

FRK 93

Diffuse reflection light scanner with background suppression

Part No. 501 11609

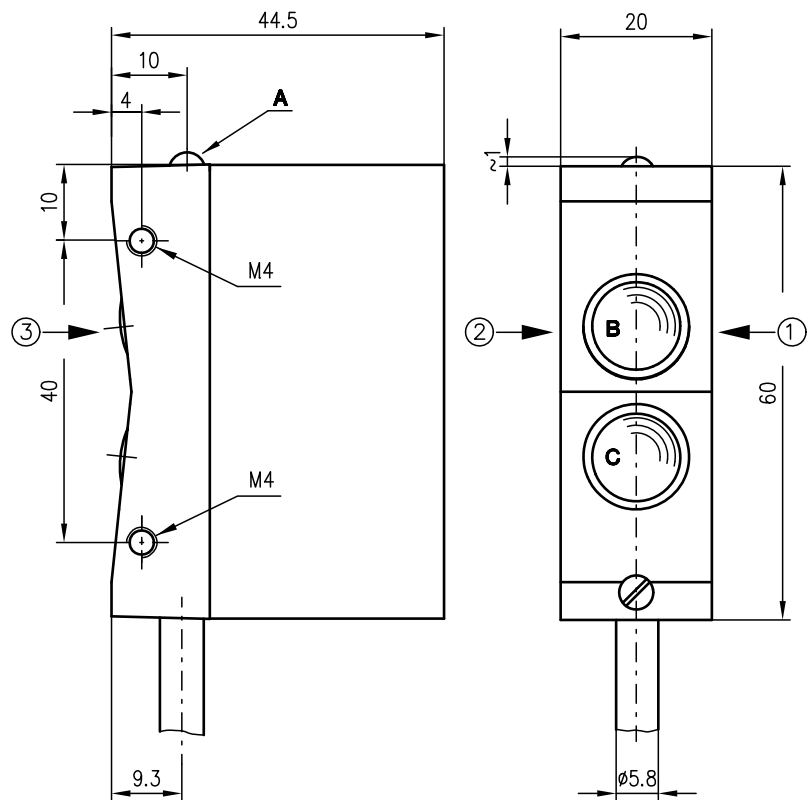


**15 ... 75m
m**



- Scanner with foreground and background suppression due to V-shaped optics
- Infrared light
- Very good detection of dark objects
- Mounting holes for fast installation
- Connection via cable

Dimensioned drawing



- A** Indicator diode
 - B** Receiver
 - C** Transmitter
- Preferred entry direction for objects ① + ② + ③

Electrical connection

10-30V DC +	br/BN
●	ws/WH
○	sw/BK
GND	bl/BU
⊕	gnge/GNYE



Accessories:

- (available separately)
- Ready-made cables (KB ...)

We reserve the right to make changes • 93_d01gb.fm

Specifications

Optical data

Typ. scanning range limit (white 90%) ¹⁾	15 ... 75 mm
Scanning range ²⁾	see tables
Light source	LED (modulated light)
Wavelength	880nm (infrared)

Timing

Switching frequency	200Hz
Response time	3.3ms

Electrical data

Operating voltage U_B ³⁾	10 ... 35VDC (incl. residual ripple)
Residual ripple	$\leq 15\%$ of U_B
Power consumption	max. 2W
Switching output	PNP transistor output
Function characteristics	light/dark switching, complementary
Signal voltage high/low	$\geq (U_B - 3V) / \leq 2V$
Output current	max. 100mA

Indicators

LED yellow on	reflection, output transistor activated
LED yellow flashing	reflection, no performance reserve

Mechanical data

Housing	metal
Optics	glass
Weight	approx. 170g
Connection type	cable 2000mm

Environmental data

Ambient temp. (operation/storage)	-20°C ... +60°C / -30°C ... +70°C
Safety class	I (acc. to EN 61140)
Protective circuit ⁴⁾	2, 3
Protection class	IP 65 (acc. to EN 60529)
LED class	1 (acc. to EN 60825-1)
Applied standards	EN 60947-5-2, UL 508

- 1) Typ. scanning range limit: max. attainable range without performance reserve
- 2) Scanning range: recommended range with performance reserve
- 3) Observe the safety regulations and installation instructions regarding power supply and wiring; for UL applications: only for use in "Class 2" circuits acc. to NEC
- 4) 2=polarity reversal protection, 3=short-circuit protection for all outputs

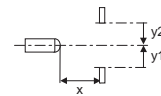
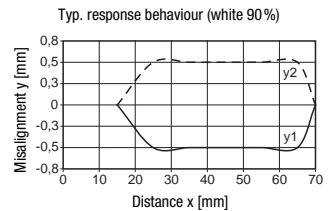
Tables

1	15	60	75
2	22	60	65
3	25	60	60

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

<input type="checkbox"/>	Scanning range [mm]
<input type="checkbox"/>	Typ. scanning range limit [mm]

Diagrams



Order guide

Designation	Part No.
FRK 93/44-60	500 21132

Remarks

Approved purpose:
The diffuse reflection light scanners are optical electronic sensors for optical, contactless detection of objects.

