



LS 97

Throughbeam photoelectric sensors

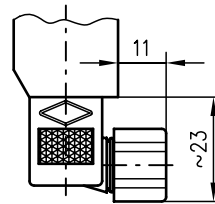
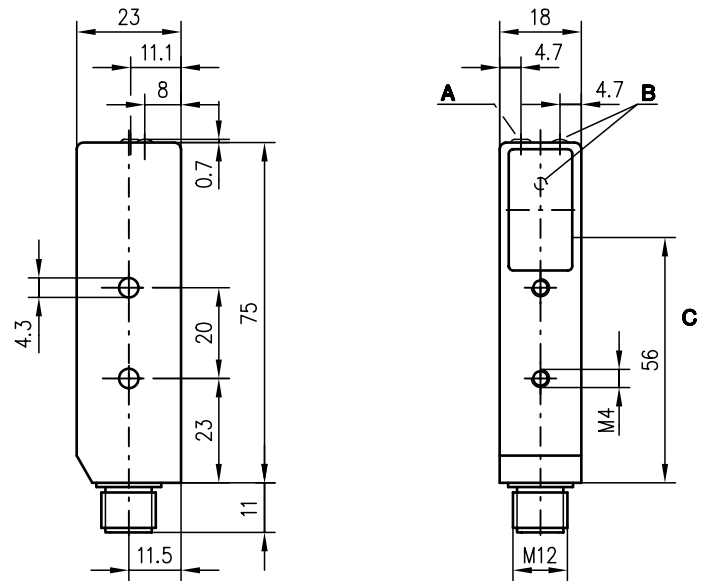


9m

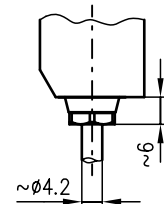
10 - 30 V
DC

- Throughbeam photoelectric sensor with infrared light or visible red light
- Small construction with glass cover and robust metal housing for protection against environmental influences
- Connection via M12 connector, plug or cable
- Activation input for testing and interlinking
- Additional indicator diode on the front part (for exact alignment)

Dimensioned drawing



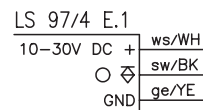
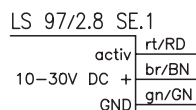
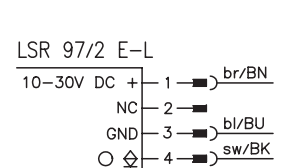
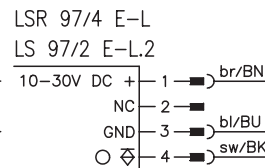
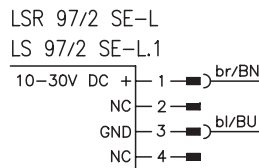
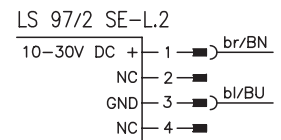
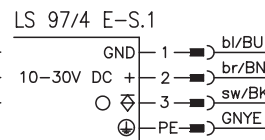
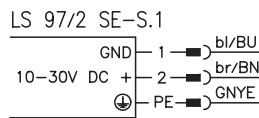
LS 97/2 SE-S.1
LS 97/4 E-S.1



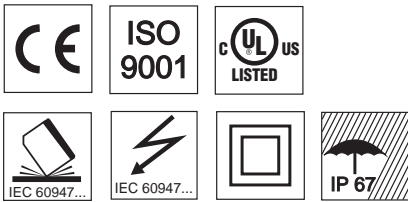
LS 97/2.8 SE.1
LS 97/4 E.1

- A Sensitivity adjustment (only for LS 97/4 E-L.2)
- B Indicator diode
- C Optical axis

Electrical connection



We reserve the right to make changes • 97_a01e.fm



Accessories:

(available separately)

- Mounting systems (BT 92, UMS 1, UMS 96-95)
- Diaphragm (BL 97.1)
- M12 connectors (KD ...)
- Ready-made cables (KB ...)

Specifications

Optical data

Typ. operating range limit ¹⁾
 Operating range ²⁾
 Light source
 Wavelength

LS 97...

