3 Series

Product description
Contents:

3 Series - overview and advantages
   Special features of Series 3
   Sensor selection table
   Data sheets
Small construction series in robust plastic housing

Operating principles:
- Throughbeam photoelectric sensors
- Retro-reflective photoelectric sensors
- Retro-reflective photoelectric sensors with polarisation filter
- Energetic diffuse reflection light scanners
- Diffuse reflection light scanners with background suppression

Visible red light for fast and easy alignment

High switching frequency up to 2000kHz for detection of fast events

10 … 30VDC voltage with PNP transistor output or push-pull output

- M8/M12 connector for fast installation
- Cable models for installation locations with limited space

Options:
- Warning output
- Activation input
- Teach-in via button (lockable) or teach input
Versatile and easy to integrate
- Small, compact construction
- IP 67 and IP 69K
- Active suppression of extraneous light A²LS
- Simple alignment with visible red light
- Reliable mounting with inset metal sleeves
- Application-specific, special solutions available, e.g. diffuse reflection scanner with elongated light spot

Throughbeam photoelectric sensors
✓ Advantage 1: Visible light spot
✓ Advantage 2: Large operating range
✓ Advantage 3: Suppression of reflector problems
✓ Advantage 4: Very comfortable alignment
✓ Advantage 5: With activation input for muting function

Retro-reflective photoelectric sensors with polarisation filter
✓ Advantage 1: Highest functional reliability through active ambient light suppression A²LS
✓ Advantage 2: High performance reserve
✓ Advantage 3: Special models with autocollimation principle available

Retro-reflective photoelectric sensors for detection of glass, PET, and foils.
✓ Advantage 1: Easy setting via lockable teach button or teach input
✓ Advantage 2: Push-pull output with light/dark switching via teach button
✓ Advantage 3: Retro-reflective photoelectric sensor without polarisation filter may also be used with glass reflectors (TG)

Laser retro-reflective photoelectric sensors
✓ Advantage 1: Polarisated retro-reflective photoelectric sensor with autocollimation principle
✓ Advantage 2: Laser safety class 1
✓ Advantage 3: High switching frequency for detection of fast events and small parts

Energetic diffuse reflection light scanners
✓ Advantage 1: Simple contrast detection
✓ Advantage 2: Adjustable via potentiometer
✓ Advantage 3: Long scanning range

Diffuse reflection light scanners with background suppression
✓ Advantage 1: Mechanical background suppression
✓ Advantage 2: Very good black/white behaviour
✓ Advantage 3: Application-specific, special solutions available, e.g. diffuse reflection scanner with elongated light spot
<table>
<thead>
<tr>
<th>Operating principle</th>
<th>Designation</th>
<th>Typ. oper. range limit</th>
<th>Housing</th>
<th>Light source</th>
<th>Operating voltage</th>
<th>Output</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic</td>
<td>10 … 30VDC</td>
<td>PNP transistor</td>
<td></td>
<td>Red light</td>
<td></td>
<td></td>
<td>PNP</td>
</tr>
<tr>
<td>Plastic</td>
<td>10 … 30VDC</td>
<td>NPN transistor</td>
<td></td>
<td>Red light</td>
<td></td>
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<td>NPN</td>
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<tr>
<td>Plastic</td>
<td>10 … 30VDC</td>
<td>Push-Pull</td>
<td></td>
<td>Red light, Laser class 1</td>
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<td>Push-Pull</td>
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</table>

<table>
<thead>
<tr>
<th>Designation</th>
<th>Typ. oper. range limit</th>
<th>Housing</th>
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</tr>
</thead>
<tbody>
<tr>
<td>LSR 3/44.8-S8</td>
<td>0 … 8500mm</td>
<td>Plastic</td>
<td>Red light</td>
<td>10 … 30VDC</td>
<td>PNP transistor</td>
<td>1000Hz</td>
</tr>
<tr>
<td>LSR 3/44.8</td>
<td>0 … 8500mm</td>
<td>Plastic</td>
<td>Red light</td>
<td>10 … 30VDC</td>
<td>PNP transistor</td>
<td>1000Hz</td>
</tr>
<tr>
<td>ILSR 3/4.8-S8</td>
<td>0 … 8500mm</td>
<td>Plastic</td>
<td>Red light</td>
<td>10 … 30VDC</td>
<td>PNP transistor</td>
<td>1000Hz</td>
</tr>
<tr>
<td>LSR 3/44.8, 5000</td>
<td>0 … 8500mm</td>
<td>Plastic</td>
<td>Red light</td>
<td>10 … 30VDC</td>
<td>PNP transistor</td>
<td>1000Hz</td>
</tr>
<tr>
<td>LSR 3/22.8-S8</td>
<td>0 … 8500mm</td>
<td>Plastic</td>
<td>Red light</td>
<td>10 … 30VDC</td>
<td>PNP transistor</td>
<td>1000Hz</td>
</tr>
<tr>
<td>ILSR 3/4.8</td>
<td>0 … 8500mm</td>
<td>Plastic</td>
<td>Red light</td>
<td>10 … 30VDC</td>
<td>PNP transistor</td>
<td>1000Hz</td>
</tr>
<tr>
<td>ILSR 3/4.8, 200-S8</td>
<td>0 … 8500mm</td>
<td>Plastic</td>
<td>Red light</td>
<td>10 … 30VDC</td>
<td>PNP transistor</td>
<td>1000Hz</td>
</tr>
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<td>LSR 3/22.8-S8</td>
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<td>PNP transistor</td>
<td>1000Hz</td>
</tr>
<tr>
<td>ILSR 3/4.8</td>
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<td>1000Hz</td>
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<td>ILSR 3/4.8, 200-S8</td>
<td>0 … 8500mm</td>
<td>Plastic</td>
<td>Red light</td>
<td>10 … 30VDC</td>
<td>PNP transistor</td>
<td>1000Hz</td>
</tr>
</tbody>
</table>

1) Scanning range preset to 65mm
2) Special light spot 3x40mm at 50mm
<table>
<thead>
<tr>
<th>Switching</th>
<th>Connection</th>
<th>Options</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light switching</td>
<td>Dark switching</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cable</td>
<td>None</td>
<td>7</td>
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<tr>
<td></td>
<td>M8 connector</td>
<td>None</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Cable with M8 connector</td>
<td>None</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Cable with M12 connector</td>
<td>None</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Warning output</td>
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</tr>
<tr>
<td></td>
<td>Activation input</td>
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<td>7</td>
</tr>
<tr>
<td></td>
<td>Background suppression</td>
<td>None</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Polarisation filter</td>
<td>None</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Sensitivity adjustment via potentiometer</td>
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<td>7</td>
</tr>
<tr>
<td></td>
<td>Sensitivity adjustment via teach button or teach input</td>
<td>None</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Transparent media</td>
<td>None</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Focussed light beam</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Direct connection to AS-i I/O coupling modules</td>
<td>None</td>
<td>7</td>
</tr>
</tbody>
</table>

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Leuze electronic
Throughbeam photoelectric sensors

- Throughbeam photoelectric sensor with high performance reserve in red light
- Small construction with robust plastic housing, protection class IP 67/IP 69K for industrial application
- High switching frequency for detection of fast events
- Complementary switching outputs for light/dark switching or as a control function
- Warning output autoControl for increased availability

8.5m

Accessories:
(available separately • see page 46)
- Mounting systems (BT 3…)
- M8 connectors (D M8A…)
- Ready-made cables (K-D …)

Dimensioned drawing

Electrical connection

**LSR 3**

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>DC Voltage</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSSR 3.8–S8</td>
<td>10–30V DC</td>
<td>+ br/BN</td>
</tr>
<tr>
<td>LSSR 3.8, 5000</td>
<td>10–30V DC</td>
<td>+ br/BN</td>
</tr>
</tbody>
</table>

**ILSR 3/4**

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>DC Voltage</th>
<th>Signal</th>
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</thead>
<tbody>
<tr>
<td>ILSR 3/4 10–30V DC</td>
<td>+ br/BN</td>
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</tr>
<tr>
<td>ILSR 3/4, 5000</td>
<td>10–30V DC</td>
<td>+ br/BN</td>
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**LSER 3/44**

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>DC Voltage</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>LSER 3/44–S8</td>
<td>10–30V DC</td>
<td>+ br/BN</td>
</tr>
<tr>
<td>LSER 3/44, 5000</td>
<td>10–30V DC</td>
<td>+ br/BN</td>
</tr>
<tr>
<td>LSER 3/22–S8</td>
<td>10–30V DC</td>
<td>+ br/BN</td>
</tr>
</tbody>
</table>

**Specifications and description**
Specifications

Optical data
- Typ. operating range limit: max. attainable range without performance reserve
  \[0 \cdots 8.5 \text{ m}\]
- Operating range: recommended range with performance reserve
  \[0 \cdots 6 \text{ m}\]
- Light source: LED (modulated light)
  Wave length: 660 nm (visible red light)