RK 93

Energetic diffuse reflection light scanner

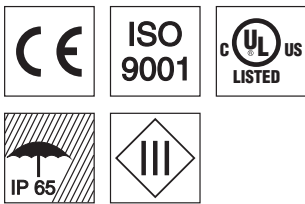
Part No. 501 11605



0 ... 23mm



- Background suppression through V-shaped optical system
- Infrared light
- Mounting holes for fast installation
- Connection via M12 connector, standard plug or cable (2m)

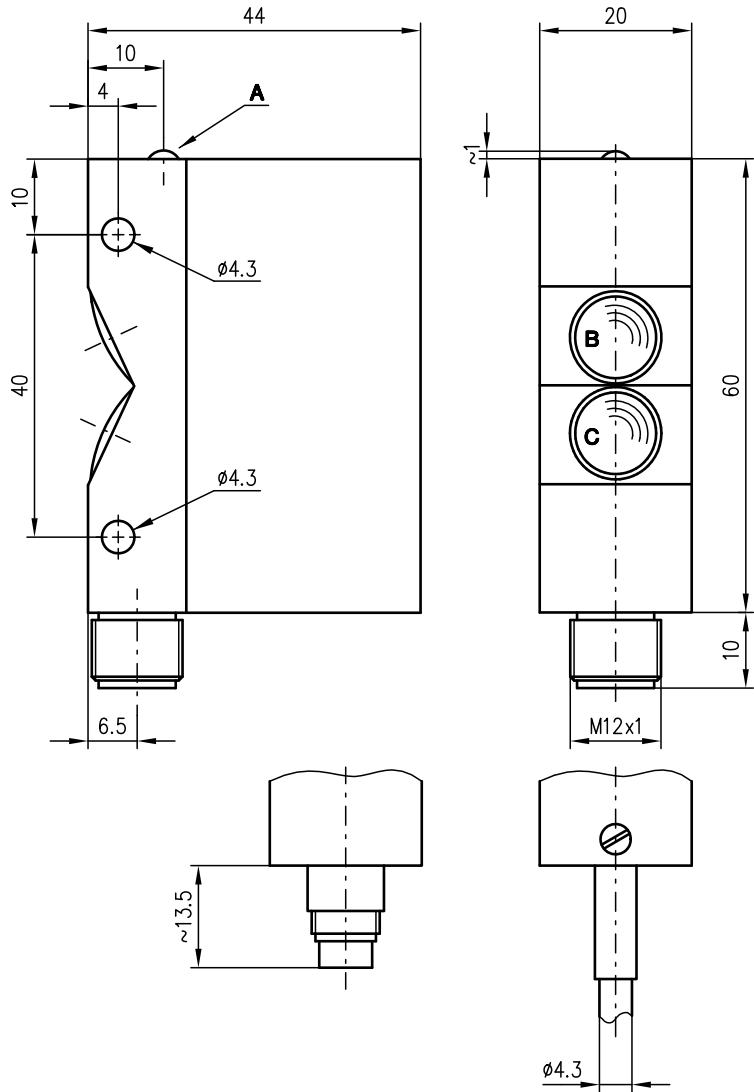


Accessories:

(available separately)

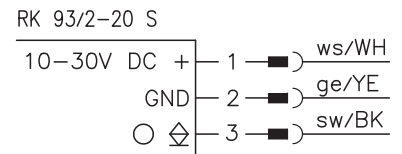
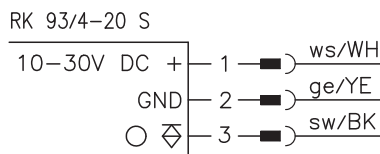
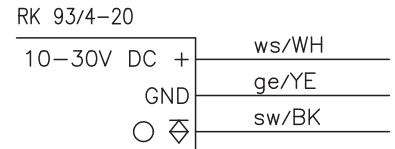
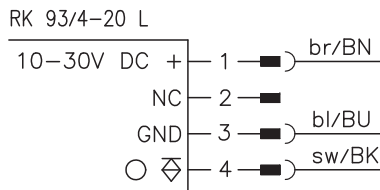
- M12 connectors (KD ...)
- Ready-made cables (KB ...)
- Standard plug

Dimensioned drawing



- A** Indicator diode
- B** Receiver
- C** Transmitter

Electrical connection



We reserve the right to make changes • 93_c01gb.fm

Specifications

Optical data

Typ. scanning range limit (white 90%) ¹⁾	0 ... 23mm
Scanning range ²⁾	see tables
Light source	LED (modulated light)
Wavelength	880nm (infrared)

Timing

Switching frequency	250Hz
Response time	2ms

Electrical data

Operating voltage U_B ³⁾	10 ... 30VDC (incl. residual ripple)
Residual ripple	$\leq 15\%$ of U_B
Power consumption	max. 0.6W
Switching output	PNP or NPN transistor output
Function characteristics	light switching
Signal voltage high/low	$\geq (U_B - 3V) / \leq 2V$
Output current	max. 100mA

Indicators

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

Mechanical data

Housing	metal
Optics cover	glass
Weight	170g
Connection type ⁴⁾	M12 connector 4-pin, standard plug 4-pin, or cable 2000mm

Environmental data

Ambient temp. (operation/storage)	-20°C ... +60°C / -30°C ... +70°C
Safety class	III (acc. to EN 61140)
Protective circuit ⁵⁾	2, 3
Protection class	IP 65 (acc. to EN 60529)
LED class	1 (acc. to EN 60825-1)
Applied standards	EN 60947-5-2, UL 508

