96 Series

Product description

Contents:

96 Series - Overview and advantages

Special features of Series 96

Sensor selection table

Data sheets

96 Series
Overview and advantages

Extensive sensor series:
- In robust metal housing with glass optics
- In solid plastic housing
- In protection class IP 67

Operating principles:
- Throughbeam photoelectric sensors to 150m
- Protective throughbeam photoelectric sensors to 60m
- Retro-reflective photoelectric sensors with polarisation filter
- Energetic diffuse reflection light scanners
- Diffuse reflection light scanners with background suppression
- Retro-reflective photoelectric sensor for safe detection of transparent media
- Laser diffuse reflection light scanners with background suppression to 5m (15m against reflective tape)

- Visible red light for easy alignment
- Infrared light for high performance reserve and to prevent interference from extraneous light

- 10 … 30VDC voltage with PNP/NPN transistor output
- Alternatively AS-interface bus connection or 20 … 230V all mains voltage with relay output

M12 connector or comfortable terminal compartment for individual electrical connection

Innovative mounting systems for rod mounting or through holes for universal screw mounting

Extensive options:
- Warning output
- Activation input
- Switching delay
- Low temperature and optics heating down to -35°C
- Wide angle

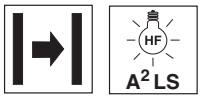
New!!!

- Sensors with complementary switching outputs
- A^2LS ensures high extraneous light protection
- Sensors for direct connection to AS-interface I/O coupling modules
- Sensors in accordance with ATEX standard
- Light/dark switching for variable signal output

Special features of Series 96

At home in all branches of industry under all environmental conditions:

- Sensors for standard and special applications
- Housings in metal and plastic versions
- Standard M12 connection or more convenient, easily assessable terminal compartment
- Sensors with integrated AS-interface technology
- Front-window heating for use under extreme environmental conditions
- Versatile mounting systems make possible timesaving and cost-effective, onsite mounting

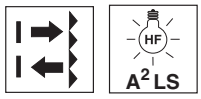


Throughbeam photoelectric sensors

✔ **Advantage 1:** Various operating ranges, each with a high performance reserve
✔ **Advantage 2:** Sensitivity adjustment for adaptation to the application
✔ **Advantage 3:** Warning output for display of soiling and misalignment
✔ **Advantage 4:** Versions in infrared and visible red light
✔ **Advantage 5:** Wide angle version for mounting in difficult-to-access areas

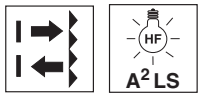
Protective throughbeam photoelectric sensors

✔ **Advantage 1:** Versions in infrared and visible red light
✔ **Advantage 2:** Display of operational readiness and status of the switching output



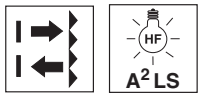
Retro-reflective photoelectric sensors

✔ **Advantage 1:** Large operating range
✔ **Advantage 2:** Invisible infrared light



Retro-reflective photoelectric sensors with polarisation filter

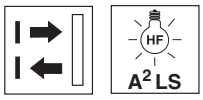
✔ **Advantage 1:** Large operating range with high performance reserve
✔ **Advantage 2:** Adjustable sensitivity
✔ **Advantage 3:** Status LED with flashing mode for display of soiling and misalignment
✔ **Advantage 4:** Activation input for function test and muting application



Retro-reflective photoelectric sensors for detection of transparent media, e.g. bottles (glass, PET)

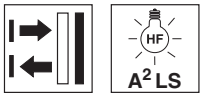
✔ **Advantage 1:** Large operating range
✔ **Advantage 2:** Exact adjustment for objects with a wide range of transmittances
✔ **Advantage 3:** Timesaving adjustment through user guidance
✔ **Advantage 4:** Adjustment possible without object
✔ **Advantage 5:** Gap detection

Universally usable optical sensors for all branches of industry



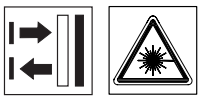
Energetic diffuse reflection light scanners

- ✔ **Advantage 1:** Sensitivity adjustment by means of adjustment potentiometer
- ✔ **Advantage 2:** Large scanning range with minimal zero distance
- ✔ **Advantage 3:** Multiple options such as switching delay, optics heating, etc.