Timing
- Switching frequency: 1000 Hz
- Response time: 0.5 ms
- Delay before start-up: \(\leq 100 \text{ ms}\)

Electrical data
- Operating voltage: \(U_B = 10 \cdots 30 \text{ VDC} \) (incl. residual ripple)
- Residual ripple: \(\leq 15\% \) of \(U_B\)
- Bias current: \(\leq 25 \text{ mA}\)
- Switching output: 2 transistor outputs, complementary
  - Function characteristics: light/dark switching
  - Signal voltage high/low: \(\geq (U_B-2V) / \leq 2V\)
- Output current: max. 100 mA
- Sensitivity: adjustable with multiturn potentiometer

Indicators
- LED yellow: light path free
- LED yellow flashing: light path free, no performance reserve

Mechanical data
- Housing: plastic
- Optics cover: plastic (PMMA)
- Weight: 20 g
- Connection type: M8 connector (4-pin) or PUR cable 2m and 5m (cross section 4x0.2 mm²)

Environmental data
- Ambient temp. (operation/storage): \(-25°C \cdots +55°C / -40°C \cdots +70°C\)
- Protective circuit: 2, 3
  - VDE safety class: II, all-insulated
  - Protection class: IP 67, IP 69K
- LED class: 1 (acc. to EN 60825-1)
- Standards applied: IEC 60947-5-2

Options
- Activation input: activ/transmitter active/not active
  - \(\geq 8\text{V} / \leq 2\text{V} \) or not connected
- Activation/disable delay: \(\leq 1\text{ ms}\)
- Input resistance: \(4.7\text{k} \pm 10\%\)
- Warning output: autoControl
  - PNP transistor, counting principle
  - Signal voltage high/low: \(\geq (U_B-2V) / \leq 2V\)
  - Output current: max. 100 mA

Order guide

Selection table

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Order code</th>
<th>LSR 3/4.8</th>
<th>LSR 3/22.8</th>
<th>LSR 3/4.8, 5000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching output</td>
<td>2xPNP transistor (Re)</td>
<td>LSR 3448, Part No. 500 30996</td>
<td>LSR 32284-S8, Part No. 500 30995</td>
<td>LSR 3448, Part No. 500 30996, Part No. 500 30995</td>
</tr>
<tr>
<td></td>
<td>2xPNP transistor (Re)</td>
<td>LSR 3448, Part No. 500 33654</td>
<td>LSR 32284-S8, Part No. 500 33653</td>
<td>LSR 3448, Part No. 500 33654, Part No. 500 33653</td>
</tr>
<tr>
<td></td>
<td>1xPNP transistor (Re)</td>
<td>LSR 3448, Part No. 500 30996</td>
<td>LSR 32284-S8, Part No. 500 30995</td>
<td>LSR 3448, Part No. 500 30996, Part No. 500 30995</td>
</tr>
<tr>
<td></td>
<td>light/dark switching</td>
<td>LSR 3448, Part No. 500 30996</td>
<td>LSR 32284-S8, Part No. 500 30995</td>
<td>LSR 3448, Part No. 500 30996, Part No. 500 30995</td>
</tr>
<tr>
<td></td>
<td>light switching</td>
<td>LSR 3448, Part No. 500 30996</td>
<td>LSR 32284-S8, Part No. 500 30995</td>
<td>LSR 3448, Part No. 500 30996, Part No. 500 30995</td>
</tr>
<tr>
<td>Connection</td>
<td>M8 connector</td>
<td>LSR 3448, Part No. 500 30996</td>
<td>LSR 32284-S8, Part No. 500 30995</td>
<td>LSR 3448, Part No. 500 30996, Part No. 500 30995</td>
</tr>
<tr>
<td></td>
<td>cable 5000 mm</td>
<td>LSR 3448, Part No. 500 30996</td>
<td>LSR 32284-S8, Part No. 500 30995</td>
<td>LSR 3448, Part No. 500 30996, Part No. 500 30995</td>
</tr>
<tr>
<td></td>
<td>cable 2000 mm</td>
<td>LSR 3448, Part No. 500 30996</td>
<td>LSR 32284-S8, Part No. 500 30995</td>
<td>LSR 3448, Part No. 500 30996, Part No. 500 30995</td>
</tr>
<tr>
<td>Features</td>
<td>activation input (Tr)</td>
<td>LSR 3448, Part No. 500 30996</td>
<td>LSR 32284-S8, Part No. 500 30995</td>
<td>LSR 3448, Part No. 500 30996, Part No. 500 30995</td>
</tr>
<tr>
<td></td>
<td>warning output</td>
<td>LSR 3448, Part No. 500 30996</td>
<td>LSR 32284-S8, Part No. 500 30995</td>
<td>LSR 3448, Part No. 500 30996, Part No. 500 30995</td>
</tr>
</tbody>
</table>

Remarks

[1] LSR = Pair consisting of LSSR = Transmitter LSER = Receiver

Tables

<table>
<thead>
<tr>
<th>Operating range [m]</th>
<th>Typ. operating range limit [m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ... 8.5 m</td>
<td>0 ... 6 m</td>
</tr>
</tbody>
</table>

Diagrams

Typ. response behaviour

![Typ. response behaviour diagram](image-url)

0605
Throughbeam photoelectric sensor with high performance reserve in red light

- Small construction with robust plastic housing, protection class IP 67/IP 69K for industrial application
- High switching frequency for detection of fast events
- Warning output autoControl for increased availability

**Accessories:**

(available separately • see page 46)

- Mounting systems (BT 3…)
- M8 connectors (D M8A…)
- Ready-made cables (K-D …)

**Electrical connection**

<table>
<thead>
<tr>
<th>LSSR 3.8,200-S8</th>
<th>ILSER 3/4,200-S8</th>
</tr>
</thead>
<tbody>
<tr>
<td>10–30V DC</td>
<td>10–30V DC</td>
</tr>
<tr>
<td>NC</td>
<td>1</td>
</tr>
<tr>
<td>GND</td>
<td>2</td>
</tr>
<tr>
<td>activ</td>
<td>3</td>
</tr>
<tr>
<td>warn</td>
<td>2</td>
</tr>
<tr>
<td>GND</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4</td>
</tr>
</tbody>
</table>
Specifications

Optical data
Typ. operating range limit 1) 0 ... 8.5 m
Operating range 2) 0 ... 6 m
Light source LED (modulated light)
Wavelength 660nm (visible red light)

Timing
Switching frequency 1000Hz
Response time 0.5ms
Delay before start-up ≤ 100ms

Electrical data
Operating voltage $U_B$ 10 ... 30VDC (incl. residual ripple)
Residual ripple ≤ 15% of $U_B$
Bias current ≤ 25mA
Switching output 1 PNP transistor output
Function characteristics light switching
Signal voltage high/low > $(U_B - 2V)/2V$
Output current max. 100mA
Sensitivity adjustable with multturn potentiometer

Indicators
LED yellow light path free
LED yellow flashing light path free, no performance reserve

Mechanical data
Housing plastic
Optics cover plastic (PMMA)
Weight 20g
Connection type M8 connector (4-pin) with 200mm cable tail

Environmental data
Ambient temp. (operation/storage) -25°C … +55°C/-40°C … +70°C
Protective circuit 3) 2=polarity reversal protection, 3=short-circuit protection for all outputs
VDE safety class 4) II, all-insulated
Protection class IP 67, IP 69K 5)
LED class 1 (acc. to EN 60825-1)
Standards applied IEC 60947-5-2

Options
Activation input active/transmitter active/not active ≥ 8V≤ 2V or not connected
Activation/disable delay ≤ 1ms
Input resistance 4.7kΩ ± 10%
Warning output autoControl warn PNP transistor, counting principle
Signal voltage high/low ≥ $(U_B - 2V)/2V$
Output current max. 100mA

1) Typ. operating range limit: max. attainable range without performance reserve
2) Operating range: recommended range with performance reserve
3) 2=polarity reversal protection, 3=short-circuit protection for all outputs
4) Rating voltage 250VAC
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

Order guide

Transmitter and receiver

Designation ILSR 3/4.8, 200-S8
Part No. 500 41887

Transmitter with 200mm cable and M8 connector

Designation LSSR 3.8,200-S8
Part No. 500 41887

Receiver with 200mm cable and M8 connector

Designation ILSER 3/4,200-S8
Part No. 500 41887

Remarks
**PRK 3B**

Retro-reflective photoelectric sensors with polarisation filter

- Polarised retro-reflective photoelectric sensor with visible red light
- High performance reserve
- Small and compact construction with robust plastic housing, protection class IP 67/IP 69K for industrial application
- Fast alignment through brightVision®
- A²LS - Active Ambient Light Suppression
- Push-pull switching outputs
- High switching frequency for detection of fast events
- Warning output for increased availability