- 1) Typ. scanning range limit: max. attainable range without performance reserve
- 2) Scanning range: recommended range with performance reserve
- 3) Observe the safety regulations and installation instructions regarding power supply and wiring; for UL applications: only for use in "Class 2" circuits acc. to NEC
- 4) Cable cross-section 4x0.25mm²
- 5) 2=polarity reversal protection, 3=short-circuit protection for all outputs

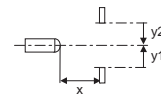
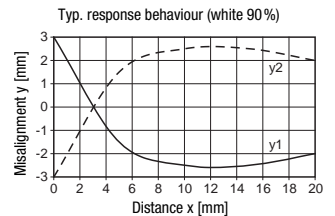
Tables

1	0	20	23
2	2	18	20
3	4	15	17

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

<input type="checkbox"/>	Scanning range [mm]
<input type="checkbox"/>	Typ. scanning range limit [mm]

Diagrams



Order guide

	Designation	Part No.
With M12 connector		
PNP transistor output	RK 93/4-20 L	500 23930
With standard plug		
NPN transistor output	RK 93/2-20 S	500 00544
PNP transistor output	RK 93/4-20 S	500 00551
With cable connection 2m		
PNP transistor output	RK 93/4-20	500 00550

Remarks

Approved purpose:

The diffuse reflection light scanners are optical electronic sensors for optical, contactless detection of objects.

RK 93

Energetic diffuse reflection light scanner

Part No. 501 11606

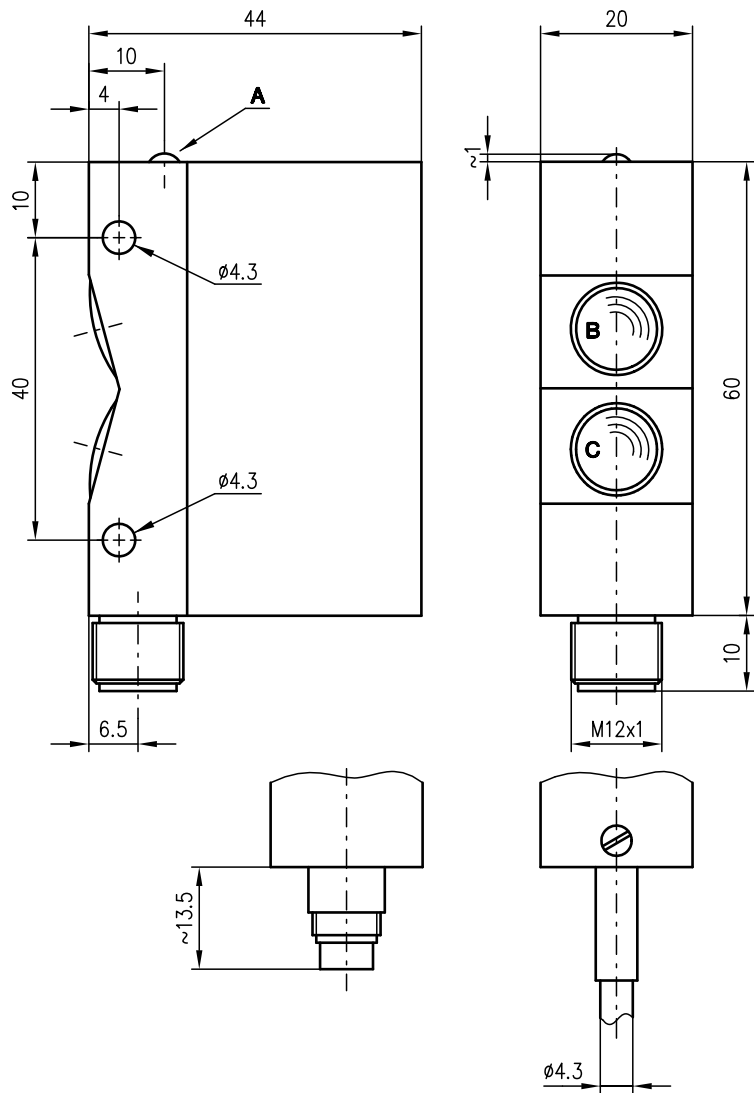


0 ... 65mm



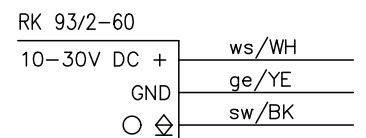
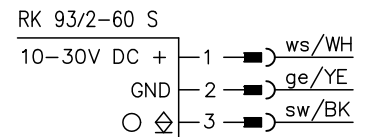
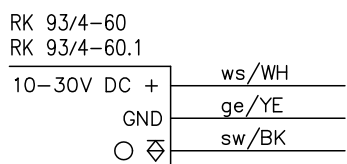
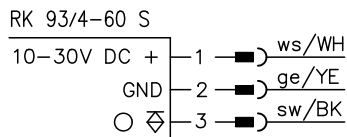
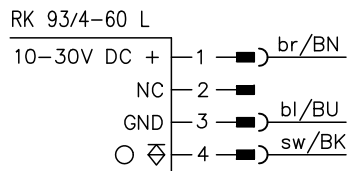
- Background suppression through V-shaped optical system
- Infrared light
- Small light profile for slot scanning (RK 93/4-60.1)
- Mounting holes for fast installation
- Connection via M12 connector, standard plug or cable (2m)

