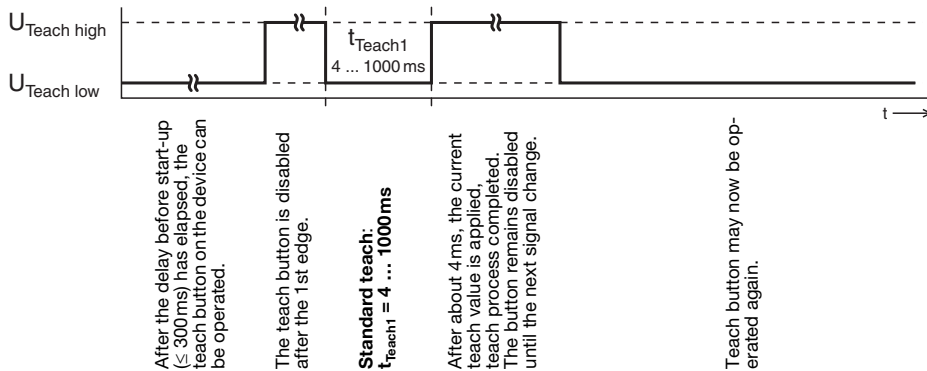
$$U_{\text{Teach low}} \leq 2\text{V}$$

$$U_{\text{Teach high}} \geq (U_B - 2\text{V})$$

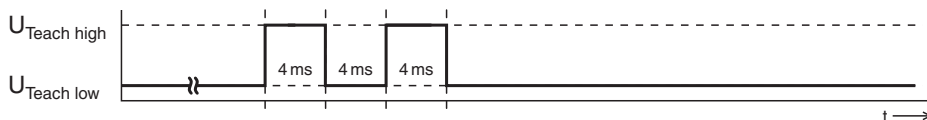
**Prior to teaching: Clear the light path to the reflector!**

The device setting is stored in a fail-safe way. A reconfiguration following voltage interruption or switch-off is thus not required.

#### Standard teaching for average sensor sensitivity (standard bottles)



#### Quick standard teach (standard bottles)

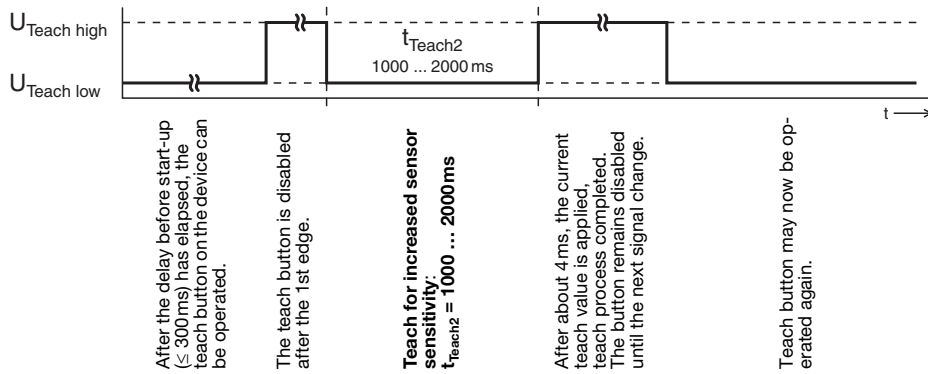


**Shortest teaching duration for standard teaching: approx. 12ms**



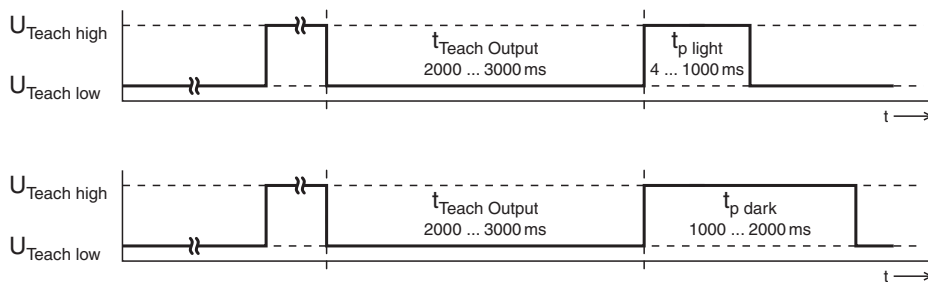
If the receive signal from the reflector is too weak, the sensor indicates the error status by means of fast and simultaneous flashing of the green and yellow LEDs. Please check the alignment, operating range, and soiling and carry out another teaching.

**Teach for increased sensor sensitivity (highly transparent bottles and foils with thickness < 20µm)**



If the receive signal from the reflector is too weak, the sensor indicates the error status by means of fast and simultaneous flashing of the green and yellow LEDs. Please check the alignment, operating range, and soiling and carry out another teaching.

**Adjusting the switching behavior of the switching output – light/dark switching**



After the delay before start-up (≤ 300ms) has elapsed, the teach button on the device can be operated.

The teach button is disabled after the 1st edge.

**Setting the switching behavior of the switching output:**  
 $t_{Teach\ Output} = 2000 \dots 3000ms$

**Switching output switches on light:**  
 $t_{p\ light} = 4 \dots 1000ms$

**Switching output switches on dark:**  
 $t_{p\ dark} = 1000 \dots 2000ms$   
 The button remains disabled until the next signal change.