**0.02 ... 6m**

- DC 10 - 30 V
- A²LS
- 1 kHz

**Accessories:**
- Mounting systems (BT 3…)
- Cable with M8 or M12 connector (K-D …)
- Reflectors
- Reflective tapes

**Specifications and description**

**Dimensioned drawing**

**Electrical connection**

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PRK 3B, …/4D - 01
PRK 3B/4, …/4D - 01
PRK 3B/6, …/6D, …/66 - 01
Specifications

Optical data
Typ. op. range limit (TK(S) 100x100) \(^1\) 0.02 … 6m
Operating range \(^2\) see tables
Light source \(^3\) LED (modulated light)
Wavelength 620nm (visible red light, polarised)

Timing
Switching frequency 1000Hz
Response time 0.5ms
Delay before start-up \(\leq 300\text{ms}\)

Electrical data
Operating voltage \(U_B\) \(^4\) For UL applications: for use in class 2 circuits according to NEC only
Residual ripple \(\leq 15\% \) of \(U_B\)
Switching output \(^5\) 2 push-pull switching outputs
pin 2: PNP dark switching, NPN light switching
pin 4: PNP light switching, NPN dark switching
1 push-pull switching output
pin 4: PNP light switching, NPN dark switching
1 PNP switching output dark switching
pin 2: not connected
Function characteristics light/dark switching
Signal voltage high/low \(\geq (U_B-2V)/\leq 2V\)
Output current max. 100mA
Sensitivity fixed setting

Indicators
LED green ready
LED yellow light path free
LED yellow flashing light path free, no performance reserve

Mechanical data
Housing plastic (PC-ABS); 1 attachment sleeve, nickel-plated steel
Optics cover plastic (PMMA)
Weight with connector: 10g
with 200mm cable and connector: 20g
with 2m cable: 50g
Connection type cable 2m (cross section 4x0.21mm²), connector M8 metal,
cable 0.2m with connector M8 or M12

Environmental data
Ambient temp. (operation/storage) \(-30^\circ\text{C} … +55^\circ\text{C}/-30^\circ\text{C} … +70^\circ\text{C}\)
VDE safety class \(^6\) II for cable,
III for metal plug
Protection class IP 67, IP 69K
LED class 1 (acc. to EN 60825-1)
Standards applied IEC 60947-5-2
Certifications UL 508 \(^4\)

Options
Warning output autoControl warn PNP transistor, counting principle
Signal voltage high/low \(\geq (U_B-2V)/\leq 2V\)
Output current max. 100mA

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) The push-pull switching outputs must not be connected in parallel
6) Pin 2: unassigned, hence especially suitable for the connection to AS-interface I/O coupling modules
7) 2-polarity reversal protection, 3-shunt-circuit protection for all transistor outputs
8) Rating voltage 50V

Tables

<table>
<thead>
<tr>
<th>Reflectors</th>
<th>Operating range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 TK(S)</td>
<td>100x100 (0.02 … 5.0m)</td>
</tr>
<tr>
<td>2 TK</td>
<td>40x60 (0.02 … 3.0m)</td>
</tr>
<tr>
<td>3 TK</td>
<td>20x40 (0.02 … 1.5m)</td>
</tr>
<tr>
<td>4 Tape 4</td>
<td>50x50 (0.02 … 1.2m)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating range [m]</th>
<th>Typ. operating range limit [m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>TK ... = adhesive</td>
<td>TKS ... = screw type</td>
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</table>

Diagrams

Typ. response behaviour

Typ. performance reserve

Remarks

Mounting system:
## Order guide

### Selection table

<table>
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<tr>
<th>Equipment</th>
<th>Order code</th>
<th>PRK 3B/46</th>
<th>PRK 3B/66-S8</th>
<th>PRK 3B/66-S8.3</th>
<th>PRK 3B/66, 200-S8</th>
<th>PRK 3B/66, 200-S8.3</th>
<th>PRK 3B/66D-S8</th>
<th>PRK 3B/66D-S8.3</th>
<th>PRK 3B/6D-S8</th>
<th>PRK 3B/6D-S8.3</th>
<th>PRK 3B/6D, 200-S8</th>
<th>PRK 3B/6D, 200-S8.3</th>
<th>PRK 3B/6D-S8</th>
<th>PRK 3B/6D-S8.3</th>
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<tbody>
<tr>
<td>Switching output</td>
<td>2 x Push-pull switching output</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td></td>
<td>1 x Push-pull switching output</td>
<td>●</td>
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<tr>
<td></td>
<td>1 x PNP output</td>
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</tr>
<tr>
<td>Switching function</td>
<td>1 PNP light switching and NPN dark switching output</td>
<td>●</td>
<td>●</td>
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<td>●</td>
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<tr>
<td></td>
<td>1 x PNP light switching output</td>
<td>●</td>
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<tr>
<td></td>
<td>1 x PNP dark switching output</td>
<td>●</td>
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<tr>
<td></td>
<td>1 warning output</td>
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</tr>
<tr>
<td>Connection</td>
<td>M8 connector, metal, 3-pin</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td></td>
<td>cable 2000mm</td>
<td>●</td>
<td>●</td>
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<td>cable 200mm with M8 connector, 3-pin</td>
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<tr>
<td></td>
<td>cable 200mm with M8 connector, 4-pin</td>
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<tr>
<td></td>
<td>cable 200mm with M12 connector, 4-pin</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<td>●</td>
</tr>
<tr>
<td></td>
<td>pin 2: not assigned, for connection to coupling modules</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Indicators</td>
<td>green LED: ready</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td></td>
<td>yellow LED: switching output</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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</tr>
</tbody>
</table>
**PRK 3B Economy**  
Retro-reflective photoelectric sensors with polarisation filter

- Polarised retro-reflective photoelectric sensor with visible red light
- High performance reserve
- Small and compact construction with robust plastic housing, protection class IP 67/IP 69K for industrial application
- Fast alignment through brightVision®
- A²LS - Active Ambient Light Suppression
- Push-pull switching output
- High switching frequency for detection of fast events
- Low current consumption

**Specifications and description**

1 kHz

10 - 30 V DC

A²LS

0.02 ... 6 m

**Accessories:**
(available separately • see page 46)
- Mounting systems (BT 3...)
- Cable with M8 or M12 connector (K-D...)
- Reflectors
- Reflective tapes

**Electrical connection**

**Dimensioned drawing**

**We reserve the right to make changes**
Specifications

Optical data

Typ. op. range limit (TK(S) 100x100) 1) 0.02 … 6m

Operating range 2)

Residual ripple ≤ 15% of U_B

Bias current ≤ 10mA

Typ. operating range limit: max. attainable range without performance reserve

Switching output 3)

Pin 4: PNP light switching, NPN dark switching

Pin 2: not connected 4)

Function characteristics

Signal voltage high/low ≥ (U_B-2V)/2V

Output current max. 100mA

Sensitivity fixed setting

Indicators

LED yellow: switching output

LED yellow flashing: light path free, no performance reserve

Mechanical data

Housing plastic (PC-ABS)

Optics cover plastic (PMMA)

Weight (plug/cable) 10g/50g

Connection type cable 2m (cross section 4x0.21mm²), M8 plastic connector

Environmental data

Ambient temp. (operation/storage) -30°C … +55°C / -30°C … +70°C

Protective circuit 7) 2, 3

VDE safety class 8) II

Protection class IP 67, IP 69K

LED class 1 (acc. to EN 60825-1)

Standards applied IEC 60947-5-2

Certifications UL 508 4)

Order guide

Selection table

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Order code</th>
<th>PRK 3B/6.7</th>
<th>PRK 3B/6D.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching output</td>
<td>1 X Push-pull switching output</td>
<td>● ● ● ● ●</td>
<td></td>
</tr>
<tr>
<td>Switching function</td>
<td>1 PNP light switching and NPN dark switching output</td>
<td>● ●</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 PNP dark switching and NPN light switching output</td>
<td>● ●</td>
<td></td>
</tr>
<tr>
<td>Connection</td>
<td>M8 connector, plastic, 4-pin</td>
<td>● ●</td>
<td></td>
</tr>
<tr>
<td></td>
<td>cable 2000mm</td>
<td>● ●</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pin 2: not assigned, for connection to coupling modules</td>
<td>● ● ●</td>
<td></td>
</tr>
<tr>
<td>Indicators</td>
<td>yellow LED: switching output</td>
<td>● ● ●</td>
<td></td>
</tr>
</tbody>
</table>

Tables

<table>
<thead>
<tr>
<th>Reflectors</th>
<th>Operating range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 TK(S)</td>
<td>100x100 0.02 … 5.0m</td>
</tr>
<tr>
<td>2 TK</td>
<td>40x60 0.02 … 3.0m</td>
</tr>
<tr>
<td>3 TK</td>
<td>20x40 0.02 … 1.5m</td>
</tr>
<tr>
<td>4 Tape 4</td>
<td>50x50 0.02 … 1.2m</td>
</tr>
</tbody>
</table>

Diagrams

Typ. response behaviour

Typ. performance reserve

Remarks

Mounting system:

1) Packaging unit: PU = 10 pcs.
PRK 3B
Retro-reflective photoelectric sensors with polarisation filter

- Polarised retro-reflective photoelectric sensor with visible red light
- Small and compact construction with robust plastic housing, protection class IP 67/ IP 69K for industrial application
- A²LS - Active Ambient Light Suppression
- Push-pull output with light/dark switching via teach-in button
- High switching frequency for detection of fast events
- Autocollimation principle
- Easy setting via lockable teach button or teach input

Accessories:
(available separately • see page 46)
- Mounting systems (BT 3…)
- Cable with M8 or M12 connector (K-D …)
- Reflectors
- Reflective tapes

Dimensioned drawing

Electrical connection

Specifications and description
Specifications

Optical data
- Typ. op. range limit (TK(S) 100x100) 1) 0...5 m
- Operating range 2) see tables
- Light source 3) LED (modulated light)
- Wavelength 620nm (visible red light, polarised)

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

Electrical data
- Operating voltage UB 4) 10...30VDC (incl. residual ripple)
- Bias current ≤ 18mA
- Switching output 5) 1 push-pull switching output
  pin 4: PNP light switching, NPN dark switching
  pin 2: teach input
  .../6.22...S8.3 1 push-pull switching output
  pin 4: PNP light switching, NPN dark switching
  pin 2: activation input

Function characteristics
- light/dark reversible
- Signal voltage high/low ≥ (UB - 2V)/2V
- Output current max. 100mA
- Sensitivity setting via teach-in

Indicators
- LED green ready
- LED yellow light path free
- LED yellow flashing light path free, no performance reserve 6)

Mechanical data
- Housing plastic (PC-ABS); 1 attachment sleeve, nickel-plated steel
- Optics cover plastic (PMMA)
- Weight with connector: 10g
- with 200mm cable and connector: 20g
- with 2m cable: 50g
- Connection type cable 2m (cross section 4x0.21mm²), connector M8 metal, cable 0.2m with connector M8 or M12

Environmental data
- Ambient temp. (operation/storage) -30°C ... +55°C / -30°C ... +70°C
- VDE safety class 8) II for cable, III for metal plug
- Protection class 1 (acc. to EN 60825-1)
- LED class IEC 60947-5-2
- Standards applied IEC 60947-5-2
- Certifications UL 508 4)

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

Tables

<table>
<thead>
<tr>
<th>Reflectors</th>
<th>Operating range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 TK(S)</td>
<td>100x100 0...4.0m</td>
</tr>
<tr>
<td>2 TK</td>
<td>40x60 0...3.0m</td>
</tr>
<tr>
<td>3 TK</td>
<td>20x40 0...1.3m</td>
</tr>
<tr>
<td>4 Tape</td>
<td>50x50 0...0.7m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating range [m]</th>
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<tbody>
<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
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<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
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<tr>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Typ. operating range [m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>TK ... = adhesive TKS ... = screw type</td>
</tr>
</tbody>
</table>

Diagrams

Typ. response behaviour

Performance reserve

Remarks

Mounting system:

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) The push-pull switching outputs must not be connected in parallel
6) Display "no performance reserve" as yellow flashing LED is only available in standard teach setting
7) 2=polarity reversal protection, 3=short-circuit protection for all transistor outputs
8) Rating voltage 50V
# Order guide

## Selection table

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switching output</td>
<td>1 x Push-pull switching output</td>
</tr>
<tr>
<td></td>
<td>1 x PNP output</td>
</tr>
<tr>
<td>Switching function</td>
<td>light/dark switching configurable</td>
</tr>
<tr>
<td></td>
<td>light switching</td>
</tr>
<tr>
<td>Connection</td>
<td>M8 connector, metal, 3-pin</td>
</tr>
<tr>
<td></td>
<td>M8 connector, metal, 4-pin</td>
</tr>
<tr>
<td></td>
<td>cable 2000mm</td>
</tr>
<tr>
<td></td>
<td>cable 200mm with M8 connector, 3-pin</td>
</tr>
<tr>
<td></td>
<td>cable 200mm with M8 connector, 4-pin</td>
</tr>
<tr>
<td></td>
<td>cable 200mm with M12 connector, 4-pin</td>
</tr>
<tr>
<td>Configuration</td>
<td>teach-in via button (lockable) and teach input</td>
</tr>
<tr>
<td></td>
<td>teach-in via button</td>
</tr>
<tr>
<td>Options</td>
<td>activation input</td>
</tr>
<tr>
<td>Indicators</td>
<td>LED green: ready + teach sequence</td>
</tr>
<tr>
<td></td>
<td>yellow LED: switching output</td>
</tr>
</tbody>
</table>

## Sensor adjustment (teach) via teach button

- The sensor is factory-adjusted for maximum operating range. Recommendation: teach only if the desired objects are not reliably detected.
- **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

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

After the standard teaching, the sensor switches when half of the light beam is covered by the object.

LED green: 2...7s simultaneously flashing at 3Hz

LED yellow: switching output
**Teaching for increased sensor sensitivity**

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

After the teaching for increased sensor sensitivity, the sensor switches when about 18% of the light beam are covered by the object.

**Teaching for maximum operating range (factory setting at delivery)**

- Prior to teaching:
  - **Cover** the light path to the reflector!
- Procedure as for standard teaching.

**Adjusting the switching behaviour 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 behaviour.
- Release teach button.
- Ready.
Locking the teach button via the teach input

A static high signal (≥ 4ms) 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!

Before 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**

After the standard teaching, the sensor switches when half of the light beam is covered by the object.

**Quick standard teach**

After the standard teaching, the sensor switches when half of the light beam is covered by the object.

shortest teaching duration for standard teaching: approx. 12ms
Teaching for increased sensor sensitivity

After the teaching for increased sensor sensitivity, the sensor switches when about 18% of the light beam are covered by the object.

Adjusting the switching behaviour of the switching output – light/dark switching

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

After about 4 ms, the current teach value is applied. The teach button is disabled until the next signal change.

The teach button may now be operated again.

LED green flashes at 3Hz

ON = light switching
OFF = dark switching
RKR 3B
Retro-reflective photoelectric sensor

- Retro-reflective photoelectric sensor with visible red laser light and autocollimation principle
- Small and compact construction with robust plastic housing, protection class IP 67/69K for industrial application
- Low current consumption
- Push-pull output with light/dark switching via teach-in button
- High switching frequency for detection of fast events
- Specifically for transparent media (glass, PET, foils)
- Easy setting via lockable teach button or teach input
- May also be used with glass reflectors (TG)

Accessories:
- Mounting systems (BT 3…)
- Cable with M8 or M12 connector (K-D …)
- Reflectors
- Reflective tapes

Electrical connection

RKR 3B/6.42 – 58
RKR 3B/6.42,200–58
RKR 3B/6.42,200–512

10–30V DC +
Teach /L
GND
1
2
3
4

br/BN
ws/WH
bi/BU
sw/BK

RKR 3B/4.48 – 58
RKR 3B/6.42 – 58 .3
RKR 3B/6.42,200 – 58 .3

10–30V DC +
activ
GND
1
2
3
4

br/BN
ws/WH
bi/BU
sw/BK

Dimensioned drawing

0 … 1.8 m

1 kHz

10 – 30 V
DC

17.4
14.2
7
6.5
5.2
3.2
50

19.5 C
39.7

A
B
C
D
E

A  Indicator diode green
B  Indicator diode yellow
C  Optical axis
D  Teach button
E  Attachment sleeve

Specifications and description
Specifications

Optical data
Typ. op. range limit (TK(S) 100x100) 1) 0 ... 1.8 m
Operating range 2) see tables
Light source 3) 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 $U_B$ 4) 10 ... 30VDC (incl. residual ripple)
Residual ripple ≤ 15% of $U_B$
Bias current ≤ 15mA
Switching output 5) …/6.42 1 push-pull switching output
pin 4: PNP light switching, NPN dark switching
pin 2: teach input
…/6.42...S8.3 1 push-pull switching output
pin 4: PNP light switching, NPN dark switching
pin 2: activation input
…/4.48 1 PNP switching output, light switching
pin 2: activation input

Function characteristics
light/dark reversible
Signal voltage high/low ≥ $(U_B-2V)$/≤ 2V
Output current max. 100mA
Sensitivity setting via teach-in

Indicators
LED green ready
LED yellow light path free

Mechanical data
Housing plastic (PC-ABS), 1 attachment sleeve, nickel-plated steel
Optics cover plastic (PMMA)
Weight with connector: 10g
with 200mm cable and connector: 20g
with 2m cable: 50g
Connection type cable 2m (cross section 4x0.20mm²), connector M8 metal,
cable 2m with connector M8 or M12

Environmental data
Ambient temp. (operation/storage) -30°C ... +55°C/-30°C ... +70°C
Protective circuit 6) II for cable,
III for metal plug
VDE safety class 7) II for cable,
III for metal plug
Protection class IP 67, IP 69K
LED class 1 (acc. to EN 60825-1)
Standards applied IEC 60947-5-2
Certifications UL 508 4)