Dimensioned drawing



- A** Indicator diode
- B** Receiver
- C** Transmitter

Electrical connection



Accessories:

(available separately)

- M12 connectors (KD ...)
- Ready-made cables (KB ...)
- Standard plug

We reserve the right to make changes • 93_c02.gb.fm

Specifications

Optical data

Typ. scanning range limit (white 90%) ¹⁾	0 ... 65mm
Scanning range ²⁾	see tables
Light source	LED (modulated light)
Wavelength	880nm (infrared)

Timing

Switching frequency	250Hz
Response time	2ms

Electrical data

Operating voltage U_B ^{3) 4)}	10 ... 30VDC (incl. residual ripple)
Residual ripple	≤ 15% of U_B
Power consumption	max. 0.6W
Switching output	PNP or NPN transistor output
Function characteristics	light switching
Signal voltage high/low	≥ ($U_B - 3V$) / ≤ 2V
Output current	max. 100mA

Indicators

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

Mechanical data

Housing	metal
Optics cover	glass
Weight	170g
Connection type ⁵⁾	M12 connector 4-pin, standard plug 4-pin or cable 2000mm

Environmental data

Ambient temp. (operation/storage)	-20°C ... +60°C / -30°C ... +70°C
Safety class	III (acc. to EN 61140)
Protective circuit ⁶⁾	2, 3
Protection class	IP 65 (acc. to EN 60529)
LED class	1 (acc. to EN 60825-1)
Applied standards	EN 60947-5-2, UL 508

- 1) Typ. scanning range limit: max. attainable range without performance reserve
- 2) Scanning range: recommended range with performance reserve
- 3) Functional extra-low voltage with reliable disconnection or protective extra-low voltage (VDE 0100/T 410)
- 4) Observe the safety regulations and installation instructions regarding power supply and wiring; for UL applications: only for use in "Class 2" circuits acc. to NEC
- 5) Cable cross-section 4x0.25mm²
- 6) 2=polarity reversal protection, 3=short-circuit protection for all outputs

Order guide

	Designation	Part No.
With M12 connector		
PNP transistor output	RK 93/4-60 L	500 22192
With standard plug		
NPN transistor output	RK 93/2-60 S	500 00546
PNP transistor output	RK 93/4-60 S	500 00553
With cable connection 2m		
NPN transistor output	RK 93/2-60	500 00545
PNP transistor output	RK 93/4-60	500 00552
PNP transistor output	RK 93/4-60.1	500 82014

Tables

RK 93...60[L][S]

1	0	60	65
2	5	40	45
3	8	37	40

RK 93/4-60.1

1	0	60	65
2	15	50	55
3	20	45	50

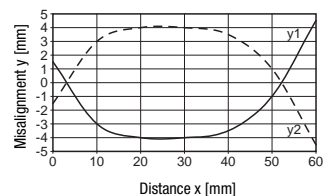
1	white 90%
2	grey 18%
3	black 6%

□	Scanning range [mm]
■	Typ. scanning range limit [mm]

Diagrams

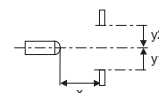
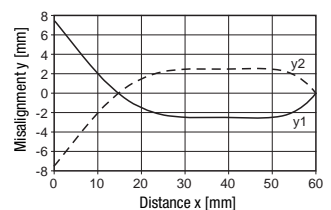
RK 93...60[L][S]

Typ. response behaviour (white 90%)



RK 93/4-60.1

Typ. response behaviour (white 90%)



Remarks

Approved purpose:

The diffuse reflection light scanners are optical electronic sensors for optical, contactless detection of objects.

- Small light spot for slot scanning (RK 93/4-60.1)