0 ... 9m
 0 ... 5m
 LED (modulated light)
 880nm (infrared)/660nm (visible red light)

LS 97/4 L.2

0 ... 6m
 0 ... 3.5m

Timing

Switching frequency
 Response time
 Delay before start-up

200Hz
 2.5ms
 ≤ 100ms

Electrical data

Operating voltage U_B
 Residual ripple
 Bias current
 Switching output
 Function characteristics
 Signal voltage high/low
 Output current
 Sensitivity

10 ... 30VDC (incl. residual ripple)
 ≤ 15% of U_B
 ≤ 40mA
 PNP or NPN transistor output
 light switching
 $\geq (U_B - 2V) / \leq 2V$
 max. 100mA

adjustable with
 12-turn potentiometer

Indicators

LED yellow
 LED yellow flashing

light path free
 light path free, no performance reserve

Mechanical data

Housing
 Optics cover
 Weight
 Connection type

diecast zinc
 glass
 85g
 M12 connector 4-pin, stainless steel,
 connector 4-pin or cable 2m (cross section 3x0.25mm²)

Environmental data

Ambient temp. (operation/storage)
 Protective circuit ³⁾
 VDE safety class ⁴⁾

-20°C ... +60°C/-30°C ... +70°C
 2, 3
 I (for S types)
 II, all-insulated (for all L and cable types)
 IP 67/IP 65 (for all S types)
 1 (acc. to EN 60825-1)
 IEC 60947-5-2

Protection class
 LED class
 Standards applied

Options

Activation input active
 Transmitter active/not active $\geq 8V / \leq 2V$ or not connected

- 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

Order guide

| Selection table | | Order code → | | | | | | |
|------------------|------------------------|--|---|--|---|---|--|--|
| Equipment ↓ | | LSR 97/2 L Part No. 500 29648 (Tr) Part No. 500 29647 (Re) | LS 97/4 S.1 Part No. 500 29651 (Tr) Part No. 500 29655 (Re) | LSR 97/4 L Part No. 500 29648 (Tr) Part No. 500 29649 (Re) | LS 97/4 L.2 Part No. 500 29650 (Tr) Part No. 500 29654 (Re) | LS 97/4.8.1 Part No. 500 29652 (Tr) Part No. 500 29653 (Re) | | |
| Switching output | PNP transistor | | ● | ● | ● | ● | | |
| | NPN transistor | ● | | | | | | |
| Light source | red light | ● | | ● | | | | |
| | infrared light | | ● | | ● | ● | | |
| Connection | M12 connector | ● | | ● | ● | | | |
| | cable | | | | | ● | | |
| | plug | | ● | | | | | |
| Features | sensitivity adjustment | | | | ● | | | |
| | activation input | | | | | ● | | |
| | UL | ● | ● | ● | ● | | | |

Tables

LS 97...

| | | |
|---|---|---|
| 0 | 5 | 9 |
|---|---|---|

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

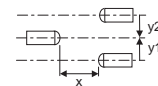
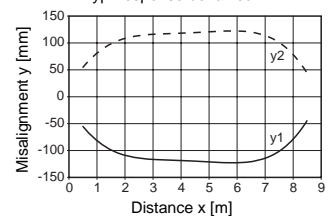
LS 97/4 L.2

| | | |
|---|-----|---|
| 0 | 3.5 | 6 |
|---|-----|---|

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

Diagrams

Typ. response behaviour



Remarks

- The S types are shipped with connectors.