Diffuse reflection light scanners with background suppression

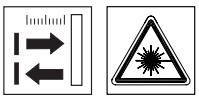
- ✔ **Advantage 1:** Versions in infrared and visible red light
- ✔ **Advantage 2:** Very good detection behaviour even with shiny surfaces
- ✔ **Advantage 3:** Safe switching behaviour in the set switching point
- ✔ **Advantage 4:** Diagnosis and programming options for timesaving commissioning and adaptation to various environmental conditions



Laser scanners with background suppression

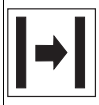
- ✔ **Advantage 1:** Large scanning and adjustment range
- ✔ **Advantage 2:** 2 or 3 individually adjustable switching points
- ✔ **Advantage 3:** Safe detection of shiny and slanted surfaces
- ✔ **Advantage 4:** Very good background and extraneous light suppression through the use of the phase-measurement principle
- ✔ **Advantage 5:** Light spot and switching behaviour suitable for positioning at long distance

Other 96 Series products (separate documents):



Measuring (laser) distance sensors ODS(L) 96

Ex Sensors LS 96 Ex, SLS 96 Ex, PRK 96 Ex, HRT 96 Ex

Operating principle	Designation	c UL us LISTED	Typ. oper. range limit/ typ. scan. range limit	Housing		Light source		Operating voltage			Output			
				Metal	Plastic	Red light	Infrared	10 ... 30 VDC	AS-i system	20 ... 230 VAC/DC	PNP transistor	NPN transistor	Relay	AS-interface
	LS 96M/P-1040-4	•	65 m	•			•	•			•			
	LS 96M/P-1130-2	•	65 m	•			•	•			•			
	LS 96M/P-1170-2	•	39 m	•		•		•			•			
	LS 96M/P-1170-4	•	39 m	•		•		•			•			
	LS 96M/N-1010-2	•	65 m	•			•	•				•		
	LS 96K/P-1010-4	•	65 m		•		•	•			•			
	LS 96K/P-1030-2	•	65 m		•		•	•			•			
	LS 96K/P-1030-4	•	65 m		•		•	•			•			
	LS 96K/P-1140-2 3)	•	39 m		•	•		•			•			
	LS 96K/P-1015-4 4)	•	65 m		•		•	•			•			
	LS 96K/P-1010.1-4 4)	•	65 m		•		•	•			•			
	LS 96M/P-3010-4	•	150 m	•			•	•			•			
	LS 96M/P-3010-2	•	150 m	•			•	•			•			
	LS 96M/P-3012-2	•	150 m	•			•	•			•			
	LS 96M/P-3012-4	•	150 m	•			•	•			•			
	LS 96M/P-181W-4	•	39 m	•		•		•			•			
	LS 96M/P-181W-2	•	39 m	•		•		•			•			
	LS 96M/P-1816-4	•	39 m	•		•		•			•			
	LS 96M/R-1310-2	•	65 m	•			•			•			•	
	LS 96K/R-1310-2	•	65 m		•		•			•			•	
	LS 96K/R-1320-2	•	65 m		•		•			•			•	
	LS 96K/R-131P-2	•	65 m		•		•			•			•	
	LS 96M/R-3310-2	•	150 m	•			•			•			•	
	LS 96M/R-176W-2		39 m	•		•				•			•	
	SLS 96M/P-1070-T2-2	•	65 m	•			•	•			•			
	SLS 96M/P-1070-T2-4	•	65 m	•			•	•			•			
	SLS 96M/P-1200-T2-2	•	39 m	•		•		•			•			
	SLS 96M/P-1200-T2-4	•	39 m	•		•		•			•			
	SLS 96M/P-1071-T2-2	•	65 m	•			•	•			•			
	SLS 96M/P-1071-T2-4	•	65 m	•			•	•			•			
	SLS 96K/P-1070-T2-2	•	65 m		•		•	•			•			
	SLS 96K/P-1070-T2-4	•	65 m		•		•	•			•			
	SLS 96K/P-1200-T2-2	•	39 m		•	•		•			•			
	SLS 96K/P-1200-T2-4	•	39 m		•	•		•			•			
	SLS 96K/P-1207-T2-2 2)	•	39 m		•	•		•			•			
	SLS 96K/P-1207-T2-4 2)	•	39 m		•	•		•			•			
	LS 96M/A-182W-4 1)	•	39 m	•		•			•					•

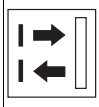
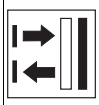
1) Transmitter without integrated AS-i-slave technology
2) Suitable for multi-sensor operation (parallel light axes)
3) Activation input LOW (active low)
4) For direct connection to AS-interface I/O coupling modules

Switching frequency	Switching		Connection		Options									Page
	Light	Dark	M12 connector	Terminals	Warning output	Polarisation filter	Background suppression	Activation input	Switching delay	Low temp./optics heating	Safety application	Transparent media	Wide angle	
500 Hz	•	•	•		•				•					11
500 Hz	•	•		•	•			•	•	•				11
500 Hz	•	•		•	•				•					11
500 Hz	•	•	•		•				•					11
500 Hz	•	•		•										11
500 Hz	•	•	•											13
500 Hz	•	•		•					•					13
500 Hz	•	•	•						•					13
500 Hz	•	•		•				•						13
500 Hz		•	•											13
500 Hz	•	•	•											13
500 Hz	•	•	•											15
500 Hz	•	•		•										15
500 Hz	•	•		•				•		•				15
500 Hz	•	•	•					•		•				15
500 Hz	•	•	•										•	17
500 Hz	•	•		•									•	17
500 Hz	•	•	•							•				17
20 Hz	•	•		•										19
20 Hz	•	•		•										19
20 Hz	•	•		•					•					19
20 Hz	•	•		•										19
20 Hz	•	•		•	•									19
20 Hz	•	•		•									•	21
500 Hz	•			•							•			23
500 Hz	•		•								•			23
500 Hz	•			•				•			•			23
500 Hz	•		•					•			•			23
500 Hz	•			•				•		•	•			23
500 Hz	•		•					•		•	•			23
500 Hz	•			•				•			•			25
500 Hz	•		•					•			•			25
500 Hz	•			•				•			•			25
500 Hz	•		•					•			•			25
500 Hz	•			•				•			•			25
500 Hz	•		•					•			•			25
500 Hz/AS-i	•	•	•		•								•	27