RK 93

Energetic diffuse reflection light scanner

Part No. 501 11608

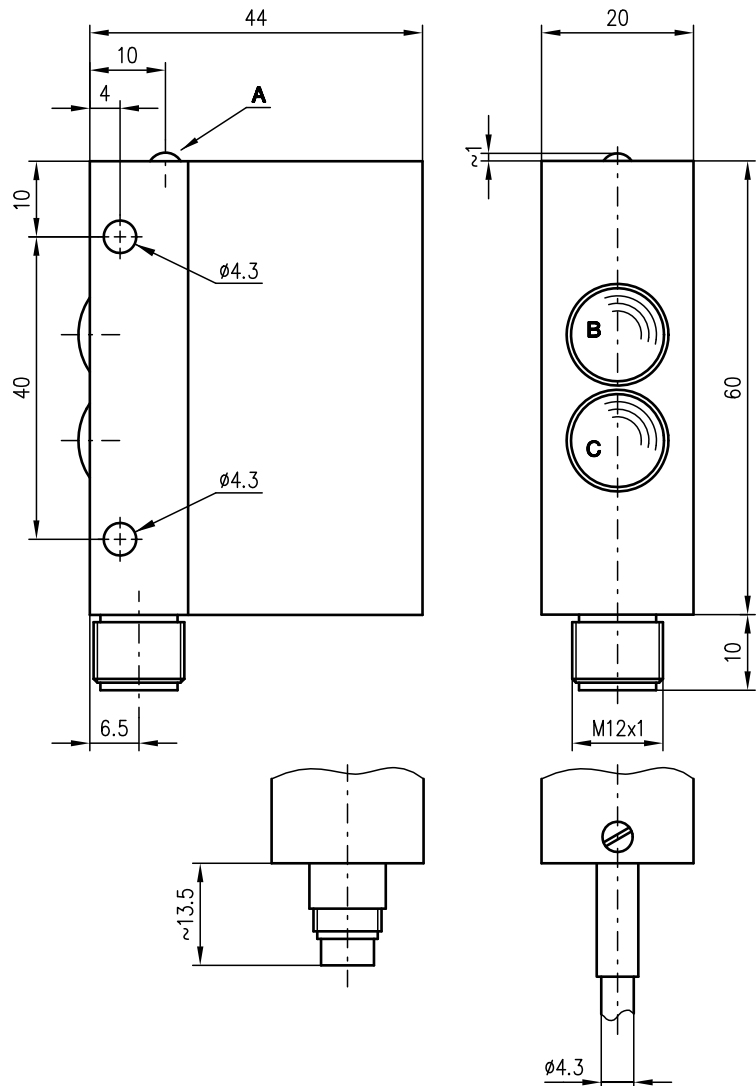


5 ... 170mm
2 ... 210mm



- Infrared light
- Background suppression through appropriate optical geometry
- Mounting holes for fast installation
- Connection via M12 connector, standard plug or cable (2m)

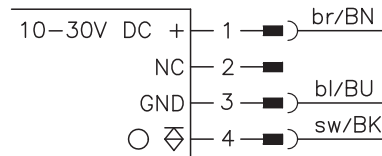
Dimensioned drawing



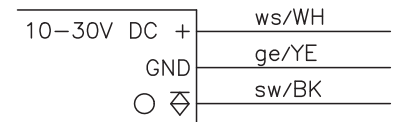
- A** Indicator diode
- B** Receiver
- C** Transmitter

Electrical connection

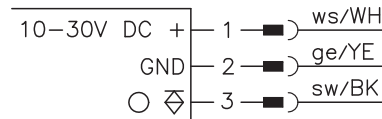
RK 93/4-150 L
RK 93/4-200 L



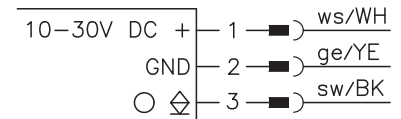
RK 93/4-150



RK 93/4-150 S



RK 93/2-150 S



Accessories:

(available separately)

- M12 connectors (KD ...)
- Ready-made cables (KB ...)
- Standard plug

We reserve the right to make changes • 93_c03gb.fm

Specifications

Optical data

Typ. scanning range limit (white 90%) ¹⁾
 Scanning range ²⁾
 Light source
 Wavelength

RK 93/4-150...

5 ... 170mm
 see tables
 LED (modulated light)
 880nm (infrared)

RK 93/4-200...

2 ... 210mm
 see tables

Timing

Switching frequency 250Hz
 Response time 2ms

Electrical data

Operating voltage U_B ^{3) 4)} 10 ... 30VDC (incl. residual ripple)
 Residual ripple $\leq 15\%$ of U_B
 Power consumption max. 0.6W
 Switching output PNP or NPN transistor output
 Function characteristics light switching
 Signal voltage high/low $\geq (U_B - 3V) \leq 2V$
 Output current max. 100mA

Indicators

LED yellow on reflection reflection, output transistor activated
 LED yellow flashing reflection, no performance reserve

Mechanical data

Housing metal
 Optics cover glass
 Weight 170g
 Connection type ⁵⁾ M12 connector 4-pin, standard plug 4-pin or cable 2000mm

Environmental data

Ambient temp. (operation/storage) -20°C ... +60°C/-30°C ... +70°C
 Safety class III (acc. to EN 61140)
 Protective circuit ⁶⁾ 2, 3
 Protection class IP 65 (acc. to EN 60529)
 LED class 1 (acc. to EN 60825-1)
 Applied standards EN 60947-5-2, UL 508

- 1) Typ. scanning range limit: max. attainable range without performance reserve
- 2) Scanning range: recommended range with performance reserve
- 3) Functional extra-low voltage with reliable disconnection or protective extra-low voltage (VDE 0100/T 410)
- 4) Observe the safety regulations and installation instructions regarding power supply and wiring; for UL applications: only for use in "Class 2" circuits acc. to NEC
- 5) Cable cross-section 4x0.25mm²
- 6) 2=polarity reversal protection, 3=short-circuit protection for all outputs

Order guide

	Designation	Part No.
With M12 connector	PNP transistor output	RK 93/4-150 L 500 25513
	PNP transistor output	RK 93/4-200 L 500 24851
With standard plug	NPN transistor output	RK 93/2-150 S 500 00549
	PNP transistor output	RK 93/4-150 S 500 00555
With cable connection 2m	PNP transistor output	RK 93/4-150 500 00554

Tables

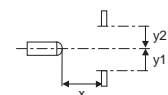
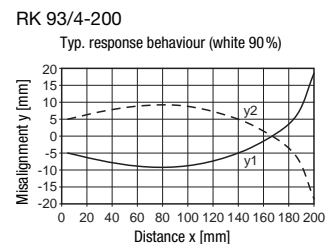
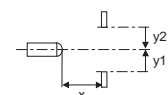
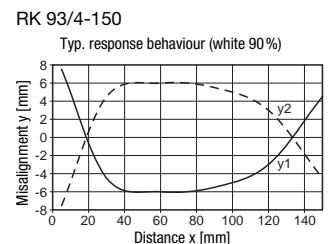
1	5	150	170
2	20	100	110
3	25	70	80

1	2	200	210
2	7	135	140
3	15	105	110

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

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

Diagrams



Remarks

Approved purpose:
 The diffuse reflection light scanners are optical electronic sensors for optical, contactless detection of objects.