RK 97

Retro-reflective photoelectric sensors

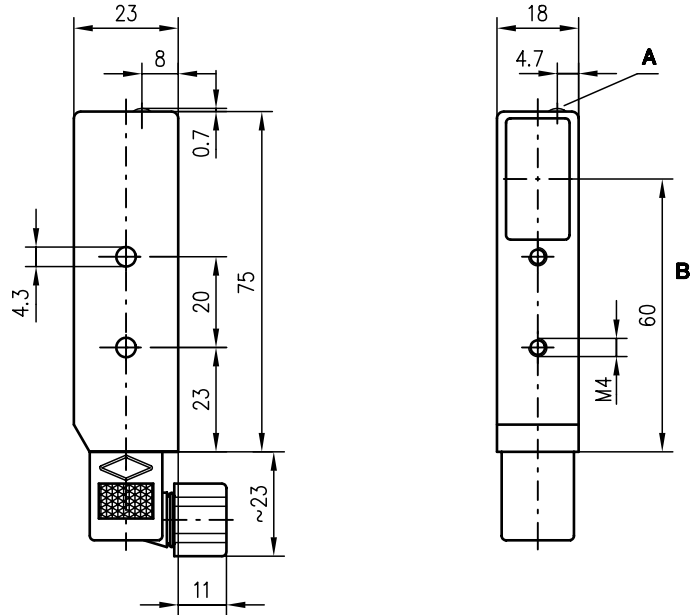


0.1 ... 6m



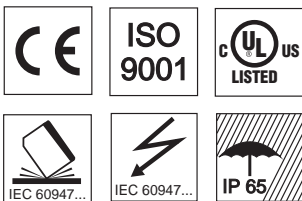
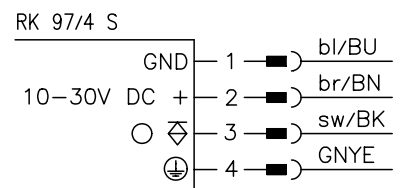
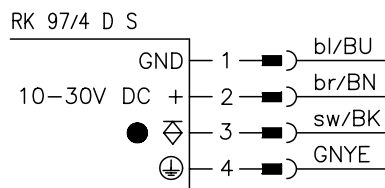
- Retro-reflective photoelectric sensors with infrared light
- Small construction with glass cover and robust metal housing for protection against environmental influences
- Connection via plug

Dimensioned drawing



- A Indicator diode
- B Optical axis

Electrical connection



Accessories:

(available separately)

- Mounting systems (BT 92, UMS 1, UMS 96-95)
- Diaphragm (BL 97.1)
- Ready-made cables (KB ...)
- Reflectors
- Reflective tapes

We reserve the right to make changes • 97_b01e.fm



Specifications

Optical data

Typ. operating range limit (TK(S) 100x100) ¹⁾ 0.1 ... 6m
 Operating range ²⁾ see table
 Light source LED (modulated light)
 Wavelength 880nm (infrared)

Timing

Switching frequency 200Hz
 Response time 2.5ms
 Delay before start-up ≤ 100ms

Electrical data

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

Indicators

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

Mechanical data

Housing diecast zinc
 Optics cover glass
 Weight 85g
 Connection type connector 4-pin

Environmental data

Ambient temp. (operation/storage) -20°C ... +60°C / -30°C ... +70°C
 Protective circuit ³⁾ 2, 3
 VDE safety class I
 Protection class IP 65
 LED class 1 (acc. to EN 60825-1)
 Standards applied IEC 60947-5-2

- 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

Tables

| Reflectors | | | Operating range |
|------------|--------|---------|-----------------|
| 1 | TK(S) | 100x100 | 0.1 ... 4m |
| 2 | MTK(S) | 50x50 | 0.1 ... 3m |
| 3 | TK(S) | 30x50 | 0.1 ... 1.7m |
| 4 | TK(S) | 20x40 | 0.1 ... 1.5m |
| 5 | Tape 2 | 100x100 | 0.15 ... 1.4m |

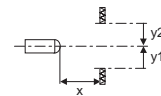
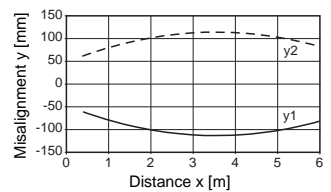
| | | | | |
|---|------|-----|-----|-----|
| 1 | 0.1 | | 4 | 6 |
| 2 | 0.1 | | 3 | 4.5 |
| 3 | 0.1 | 1.7 | 2.6 | |
| 4 | 0.1 | 1.5 | 2.4 | |
| 5 | 0.15 | 1.4 | 2.4 | |

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

TK ... = adhesive
 TKS ... = screw type
 Tape 2 = adhesive

Diagrams

Typ. response behaviour (TK 100x100)



Order guide

| | Designation | Part No. |
|-----------------|-------------|-----------|
| light switching | RK 97/4 S | 500 00556 |
| dark switching | RK 97/4 DS | 500 00557 |

Remarks

- The devices are shipped with connectors.