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

Remarks
Mounting system:

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) The push-pull switching outputs must not be connected in parallel
6) 2-polarity reversal protection, 3=short-circuit protection for all transistor outputs
7) Rating voltage 50V

Tables

<table>
<thead>
<tr>
<th>Reflector</th>
<th>Operating range [m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 TK(S) 100x100</td>
<td>0 ... 1.5m</td>
</tr>
<tr>
<td>2 TK 40x60</td>
<td>0 ... 1.0m</td>
</tr>
<tr>
<td>3 MTKS 50x50</td>
<td>0 ... 1.0m</td>
</tr>
<tr>
<td>4 TK 20x40</td>
<td>0 ... 0.5m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating range [m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 0</td>
</tr>
<tr>
<td>2 0</td>
</tr>
<tr>
<td>3 0</td>
</tr>
<tr>
<td>4 0</td>
</tr>
</tbody>
</table>

Diagrams

Typ. response behaviour

Remarks

- Packaging unit: PU = 10 pcs.
**Order guide**

**Selection table**

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Order code</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Switching output</strong></td>
<td>RKR 3B/42, 200-S12&lt;br&gt;Part No. 501 04704&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;Part No. 501 04703&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;Part No. 501 04702&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;on request&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;on request&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;on request</td>
</tr>
<tr>
<td>1 x Push-pull switching output</td>
<td>● ● ● ● ● ●</td>
</tr>
<tr>
<td>1 x PNP output</td>
<td>●</td>
</tr>
<tr>
<td><strong>Switching function</strong></td>
<td>RKR 3B/42, 200-S12&lt;br&gt;Part No. 501 04704&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;Part No. 501 04703&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;Part No. 501 04702&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;on request&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;on request&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;on request</td>
</tr>
<tr>
<td>light/dark switching configurable</td>
<td>● ● ● ● ● ●</td>
</tr>
<tr>
<td>light switching</td>
<td>●</td>
</tr>
<tr>
<td><strong>Connection</strong></td>
<td>RKR 3B/42, 200-S12&lt;br&gt;Part No. 501 04704&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;Part No. 501 04703&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;Part No. 501 04702&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;on request&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;on request&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;on request</td>
</tr>
<tr>
<td>M8 connector, metal, 3-pin</td>
<td>● ● ● ● ● ●</td>
</tr>
<tr>
<td>M8 connector, metal, 4-pin</td>
<td>●</td>
</tr>
<tr>
<td>cable 2000mm</td>
<td>●</td>
</tr>
<tr>
<td>cable 200mm with M8 connector, 3-pin</td>
<td>●</td>
</tr>
<tr>
<td>cable 200mm with M8 connector, 4-pin</td>
<td>●</td>
</tr>
<tr>
<td>cable 200mm with M12 connector, 4-pin</td>
<td>●</td>
</tr>
<tr>
<td><strong>Configuration</strong></td>
<td>RKR 3B/42, 200-S12&lt;br&gt;Part No. 501 04704&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;Part No. 501 04703&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;Part No. 501 04702&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;on request&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;on request&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;on request</td>
</tr>
<tr>
<td>teach-in via button (lockable) and teach input</td>
<td>● ● ● ● ● ●</td>
</tr>
<tr>
<td>teach-in via button (lockable)</td>
<td>●</td>
</tr>
<tr>
<td><strong>Options</strong></td>
<td>RKR 3B/42, 200-S12&lt;br&gt;Part No. 501 04704&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;Part No. 501 04703&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;Part No. 501 04702&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;on request&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;on request&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;on request</td>
</tr>
<tr>
<td>activation input</td>
<td>●</td>
</tr>
<tr>
<td><strong>Indicators</strong></td>
<td>RKR 3B/42, 200-S12&lt;br&gt;Part No. 501 04704&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;Part No. 501 04703&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;Part No. 501 04702&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;on request&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;on request&lt;br&gt;RKR 3B/42, 200-S8&lt;br&gt;on request</td>
</tr>
<tr>
<td>green LED: ready</td>
<td>● ● ● ● ● ●</td>
</tr>
<tr>
<td>yellow LED: switching output</td>
<td>● ● ● ● ● ●</td>
</tr>
</tbody>
</table>

**General information**

- The sensor is factory-adjusted for the detection of coloured 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 (coloured glass)

- 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.

Teaching for increased sensor sensitivity (clear glass, PET, foils)

- Press teach button until both LEDs flash alternately.
- 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 behaviour 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 behaviour.
- Release teach button.
- Ready.
Locking the teach button via the teach input

A static high signal (≥ 4ms) 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!

**UTeach low** ≤ 2V

**UTeach high** ≥ (UB-2V)

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 (coloured glass)

<table>
<thead>
<tr>
<th>UTeach high</th>
<th>UTeach low</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

Standard teaching:

After about 4ms, the current teaching process is completed, and the button remains disabled until the next signal change.

Teach button may now be operated again.

**Quick standard teach**

<table>
<thead>
<tr>
<th>UTeach high</th>
<th>UTeach low</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

shortest teaching duration for standard teaching:
approx. 12ms
Teaching for increased sensor sensitivity (clear glass, PET, foils)

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 behaviour of the switching output – light/dark switching

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

The teach button is disabled after the 1st edge.

The current teach value is applied, teach process completed. The button remains disabled until the next signal change.

LED green flashes at 3Hz

ON = light switching

OFF = dark switching

LED yellow
PRKL 3B  Laser retro-reflective photoelectric sensor with polarisation filter

- Polarised retro-reflective photoelectric sensor with autocollimation principle
- Small and compact construction with robust plastic housing, protection class IP 67/IP 69K for industrial application
- Push-pull output with light/dark switching via teach-in button
- High switching frequency for detection of fast events and small parts
- Easy setting via lockable teach button or teach input
- Laser safety class 1

Accessories:
(available separately • see page 46)
- Mounting systems (BT 3…)
- Cable with M8 or M12 connector (K-D …)
- Reflectors
- Reflective tapes

0 ... 3 m
10 - 30 V DC
2 kHz

Specifications and description

Dimensioned drawing

Electrical connection

| PRKL 3B/4.28–S8  | PRKL 3B/6.22–S8  | PRKL 3B/6.22,200–S8  | PRKL 3B/4.28–S8  |
| 10–30V DC  | + 1  | br/BN  | + 1  | br/BN  |
| Teach  | + 2  | ws/WH  | + 2  | ws/WH  |
| GND  | + 3  | bi/BU  | + 3  | bi/BU  |
| 10–30V DC  | + 4  | sw/BK  | + 4  | sw/BK  |

UL
US
C
LISTED

IEC 60947...
IEC 60947...

IP 69K
IP 67

PRKL 3B/6.22

We reserve the right to make changes.
PRKL 3B/6.22 – 01
PRKL 3B/4.28 – 01
Specifications

Optical data
- Typ. op. range limit (MTKS 50 x 50) 1) 0 ... 3 m
- Operating range 2) see tables
- Light beam characteristic collimated
- Light spot diameter approx. 2 mm at light beam gate
- Light source 3) Laser (pulsed)
- Wavelength 655nm (visible red light, polarised)
- Max. output power 0.25mW
- Pulse duration ≤ 3 µs

Timing
- Switching frequency 2000 Hz
- Response time 0.25 ms
- Delay before start-up ≤ 300 ms

Electrical data
- Operating voltage U_B 4) 10 ... 30VDC (incl. residual ripple)
- Residual ripple ≤ 15 % of U_B
- Bias current ≤ 15mA
-Switching output 5) .../6.22 1 push-pull switching output
  pin 4: PNP light switching, NPN dark switching
  pin 2: teach input
- .../6.22.../S8.3 1 push-pull switching output
  pin 4: PNP light switching, NPN dark switching
  pin 2: activation input
- Function characteristics light/dark reversible
- Signal voltage high/low ≥ (U_B - 2V)/≤ 2V
- Output current max. 100mA
- Sensitivity setting via teach-in

Indicators
- LED green ready
- LED yellow light path free
- LED yellow flashing light path free, no performance reserve 6)

Mechanical data
- Housing plastic (PC-ABS); 1 attachment sleeve, nickel-plated steel
- Optics cover plastic (PMMA)
- Weight with connector: 10g
  with 200mm cable and connector: 20g
  with 2m cable: 50g
- Connection type cable 2m (cross section 3x0.20mm²),
  connector M8 metal,
  cable 2m with connector M8 or M12

Environmental data
- Ambient temp. (operation/storage) -10°C ... +40°C/-30°C ... +70°C
- Protective circuit 7) 2, 3
- VDE safety class 8) II for cable,
  III for metal plug
- Protection class IP 67, IP 69K
- Laser class 1 (acc. to EN 60825-1)
- Standards applied IEC 60947-5-2
- Certifications CDRH 21 CFR 1040 9), UL 508 4)