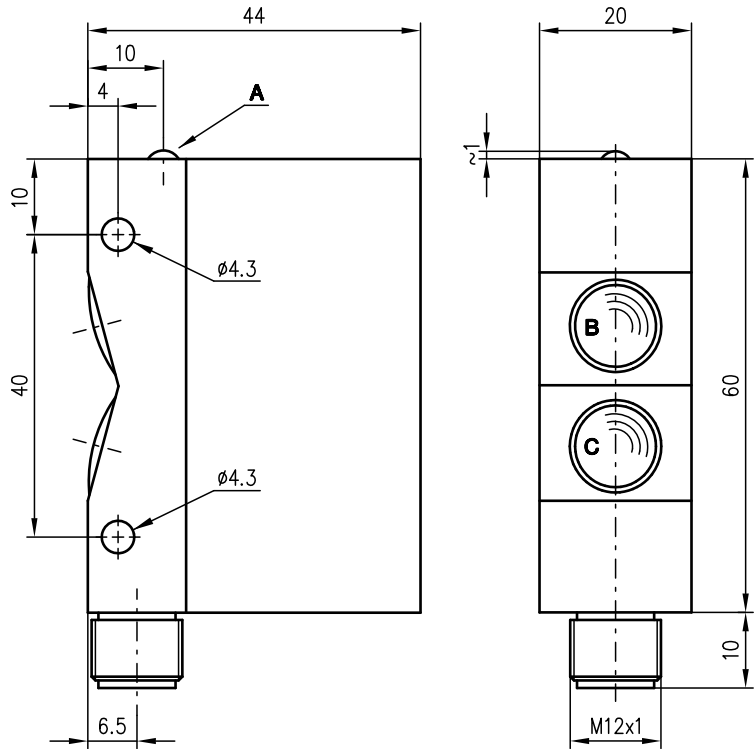
RK 93

Energetic diffuse reflection light scanner

Part No. 501 11607



Dimensioned drawing



- A** Indicator diode
- B** Receiver
- C** Transmitter

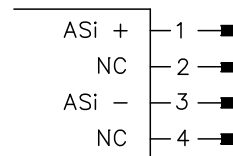


0 ... 65mm



- Background suppression through V-shaped optical system
- Integrated AS-i slave
- Infrared light
- Mounting holes for fast installation

Electrical connection



Accessories:

(available separately)

- M12 connectors (KD ...)

AS-i Accessories:

(available separately)

- Bus terminals
- AS-i ribbon cable
- Address programming device
- Coupling modules
- Intermediate cables etc.

We reserve the right to make changes • 93_c05gb.fm

Specifications

Optical data

Typ. scanning range limit (white 90%)	0 ... 65mm
Scanning range	see tables
Light source	LED (modulated light)
Wavelength	880nm (infrared)
Timing	
Switching frequency (sensor)	acc. to AS-i specifications max. 5ms (250Hz)
Response time (sensor)	2.5ms

Electrical data

Operating voltage U_B ¹⁾	26.5 ... 31.6V (acc. to AS-i specifications)
Open-circuit current	≤ 35mA
Indicators	
LED yellow on	reflection
LED yellow flashing	reflection, no performance reserve

Mechanical data

Housing	metal
Optics cover	glass
Weight	170g
Connection type	M12 connector, 4-pin, stainless steel

Environmental data

Ambient temp. (operation/storage)	-20°C ... +60°C/-30°C ... +70°C
Protection class	IP 65 (acc. to EN 60529)
LED class	1 (acc. to EN 60825-1)
Applied standards	EN 60947-5-2
Electromagnetic compatibility	acc. to AS-i specifications

AS-i data

I/O code	1
ID code	1
Address	programmed by the user in the range of 1 to 31
Cycle time acc. to AS-i specifications	5ms
AS-i standard according to profile	S-1.1

1) Observe the safety regulations and installation instructions regarding power supply and wiring

Assignment: data bits				Assignment: parameter bits			
		Programming (host level)				Programming (host level)	
D ₀	Switching output	0	no reflection	*P ₀	NC	0	
		1	reflection			1	System parameter
D ₁	NC	0		*P ₁	Light/dark switching	0	dark switching
		1				1	light switching
D ₂	NC	0		*P ₂	NC	0	
		1				1	System parameter
D ₃	NC	0		*P ₃	NC	0	
		1				1	System parameter

* default = 1

Order guide

Designation	Part No.
RK 93/A-60 L	500 81080

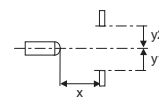
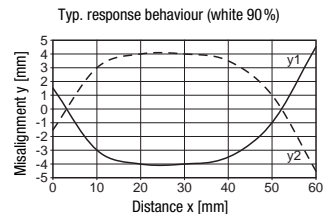
Tables

1	0	60	65
2	5	40	45
3	8	37	40

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

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

Diagrams



Remarks

Approved purpose:
The diffuse reflection light scanners are optical electronic sensors for optical, contactless detection of objects.