PRK 97

Retro-reflective photoelectric sensors with polarisation filter

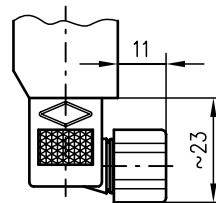
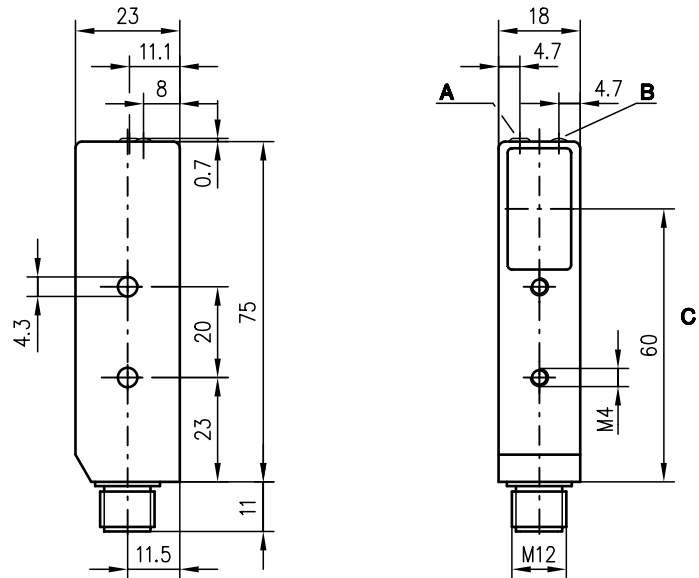


0.1 ... 6m

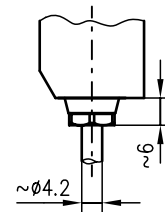


- Polarised retro-reflective photoelectric sensors with visible red light
- Small construction with glass cover and robust metal housing for protection against environmental influences
- Adjustable sensitivity with high resolution allows detection of transparent objects
- Connection via M12 connector, plug or cable
- Activation input for testing and interlinking

Dimensioned drawing



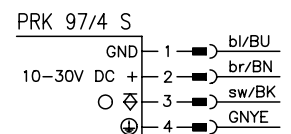
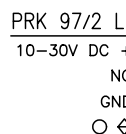
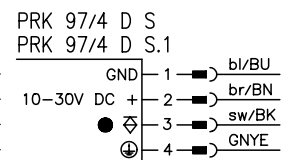
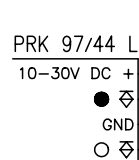
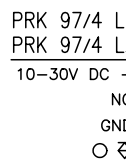
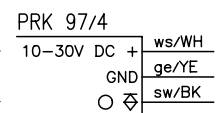
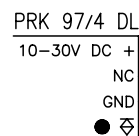
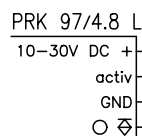
PRK 97/4 D S.1
PRK 97/4 S



PRK 97/4

- A** Sensitivity adjustment (only PRK 97/4 L.1)
- B** Indicator diode
- C** Optical axis

Electrical connection



Accessories:

(available separately)

- Mounting systems (BT 92, UMS 1, UMS 96-95)
- Diaphragm (BL 97.1)
- M12 connectors (KD ...)
- Ready-made cables (KB ...)
- Reflectors
- Reflective tapes

We reserve the right to make changes • 97_b02e.fm





Specifications

Optical data

Typ. operating range limit (TK(S) 100x100) ¹⁾ 0.1 ... 6m
 Operating range ²⁾ see table
 Light source LED (modulated light)
 Wavelength 660nm (visible red light, polarised)

Timing

Switching frequency 200Hz
 Response time 2.5ms
 Delay before start-up ≤ 100ms

Electrical data

Operating voltage U_B 10 ... 30VDC (incl. residual ripple)
 Residual ripple ≤ 15% of U_B
 Bias current ≤ 30mA
 Switching output PNP or NPN transistor output
 Function characteristics light/dark switching (PRK 97/44 L with complementary outputs)
 Signal voltage high/low ≥ (U_B-2V)/≤ 2V
 Output current max. 100mA
 Sensitivity adjustable with 12-turn potentiometer for PRK 97/4 L.1