Options
- Teach-in input/activation input
  Transmitter active/not active ≥ 8V/≤ 2V
  Activation/disable delay ≤ 1 ms
  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 50'000h at an ambient temperature of 25°C
4) For UL applications: for use in class 2 circuits according to NEC only
5) The push-pull switching outputs must not be connected in parallel
6) Display "no performance reserve" as yellow flashing LED is only available in standard teach setting
7) 2=polarity reversal protection, 3=short-circuit protection for all transistor outputs
8) For UL applications: for use in class 2 circuits according to NEC only
9) Applied for

<table>
<thead>
<tr>
<th>Reflector</th>
<th>Operating range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 MTKS</td>
<td>50x50 0 ... 2.0m</td>
</tr>
<tr>
<td>2 MTKS</td>
<td>15x30 0 ... 1.6m</td>
</tr>
<tr>
<td>3 MTKS</td>
<td>20x40.1 0 ... 1.0m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MTKS</th>
<th>Operating range [m]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.0</td>
</tr>
<tr>
<td>2</td>
<td>1.6</td>
</tr>
<tr>
<td>3</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Remarks

Mounting system:

1) = BT 3
   (Part No. 500 60511)
2) = BT 3.1 1)
   (Part No. 501 05585)
3) = BT 3B
   (Part No. 501 05546)

1) Packaging unit: PU = 10 pcs.
PRKL 3B Laser retro-reflective photoelectric sensor with polarisation filter

Order guide

Selection table

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Order code</th>
<th>PRKL 3B/4.28</th>
<th>PRKL 3B/6.22-S8.3</th>
<th>PRKL 3B/6.22-S8</th>
<th>PRKL 3B/6.22-S8 on request</th>
<th>PRKL 3B/6.22-S12</th>
<th>PRKL 3B/6.22-S12 on request</th>
<th>PRKL 3B/6.22 on request</th>
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</thead>
<tbody>
<tr>
<td>Switching output</td>
<td>1 x Push-pull switching output</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>1 x PNP output</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Switching function</td>
<td>light/dark switching configurable</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>light switching</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Connection</td>
<td>M8 connector, metal, 3-pin</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>M8 connector, metal, 4-pin</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td></td>
<td>cable 2000mm</td>
<td>●</td>
<td>●</td>
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<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>cable 200mm with M8 connector, 3-pin</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>cable 200mm with M8 connector, 4-pin</td>
<td>●</td>
<td>●</td>
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<td>●</td>
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<tr>
<td></td>
<td>cable 200mm with M12 connector, 4-pin</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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</tr>
<tr>
<td>Configuration</td>
<td>teach-in via button (lockable) and teach input</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<td>●</td>
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<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Options</td>
<td>activation input</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Indicators</td>
<td>green LED: ready</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td></td>
<td>yellow LED: switching output</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

General information

- The laser retro-reflective photoelectric sensors PRKL 3B/… have an optimised light beam propagation in the typical range of application of 0 ... 1m (not to be confused with the operating range, which is 0 ... 3m in combination with a reflector MTKS 50x50). This permits the reliable recognition of the smallest of parts or the positioning of objects with maximum precision across the entire area.
- 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 unit's configuration. Depending on the teach mode, the following values are possible:

<table>
<thead>
<tr>
<th>Setting</th>
<th>Detection from object size 1)</th>
<th>Sensor switches at a light occlusion of</th>
</tr>
</thead>
<tbody>
<tr>
<td>max. operating range (factory setting)</td>
<td>1.5mm</td>
<td>50%</td>
</tr>
<tr>
<td>normal sensor sensitivity (standard teaching)</td>
<td>1mm</td>
<td>25%</td>
</tr>
<tr>
<td>maximum sensor sensitivity (dynamic teaching)</td>
<td>0.1 ... 0.2mm</td>
<td>5%</td>
</tr>
</tbody>
</table>

1) All specifications are typical values and may vary by a small amount for each unit.
- For safety reasons, the laser transmitter is equipped with a monitor, which automatically switches off the transmitter in case of a component defect. In case of failure, the yellow LED flashes rapidly and the green LED is off. The state is irreversible and the sensor must be exchanged.
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

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

After standard teaching, the sensor switches for objects with a minimum size of 1 mm (see table under "General Information").

If both LEDs flash rapidly after the teaching event, a teaching error has happened. Please check the alignment of the light beam onto the reflector and carry out another teaching event.

Teaching for maximal sensor sensitivity (dynamic teaching)

- Press teach button until both LEDs flash alternately. Sensor remains in teaching mode even after the teach button has been released.
- Move some objects through the light path or swing a single object slowly back and forth through the light path.
- Briefly press the teach button to terminate the teaching event.
- Ready

After teaching for maximum sensor sensitivity, the sensor switches for objects with a minimum size of 0.1 … 0.2 mm (see table under "General Information").

If both LEDs flash rapidly after the teaching event, a teaching error has happened. Please check the alignment of the light beam onto the reflector and carry out another teaching event.
PRKL 3B Laser retro-reflective photoelectric sensor with polarisation filter

Teaching for maximum operating range (factory setting at delivery)

- Prior to teaching:
  - Cover the light path to the reflector!
- Procedure as for standard teaching.

Adjusting the switching behaviour 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 behaviour.
- Release teach button.
- Ready.

2 ... 7 s simultaneously flashing at 3Hz

> 12 s

LED green

LED yellow

LED green

LED yellow

ON = light switching

OFF = dark switching

Locking the teach button via the teach input

A static high signal (≥ 4 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!

\[ U_{\text{Teach low}} \leq 2V \]
\[ U_{\text{Teach high}} \geq (U_B-2V) \]

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**

After standard teaching, the sensor switches for objects with a minimum size of 1 mm (see table under "General Information").

**Quick standard teach**

After standard teaching, the sensor switches for objects with a minimum size of 1 mm (see table under "General Information").
Teaching for maximal sensor sensitivity (dynamic teaching)

After teaching for maximum sensor sensitivity, the sensor switches for objects with a minimum size of 0.1 ... 0.2mm (see table under "General Information").

Adjusting the switching behaviour of the switching output – light/dark switching

After teaching for maximum sensor sensitivity, the sensor switches for objects with a minimum size of 0.1 ... 0.2mm (see table under "General Information").
**RTR 3**

**Energetic diffuse reflection light scanner**

- Energetic scanner with sensitivity adjustment
- Visible red light for fast and easy alignment
- Small construction with robust plastic housing, protection class IP 67/IP 69K for industrial application
- High switching frequency for detection of fast events
- Complementary switching outputs for light/dark switching or as a control function

**Dimensioned drawing**

**Accessories:**
(available separately • see page 46)
- Mounting systems (BT 3…)
- M8 connectors (D M8A…)
- Ready-made cables (K-D …)

**Electrical connection**

**RTR 3/44–300**

<table>
<thead>
<tr>
<th>10–30V DC</th>
<th>+</th>
<th>br/BN</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>GND</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10–30V DC</th>
<th>+</th>
<th>br/BN</th>
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<tr>
<td>GND</td>
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**RTR 3/44–300–S8**

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<table>
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<th>br/BN</th>
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**RTR 3/22–300–S8**

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</thead>
<tbody>
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</table>

**RTR 3/44–300 - 04**
**RTR 3/44–300–S8 - 04**
Specifications

Optical data
Typ. scanning range limit 1) 5…500mm
Scanning range 2) see tables
Adjustment range 60…500mm
Light source LED (modulated light)
Wavelength 660nm (visible red light)

Timing
Switching frequency 1000Hz
Response time 0.5ms
Delay before start-up ≤ 100ms

Electrical data
Operating voltage UB 10 … 30VDC (incl. residual ripple)
Residual ripple ≤ 15% of UB
Bias current ≤ 25mA
Switching output 2 transistor outputs, complementary
Function characteristics light/dark switching
Signal voltage high/low ≥ (UB-2V)/≤ 2V
Output current max. 100mA
Sensitivity adjustable with multiturn potentiometer

Indicators
LED yellow reflection
LED yellow flashing reflection, no performance reserve

Mechanical data
Housing plastic
Optics cover plastic (PMMA)
Weight 20g
Connection type M8 connector (4-pin) or PUR cable 2m (cross section 4x0.2mm²)

Environmental data
Ambient temp. (operation/storage) -25°C … +55°C/-40°C … +70°C
Protective circuit 3) 2=polarity reversal protection, 3=short-circuit protection for all outputs
VDE safety class 4) Rating voltage 250VAC
Protection class IP 67, IP 69K 5)
LED class 1 (acc. to EN 60825-1)
Standards applied IEC 60947-5-2

Order guide

With cable
With complementary PNP switching outputs RTR 3/44-300 500 30921

With M8 connector
With complementary PNP switching outputs RTR 3/44-300-S8 500 30920
With complementary NPN switching outputs RTR 3/22-300-S8 500 33310

Tables

<table>
<thead>
<tr>
<th>1</th>
<th>5</th>
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<th>800</th>
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<tr>
<td>2</td>
<td>10</td>
<td>110</td>
<td>120</td>
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</table>

Diagrams

Typ. response behaviour (white 90%)

Typ. black/white behaviour

Remarks
- With the set scanning range, a tolerance of the upper scanning range limit is possible depending on the reflection properties of the material surface.
HRTR 3
Diffuse reflection light scanner with background suppression

- Scanner with adjustable background suppression
- Very good black/white performance, exact adjustment via multiturn potentiometer
- Small construction with robust plastic housing, protection class IP 67/IP 69K for industrial application
- High switching frequency for detection of fast events

7 ... 180mm

10 - 30 V DC

Accessories:
- Mounting systems (BT 3...)
- M8 connectors (D M8A...)
- Ready-made cables (K-D...)