IFRK 93

Diffuse reflection light scanner with background suppression

Part No. 501 11612

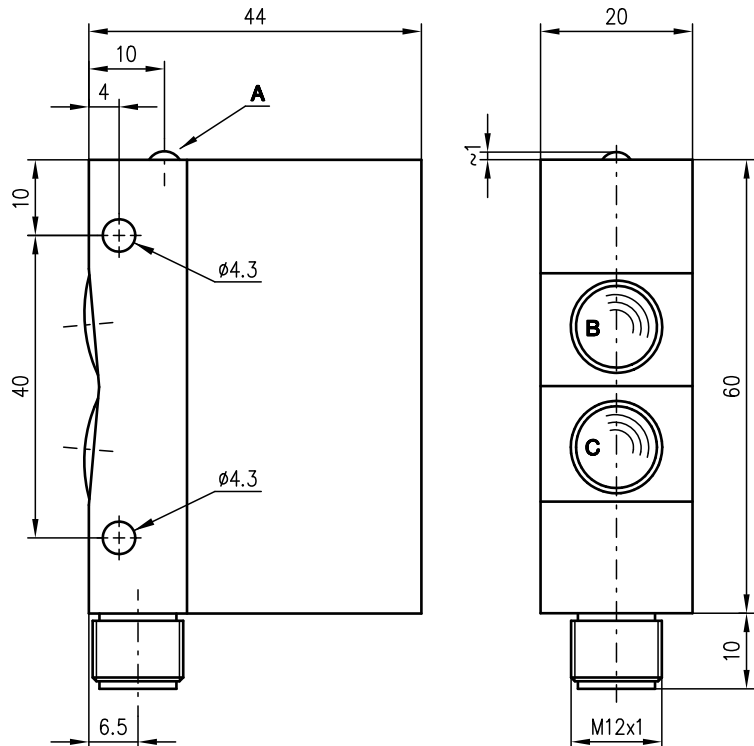


30 ... 100mm



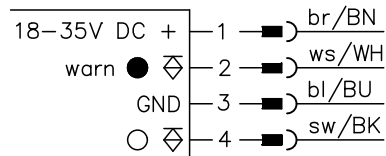
- Scanner with foreground and background suppression through V-shaped optics
- Infrared light
- Mounting holes for fast installation
- Connection via M12 connector

Dimensioned drawing



- A** Indicator diode
- B** Receiver
- C** Transmitter

Electrical connection



Accessories:

(available separately)

- M12 connectors (KD ...)

We reserve the right to make changes • 93_d02gb.fm

Specifications

Optical data

Typ. scanning range limit (white 90%) ¹⁾	30 ... 100mm
Scanning range ²⁾	see tables
Light source	LED (modulated light)
Wavelength	880nm (infrared)

Timing

Switching frequency	150Hz
Response time	3.3ms

Electrical data

Operating voltage U_B ^{3) 4)}	18 ... 35VDC (incl. residual ripple)
Residual ripple	≤ 15% of U_B
Power consumption	max. 2W
Switching output	PNP transistor output
Function characteristics	light switching
Signal voltage high/low	≥ ($U_B - 3V$) / ≤ 2V
Output current	max. 100mA

Indicators

LED yellow off	no reflection, warning output activated (wire break monitoring)
LED yellow on	reflection, switching output activated
LED yellow flashing	warning output activated reflection, no performance reserve warning output not activated

Mechanical data

Housing	metal
Optics	glass
Weight	170g
Connection type	M12 connector, 4-pin

Environmental data

Ambient temp. (operation/storage)	-20°C ... +60°C / -30°C ... +70°C
Safety class	III (acc. to EN 61140)
Protective circuit ⁵⁾	2, 3
Protection class	IP 65 (acc. to EN 60529)
LED class	1 (acc. to EN 60825-1)
Applied standards	EN 60947-5-2, UL 508

Options

Warning output	PNP transistor output
Function characteristics	
Switching output = Q	at reflection: Q 0 high / QW 0 high
Warning output = QW	at reflection, performance reserve insufficient: Q=high, QW=low no reflection: Q=low / QW=high

- 1) Typ. scanning range limit: max. attainable range without performance reserve
- 2) Scanning range: recommended range with performance reserve
- 3) Functional extra-low voltage with reliable disconnection or protective extra-low voltage (VDE 0100/T 410)
- 4) Observe the safety regulations and installation instructions regarding power supply and wiring; for UL applications: only for use in "Class 2" circuits acc. to NEC
- 5) 2=polarity reversal protection, 3=short-circuit protection for all outputs

Order guide

Designation	Part No.
IFRK 93/4-100 L.2	500 27863

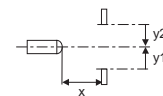
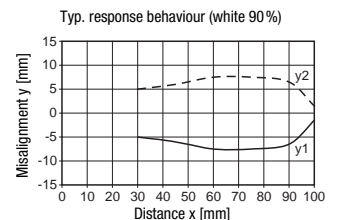
Tables

1	30	100	100
2	30	100	100
3	30	90	95

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

<input type="checkbox"/>	Scanning range [mm]
<input type="checkbox"/>	Typ. scanning range limit [mm]

Diagrams



Remarks

Approved purpose:

The diffuse reflection light scanners are optical electronic sensors for optical, contactless detection of objects.