Indicators

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

Mechanical data

Housing diecast zinc
 Optics cover glass
 Weight 85g
 Connection type M12 connector 4-pin, stainless steel, connector 4-pin or cable 2m (cross section 3x0.25mm²)

Environmental data

Ambient temp. (operation/storage) -20°C ... +60°C/-30°C ... +70°C
 Protective circuit ³⁾ 2, 3
 VDE safety class ⁴⁾ I (for S types)
 Protection class II, all-insulated (for all L and cable types)
 LED class IP 67/IP 65 (for all S types)
 Standards applied 1 (acc. to EN 60825-1)
 IEC 60947-5-2

Options

Activation input active
 Transmitter active/not active ≥ 8V/≤ 2V or not connected

- 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

Tables

| Reflectors | | | Operating range | |
|------------|--------|---------|-----------------|--|
| 1 | TK(S) | 100x100 | 0.1 ... 4m | |
| 2 | MTK(S) | 50x50 | 0.1 ... 3m | |
| 3 | TK(S) | 30x50 | 0.1 ... 1.7m | |
| 4 | TK(S) | 20x40 | 0.1 ... 1.4m | |
| 5 | Tape 2 | 100x100 | 0.15 ... 1.4m | |

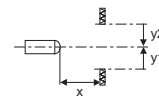
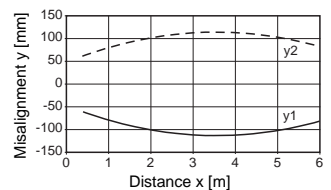
| | | | | |
|---|------|-----|-----|-----|
| 1 | 0.1 | | 4 | 6 |
| 2 | 0.1 | | 3 | 4.5 |
| 3 | 0.1 | 1.7 | 2.6 | |
| 4 | 0.1 | 1.4 | 2.1 | |
| 5 | 0.15 | 1.4 | 2.4 | |

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

TK ... = adhesive
 TKS ... = screw type
 Tape 2 = adhesive

Diagrams

Typ. response behaviour (TK 100x100)



Order guide

| Selection table | | Order code → | | | | | | | | | |
|------------------|------------------------|------------------------------------|----------------------------------|----------------------------------|-------------------------------------|-----------------------------------|--------------------------------|------------------------------------|----------------------------------|-----------------------------------|-----------------------------------|
| Equipment ↓ | | PRK 97/4.8 L Part No. 500 80474 | PRK 97/4 L Part No. 500 19663 | PRK 97/4 S Part No. 500 17092 | PRK 97/4 DS.1 Part No. 500 25686 | PRK 97/4 DL Part No. 500 29642 | PRK 97/4 Part No. 500 80994 | PRK 97/4 L.1 Part No. 500 25324 | PRK 97/2 L Part No. 500 29641 | PRK 97/44 L Part No. 500 35301 | PRK 97/4 DS Part No. 500 81305 |
| Switching output | PNP transistor | ● | ● | ● | ● | ● | ● | ● | | ● | ● |
| | NPN transistor | | | | | | | | ● | | |
| Switching | light switching | ● | ● | ● | | | ● | ● | ● | | |
| | dark switching | | | | ● | ● | | | | | ● |
| | compl. switch. outputs | | | | | | | | | ● | |
| Connection | M12 connector | ● | ● | | | ● | | ● | ● | ● | |
| | cable | | | ● | ● | | | | | | ● |
| | plug | | | | | | ● | | | | |
| Features | activation input | ● | | | | | | | | | |
| | sensitivity | | | | | | | ● | | | |
| | UL | ● | ● | ● | ● | ● | ? | ● | ? | ● | ● |

Remarks

- PRK 97/4 S and PRK 97/4 DS are shipped with cable connector.