Dimensioned drawing

Electrical connection

<table>
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<tr>
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<td>ws/WH</td>
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<th>br/BN</th>
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<th>10–30V DC +</th>
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<td>sw/BK</td>
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</tr>
<tr>
<td></td>
<td>ws/WH</td>
<td></td>
</tr>
</tbody>
</table>
Specifications

Optical data
Typ. scanning range limit 1) 7 … 180 mm
Scanning range 2) see tables
Adjustment range 25 … 180 mm
Light beam characteristic focussed at 110 mm
Wavelength 660 nm (visible red light)

Timing
Switching frequency 1000 Hz
Response time 0.5 ms
Delay before start-up ≤ 100 ms

Electrical data
Operating voltage $U_B$ 10 … 30 V DC (incl. residual ripple)
Residual ripple ≤ 15% of $U_B$
Bias current ≤ 25 mA
Switching output 2 transistor outputs, complementary
Function characteristics light/dark switching
Signal voltage high/low $\geq (U_B-2V)/2V$
Output current max. 100 mA

Indicators
LED yellow

Mechanical data
Housing plastic
Optics cover plastic (PMMA)
Weight 20 g
Connection M8 connector (4-pin) or PUR cable 2 m/5 m (cross section 4x0.2 mm²)

Environmental data
Ambient temp. (operation/storage) -25 °C … +55 °C/-40 °C … +70 °C
Protective circuit 2, 3
VDE safety class 4)
Protection class IP 67, IP 69 K 5)
LED class 1 (acc. to EN 60825-1)
Standards applied IEC 60947-5-2

Order guide

Selection table

<table>
<thead>
<tr>
<th>Equipment</th>
<th>PNP transistor</th>
<th>NPN transistor</th>
<th>light/dark switching</th>
<th>M8 connector</th>
<th>cable 5000 mm</th>
<th>cable 2000 mm</th>
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</thead>
<tbody>
<tr>
<td>Switching output</td>
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<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Connection</td>
<td>●</td>
<td>●</td>
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Order code

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<tbody>
<tr>
<td>Part No.</td>
<td>500 30925</td>
<td>500 37144</td>
<td>500 30924</td>
<td>500 37144</td>
</tr>
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</table>
| Remarks | With the set scanning range, a tolerance of the upper scanning range limit is possible depending on the reflection properties of the material surface.

Tables

<table>
<thead>
<tr>
<th>Scanning range [mm]</th>
<th>Typ. scanning range limit [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>white 90%</td>
</tr>
<tr>
<td>2</td>
<td>grey 18%</td>
</tr>
<tr>
<td>3</td>
<td>black 6%</td>
</tr>
</tbody>
</table>

Diagrams

Typ. response behaviour (white 90%)

Typ. black/white behaviour

| Remarks | With the set scanning range, a tolerance of the upper scanning range limit is possible depending on the reflection properties of the material surface. |
HRTR 3  
Diffuse reflection light scanner with background suppression

- Scanner with adjustable background suppression
- Very good black/white performance, exact adjustment via multiturn potentiometer
- Small construction with robust plastic housing, protection class IP 67/IP 69K for industrial application
- High switching frequency for detection of fast events

7 ... 180 mm

10 - 30 V DC

Accessories:
(available separately • see page 46)
- Mounting systems (BT 3…)
- M8 connectors (D M8A…)
- Ready-made cables (K-D…)

Dimensioned drawing

Electrical connection

A Receiver
B Transmitter
C Optical axis
D Adjustment screw
E Indicator diode

UL LISTED

ISO 9001

IEC 60947...

IP 67

IEC 60947...

IP 69K

IP 67

UL LISTED

Dimensions:
7 ... 180 mm

Electrical connection:
HRTR 3/4-150, 200-S8
10-30 V DC +1 — br/BN
+ — bl/BU
— — GND
4 — sw/GR

We reserve the right to make changes.

Leuze electronic GmbH + Co. KG
www.leuze.de

Leuze electronic GmbH + Co. KG
Post-box 1111 D-73277 Owen-Teck Tel. +49 7021 5730

HRTR 3/4-150, 200-S8 - 03

– 40 –
Specifications

Optical data

Typ. scanning range limit 1) 7 … 180mm
Scanning range 2) see tables
Adjustment range 25 … 180mm
Light beam characteristic focussed at 110mm
Wavelength 660nm (visible red light)

Timing

Switching frequency 1000Hz
Response time 0.5ms
Delay before start-up ≤ 100ms

Electrical data

Operating voltage UB 10 … 30VDC (incl. residual ripple)
Residual ripple ≤ 15% of UB
Bias current ≤ 25mA
Switching output 1 PNP transistor output
Function characteristics light switching
Signal voltage high/low ≥ (UB-2V)/2V
Output current max. 100mA

Indicators

LED yellow reflection

Mechanical data

Housing plastic
Optics cover plastic (PMMA)
Weight 20g
Connection type M8 connector (3-pin) with 200mm cable tail

Environmental data

Ambient temp. (operation/storage) -25°C … +55°C/-40°C … +70°C
Protective circuit 3) 2=polarity reversal protection, 3=short-circuit protection for all outputs
VDE safety class 4) II, all-insulated
Protection class IP 67, IP 69K 5) acc. to IEC 60947-5-1
LED class 1 (acc. to EN 60825-1)
Standards applied acc. to IEC 60947-5-2

1) Typ. scanning range limit: max. attainable range without performance reserve
2) Scanning range: recommended range with performance reserve
3) 2=polarity reversal protection, 3=short-circuit protection for all outputs
4) Rating voltage 150VAC
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

Order guide

With 200mm cable and M8 connector

<table>
<thead>
<tr>
<th>Designation</th>
<th>Part No.</th>
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<tbody>
<tr>
<td>HRTR 3/4-150, 200-S8</td>
<td>500 33214</td>
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Remarks

- With the set scanning range, a tolerance of the upper scanning range limit is possible depending on the reflection properties of the material surface.
**HRTR 3**

Diffuse reflection light scanner with background suppression

- Scanner with adjustable background suppression
- Very good black/white performance, exact adjustment via multiturn potentiometer
- Small construction with robust plastic housing, protection class IP 67/IP 69K for industrial application
- High switching frequency for detection of fast events
- Cable tail with M12 connector for optimal mounting

**Accessories:**

(available separately • see page 46)
- Mounting systems (BT 3…)
- M12 connectors (D M8A…)
- Ready-made cables (K-D …)

**Dimensioned drawing**

- Receiver
- Transmitter
- Optical axis
- Adjustment screw
- Indicator diode

**Electrical connection**

```
HRTR 3/44–150, 150–S12
10–30V DC + 1 br/BN
  2 ws/WH
  3 bi/BU
  4 sw/BK
```
Specifications

Optical data
Typ. scanning range limit ¹ 7 ... 180 mm
Scanning range ² see tables
Adjustment range 25 ... 180 mm
Light beam characteristic focussed at 110 mm
Wavelength 660nm (visible red light)

Timing
Switching frequency 1000Hz
Response time 0.5ms
Delay before start-up ≤ 100ms

Electrical data
Operating voltage $U_B$ 10 ... 30VDC (incl. residual ripple)
Residual ripple ≤ 15% of $U_B$
Bias current ≤ 25mA
Switching output 2 PNP transistor outputs, complementary
Function characteristics light/dark switching
Signal voltage high/low $\geq (U_B-2V)/2V$
Output current max. 100mA

Indicators
LED yellow reflection

Mechanical data
Housing plastic
Optics cover plastic (PMMA)
Weight 20g
Connection type M12 connector (4-pin) with 150mm cable tail (cross section 4x0.2mm²)

Environmental data
Ambient temp. (operation/storage) -25°C … +55°C/-40°C … +70°C
Protective circuit 3) 2=polarity reversal protection, 3=short-circuit protection for all outputs
VDE safety class 4) II, all-isolated
Protection class IP 67, IP 69K ⁵)
LED class 1 (acc. to EN 60825-1)
Standards applied IEC 60947-5-2

Order guide
With complementary PNP switching outputs

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Tables

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<td>2</td>
<td>10</td>
</tr>
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<td>3</td>
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</table>

Diagram

Typ. response behaviour (white 90%)

Remarks
- With the set scanning range, a tolerance of the upper scanning range limit is possible depending on the reflection properties of the material surface.