- Warning output with double-function

IFRK 93

Diffuse reflection light scanner with background suppression

Part No. 501 11611

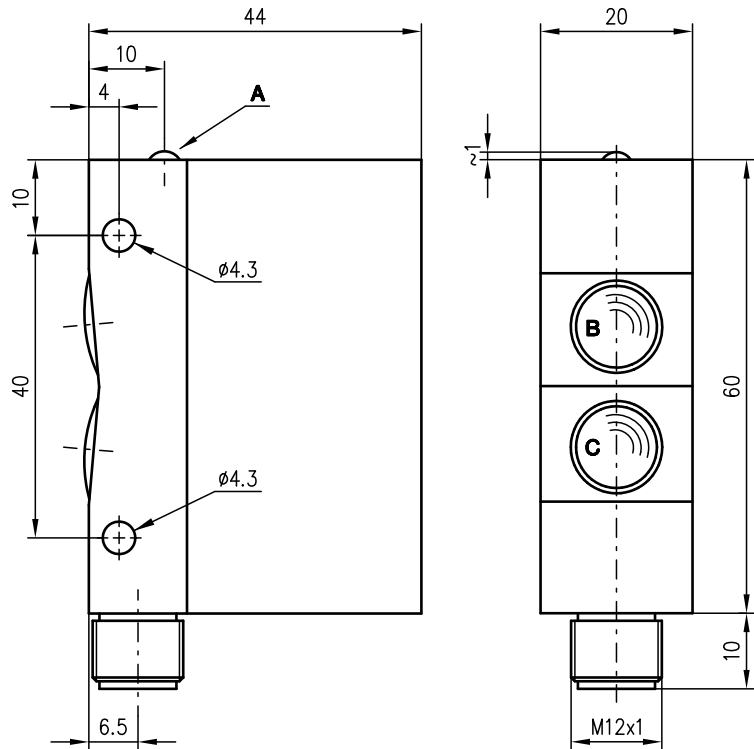


50 ... 200mm



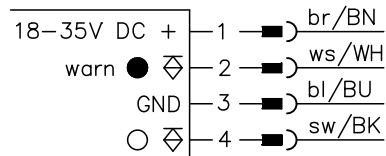
- Scanner with foreground and background suppression due to V-shaped optics
- Infrared light
- Mounting holes for fast installation
- Connection via M12 connector

Dimensioned drawing



- A** Indicator diode
- B** Receiver
- C** Transmitter

Electrical connection



Accessories:

(available separately)

- M12 connectors (KD ...)

We reserve the right to make changes • 93_d03gb.fm

Specifications

Optical data

Typ. scanning range limit (white 90%) ¹⁾	50 ... 200mm
Scanning range ²⁾	see tables
Light source	LED (modulated light)
Wavelength	880nm (infrared)

Timing

Switching frequency	150Hz
Response time	3.3ms

Electrical data

Operating voltage U_B ^{3) 4)}	18 ... 35VDC (incl. residual ripple)
Residual ripple	≤ 15% of U_B
Power consumption	max. 2W
Switching output	PNP transistor output
Function characteristics	light switching
Signal voltage high/low	≥ ($U_B - 3V$) / ≤ 2V
Output current	max. 100mA

Indicators

LED yellow off	no reflection, warning output activated (wire break monitoring)
LED yellow on	reflection, switching output activated
LED yellow flashing	warning output activated reflection, no performance reserve warning output not activated

Mechanical data

Housing	metal
Optics	glass
Weight	170g
Connection type	M12 connector, 4-pin

Environmental data

Ambient temp. (operation/storage)	-20°C ... +60°C / -30°C ... +70°C
Safety class	III (acc. to EN 61140)
Protective circuit ⁵⁾	2, 3
Protection class	IP 65 (acc. to EN 60529)
LED class	1 (acc. to EN 60825-1)
Applied standards	EN 60947-5-2, UL 508

Options

Warning output	PNP transistor output
Function characteristics	
Switching output = Q	at reflection: Q 0 high / QW 0 high
Warning output = QW	at reflection, performance reserve insufficient: Q=high, QW=low no reflection: Q=low / QW=high

- 1) Typ. scanning range limit: max. attainable range without performance reserve
- 2) Scanning range: recommended range with performance reserve
- 3) Functional extra-low voltage with reliable disconnection or protective extra-low voltage (VDE 0100/T 410)
- 4) Observe the safety regulations and installation instructions regarding power supply and wiring;
for UL applications: only for use in "Class 2" circuits acc. to NEC
- 5) 2=polarity reversal protection, 3=short-circuit protection for all outputs

Order guide

Designation	Part No.
IFRK 93/4-200 L.1	500 41999

Tables

1	50	200	200
2	50	165	185
3	50	150	170

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

<input type="checkbox"/>	Scanning range [mm]
<input type="checkbox"/>	Typ. scanning range limit [mm]

Diagrams

Remarks

Approved purpose:

The diffuse reflection light scanners are optical electronic sensors for optical, contactless detection of objects.

- Warning output with double-function