RK(R) 97

Energetic diffuse reflection light scanner

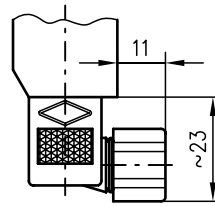
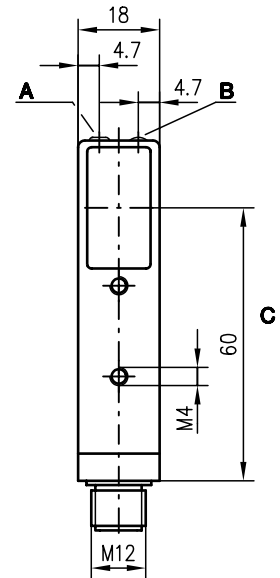
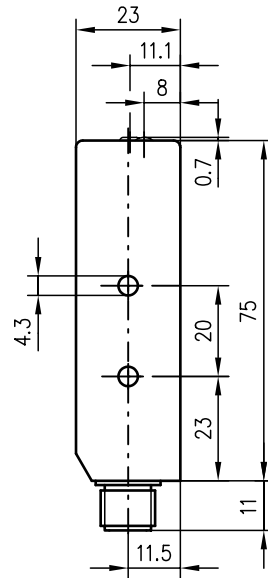


2 ... 100mm
2 ... 200mm

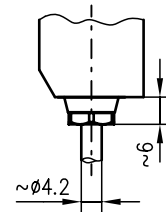


- Energetic scanner with sensitivity adjustment in visible red light or fixed scanning range with infrared light
- Small construction with glass cover and robust metal housing for protection against environmental influences
- Adjustable sensitivity with high resolution allows optimal adaptation to applications
- Connection via M12 connector, plug or cable
- Activation input for testing and interlinking

Dimensioned drawing



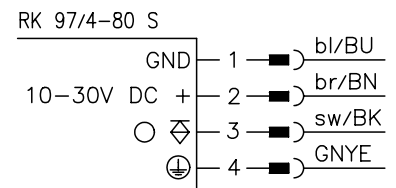
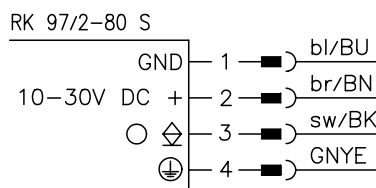
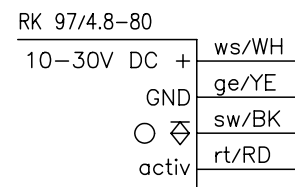
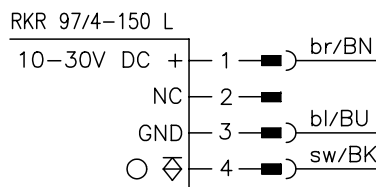
RK 97/4-80 S
RK 97/2-80 S



RK 97/4.8-80

- A** Sensitivity adjustment (only PRK 97/4 150 L)
- B** Indicator diode
- C** Optical axis

Electrical connection



Accessories:

(available separately)

- Mounting systems (BT 92, UMS 1, UMS 96-95)
- M12 connectors (KD ...)
- Ready-made cables (KB ...)



We reserve the right to make changes • 97_c01e.fm

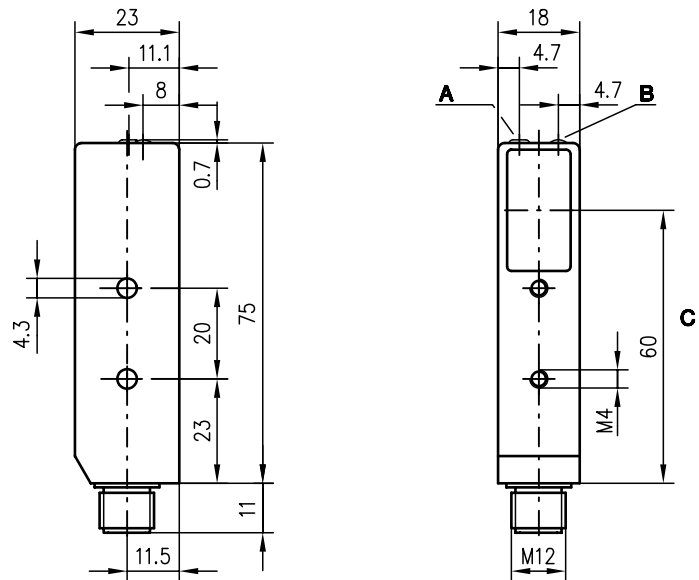


FRKR 97

Diffuse reflection light scanner with background suppression



Dimensioned drawing



2 ... 150mm



- Scanner with adjustable background suppression
- Visible red light for fast and easy alignment
- Very good black/white performance, exact adjustment via multiturn potentiometer
- Small construction with glass cover and robust metal housing for protection against environmental influences