¹) Typ. scanning range limit: max. attainable range without performance reserve
²) Scanning range: recommended range with performance reserve
³) 2=polarity reversal protection, 3=short-circuit protection for all outputs
⁴) Rating voltage 250VAC
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
HRTR 3  Diffuse reflection light scanner with background suppression

Scanner with special light spot and adjustable background suppression for the detection of:
- objects with large holes
- foils and bottles
- blister
- objects with varying position
- Gaps of up to 10mm are not detected
- Very good black/white performance, exact adjustment via multiturn potentiometer

Accessories:
(available separately • see page 46)
- Mounting systems (BT 3…)
- M8 connectors (D M8A…)
- Ready-made cables (K-D …)

Dimensioned drawing

Electrical connection

HRTR 3/44–50, 150–S12
HRTR 3/44–50–S8

10–30V DC +  br/BN
  1  wa/WH
  2  bl/BU
  3  sw/GR
  4  GND
Special light spot

Specifications

Optical data
Typ. scanning range limit 1) 5 ... 150mm
Scanning range 2) see tables
Adjustment range 25 ... 100mm
Light spot approx. 3x40mm at 50mm
Light source LED (modulated light)
Wavelength 660nm (visible red light)

Timing
Switching frequency 500Hz
Response time 0.5ms
Delay before start-up ≤ 100ms

Electrical data
Operating voltage $U_B$ 10 ... 30VDC (incl. residual ripple)
Residual ripple ≤ $15\%$ of $U_B$
Bias current ≤ 25mA
Switching output 2 transistor outputs, complementary
Function characteristics light/dark switching
Signal voltage high/low ≥ ($U_B-2V)/2$ V
Output current max. 100mA

Indicators
LED yellow reflection

Mechanical data
Housing plastic
Optics cover plastic (PMMA)
Weight 20g
Connection type M8 connector (4-pin)
M12 cable tail (cross section 4x0.2mm²)

Environmental data
Ambient temp. (operation/storage) -25°C ... +55°C/-40°C ... +70°C
Protective circuit 3) 2, 3
VDE safety class 4) II, all-insulated
Protection class IP 67, IP 69K 5)
LED class 1 (acc. to EN 60825-1)
Standards applied IEC 60947-5-2

1) Typ. scanning range limit: max. attainable range without performance reserve
2) Scanning range: recommended range with performance reserve
3) 2-polarity reversal protection, 3-short-circuit protection for all outputs
4) Rating voltage 250VAC
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

Order guide

<table>
<thead>
<tr>
<th>Designation</th>
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<tbody>
<tr>
<td>With M8 connector</td>
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<td>500 39724</td>
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<tr>
<td>With M12 cable tail</td>
<td>HRTR 3/44-50,150-S12</td>
<td>501 02716</td>
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Tables

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<td></td>
</tr>
<tr>
<td>2</td>
<td>gray 18%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>black 6%</td>
<td></td>
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</tr>
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</table>

Diagrams

Setting to white, 150mm
Typ. response behaviour (white 90%)

Setting to white, 50mm
Typ. response behaviour (white 90%)

Remarks

● With the set scanning range, a tolerance of the upper scanning range limit is possible depending on the reflection properties of the material surface.

HRTR 3/44-50 (150)-S8 - 04
Reflectors and reflective tapes are ideally suited for Leuze retro-reflective photoelectric sensors. The performance data refer to the use of Leuze reflectors and reflective tapes. The range of retro-reflective photoelectric sensors depends on the type and size of the reflector.

Adhesive and screw type versions permit universal installation.

Precise optical alignment is not required, as the reflector may be slightly inclined relative to the optical axis.

For retro-reflective photoelectric sensors with polarisation filters, only triad-type reflectors made of plastic or reflective tape No. 4 may be used.

Order codes:

<table>
<thead>
<tr>
<th>Designation</th>
<th>Part No.</th>
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<tbody>
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<td>500 22816</td>
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<td>TK 100x100</td>
<td>500 03192</td>
</tr>
<tr>
<td>TKS 40x60</td>
<td>500 40820</td>
</tr>
<tr>
<td>TKS 20x40</td>
<td>500 81283</td>
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<tr>
<td>MTKS 50x50</td>
<td>500 36188</td>
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<td>MTKS 20x40.1</td>
<td>500 04130</td>
</tr>
<tr>
<td>MTKS 20x30</td>
<td>500 40894</td>
</tr>
<tr>
<td>Reflective tape no. 4, roll 50x1000</td>
<td>500 38060</td>
</tr>
<tr>
<td>Reflective tape no. 4, roll 50x22800</td>
<td>500 38062</td>
</tr>
</tbody>
</table>
3 Series Accessories

Dimensioned drawings M8

- D M8A-3P-SK
- D M8A-4P-SK

Dimensioned drawings M12

- KD 095-4
- KD 095-4A

Connectors, cables

For devices with M8/M12 connectors, there are connectors with ready-made cable and connectors with screw connection available.

Protection class IP 67 (DIN 40050) is provided with both the connector cable accessories and the field-wireable connectors.

**Important:**

With throughbeam photoelectric sensors, a connector is required both for the transmitter and the receiver.
### Connectors, cables

#### Selection table

<table>
<thead>
<tr>
<th>Connection type</th>
<th>M8, without cable, 3-pin</th>
<th>M8, without cable, 4-pin</th>
<th>M12, without cable, 4-pin</th>
</tr>
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<tbody>
<tr>
<td><strong>Insulation displacement connection</strong></td>
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<td>–</td>
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</tr>
<tr>
<td><strong>Part No.</strong></td>
<td><strong>D M8A-3P-SK</strong> Part No. 501 04582</td>
<td><strong>D M8A-4P-SK</strong> Part No. 501 04583</td>
<td><strong>Part No.</strong></td>
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</tbody>
</table>

#### M8 connection cable with connector, single-sided

<table>
<thead>
<tr>
<th>Length</th>
<th>PVC cable sheath, 3-pin</th>
<th>PVC cable sheath, 4-pin</th>
<th>PUR cable sheath, 4-pin</th>
</tr>
</thead>
<tbody>
<tr>
<td>2m</td>
<td>K-D M8W-3P-2m-PVC Part No. 501 04521</td>
<td>K-D M8A-3P-2m-PVC Part No. 501 04520</td>
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</tr>
<tr>
<td>5m</td>
<td>K-D M8W-3P-5m-PVC Part No. 501 04523</td>
<td>K-D M8A-3P-5m-PVC Part No. 501 04522</td>
<td>–</td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2m</td>
<td>K-D M8W-4P-2m-PVC Part No. 501 04525</td>
<td>K-D M8A-4P-2m-PVC Part No. 501 04524</td>
<td>–</td>
</tr>
<tr>
<td>5m</td>
<td>K-D M8W-4P-5m-PVC Part No. 501 04527</td>
<td>K-D M8A-4P-5m-PVC Part No. 501 04526</td>
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</tr>
<tr>
<td>10m</td>
<td>K-D M8W-4P-10m-PVC Part No. 501 04529</td>
<td>K-D M8A-4P-10m-PVC Part No. 501 04528</td>
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</tr>
<tr>
<td><strong>Length</strong></td>
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<td></td>
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</tr>
<tr>
<td>2m</td>
<td>K-D M8W-4P-2m-PUR Part No. 501 04531</td>
<td>K-D M8A-4P-2m-PUR Part No. 501 04530</td>
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<tr>
<td>5m</td>
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<td>K-D M8W-4P-10m-PUR Part No. 501 04534</td>
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## Selection table

### M12 connection cable with connector, single-sided

<table>
<thead>
<tr>
<th>Length</th>
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<td>20m</td>
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### M8 / M12 connection cable with connector, single-sided, with 2 integrated LEDs in transparent connector

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## Connectors, cables

### Remarks

LED circuit diagram (K-D M12...-DP-...):

```
1  2  3  4
   |   |   |
   sv/BN   sv/OK   ex/WH
   |   |   |
   1s/IN
```

---

3 Series Accessories - 04

0605
**Mounting systems**

1. = BT 3
   (Part No. 500 60511)
2. + 3. = BT 3.1 1)
   (Part No. 501 05585)
1. + 2. + 3. = BT 3B
   (Part No. 501 05546)

---

**Dimensioned drawings**

**BT 3**

1) Packaging unit: PU = 10 pcs.
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...detection
- Standard sensors in cubic design
- Cylindrical sensors
- Measuring sensors
- Forked photoelectric sensors

...identification
- Bar code readers
- Data matrix code readers
- Hand-held readers
- RF identification systems

...protection
- Safety light curtains
- Multiple light beam safety devices
- Safety laser scanners
- Safety interlocks

- Contrast, colour, luminescence scanners
- Fibre optic amplifiers
- Double sheet monitoring/splice detection
- Accessories

- Bar code positioning systems
- Optical data transmission systems
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