- A Scanning range adjustment
- B Indicator diode
- C Optical axis

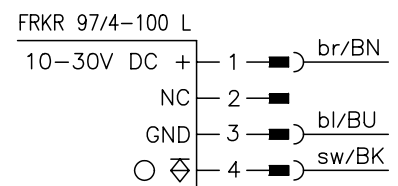
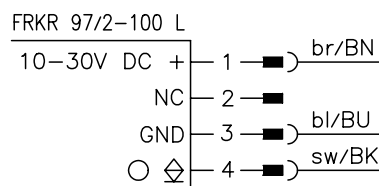
Electrical connection



Accessories:

(available separately)

- Mounting systems (BT 92, UMS 1, UMS 96-95)
- M12 connectors (KD ...)
- Ready-made cables (KB ...)



We reserve the right to make changes • 97_d01e.fm



Specifications

Optical data

| | |
|---|---------------------------|
| Typ. scanning range limit (white 90%) ¹⁾ | 2 ... 150mm |
| Scanning range ²⁾ | 2 ... 100mm |
| Adjustment range | 30 ... 150mm |
| Light beam characteristic | focussed at 80mm |
| Light source | LED (modulated light) |
| Wavelength | 660nm (visible red light) |

Timing

| | |
|-----------------------|---------|
| Switching frequency | 200Hz |
| Response time | 2.5ms |
| Delay before start-up | ≤ 100ms |

Electrical data

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

Indicators

| | |
|------------|-----------------|
| LED yellow | light path free |
|------------|-----------------|

Mechanical data

| | |
|-----------------|---------------------------------------|
| Housing | diecast zinc |
| Optics cover | glass |
| Weight | 85g |
| Connection type | M12 connector, 4-pin, stainless steel |

Environmental data

| | |
|-----------------------------------|--------------------------------|
| Ambient temp. (operation/storage) | -20°C ... +60°C/-30°C ...+70°C |
| Protective circuit ³⁾ | 2, 3 |
| VDE safety class ⁴⁾ | II, all-insulated |
| Protection class | IP 67 |
| 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

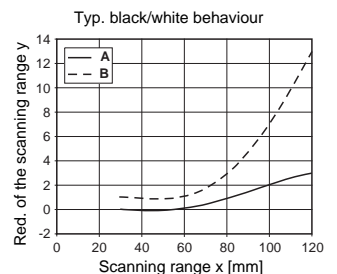
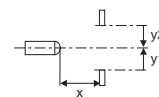
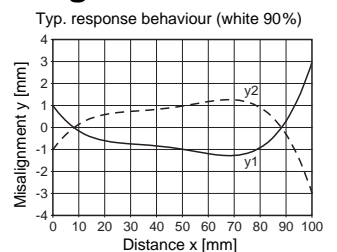
Tables

| | | | |
|---|---|-----|-----|
| 1 | 2 | 100 | 150 |
| 2 | 4 | 98 | 135 |
| 3 | 9 | 93 | 120 |

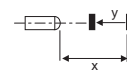
| | |
|---|-----------|
| 1 | white 90% |
| 2 | grey 18% |
| 3 | black 6% |

- Scanning range [mm]
- Typ. scanning range limit [mm]

Diagrams



- A grey 18%
- B black 6%



Order guide

| | Designation | Part No. | UL |
|-----------------------|-----------------|-----------|----|
| PNP transistor output | FRKR 97/4-100 L | 500 29646 | ● |
| NPN transistor output | FRKR 97/2-100 L | 500 29645 | ? |

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.