Operating principle	Designation	c UL us LISTED	Typ. oper. range limit/ typ. scan. range limit	Housing		Light source		Operating voltage			Output			
				Metal	Plastic	Red light	Infrared	10 ... 30 VDC	AS-i system	20 ... 230 VAC/DC	PNP transistor	NPN transistor	Relay	AS-interface
	RK 96M/P-1440-21	•	18m	•			•	•			•			
	RK 96K/R-1560-25	•	18m		•		•			•			•	
	RK 96K/R-156P-25	•	18m		•		•			•			•	
	PRK 96M/P-1370-22	•	10m	•		•		•			•			
	PRK 96M/P-1370-42	•	10m	•		•		•			•			
	PRK 96M/P-1400-22	•	10m	•		•		•			•			
	PRK 96M/P-1400-42	•	10m	•		•		•			•			
	PRK 96M/P-1361.1-47	•	10m	•		•		•			•			
	PRK 96M/P-3380-41	•	18m	•		•		•			•			
	PRK 96M/P-3360-21	•	18m	•		•		•			•			
	PRK 96M/N-3366-27	•	18m	•		•		•				•		
	PRK 96K/P-1360-21	•	10m		•	•		•			•			
	PRK 96K/P-1360-41	•	10m		•	•		•			•			
	PRK 96K/P-1380-21	•	10m		•	•		•			•			
	PRK 96K/P-1380-41	•	10m		•	•		•			•			
	PRK 96K/P-3368-41	•	28m		•	•		•			•			
	PRK 96K/P-1365-45 3)	•	10m		•	•		•			•			
	PRK 96K/P-1360.1-41 3)	•	10m		•	•		•			•			
	PRK 96K/N-1380-46	•	10m		•	•		•				•		
	PRK 96M/P-1362-47	•	10m	•		•		•			•			
	PRK 96M/P-1361-47	•	10m	•		•		•			•			
	PRK 96K/P-1363-29 1)	•	10m		•	•		•			•			
	PRK 96K/P-1361-29	•	10m		•	•		•			•			
	PRK 96M/R-3420-25		18m	•		•				•			•	
	PRK 96M/R-3430-25		18m	•		•				•			•	
	PRK 96K/R-1420-25	•	10m		•	•				•			•	
	PRK 96K/R-1430-25	•	10m		•	•				•			•	
	PRK 96K/R-3428-25		24m		•	•				•			•	
	PRK 96M/P-1830-21 2)	•	1.85m	•		•		•			•			
	PRK 96M/P-1830-41 2)	•	1.85m	•		•		•			•			
	PRK 96M/R-1850-25 2)	•	1.85m	•		•				•			•	
	PRK 96M/P-1838-21	•	8.5m	•		•		•			•			
	PRK 96M/P-1838-41	•	8.5m	•		•		•			•			
	PRK 96M/R-1858-25	•	8.5m	•		•				•			•	
	PRK 96M/A-3410-44	•	18m	•		•			•					•
	PRK 96M/P-2838-28	•	8.5m	•		•		•			•			
	PRK 96M/P-2838-48		8.5m	•		•		•			•			

1) Active low
2) Gap detection
3) For direct connection to AS-interface I/O coupling modules

Switching frequency	Switching		Connection		Options									Page
	Light	Dark	M12 connector	Terminals	Warning output	Polarisation filter	Background suppression	Activation input	Switching delay	Low temp./optics heating	Safety application	Transparent media	Single lens	
1000 Hz	•	•		•										29
20 Hz	•	•		•										31
20 Hz	•	•		•										31
1000 Hz	•			•	•	•								33
1000 Hz	•		•		•	•								33
1000 Hz	•			•	•	•			•	•				33
1000 Hz	•		•		•	•			•	•				33
1000 Hz	•	•	•			•		•						33
1000 Hz	•	•	•			•			•					33
1000 Hz	•	•		•		•								33
1000 Hz	•	•	•			•				•				33
1000 Hz	•	•		•		•								35
1000 Hz	•	•	•			•								35
1000 Hz	•	•		•		•			•					35
1000 Hz	•	•	•			•			•					35
1000 Hz	•	•	•			•								35
1000 Hz		•	•			•								35
1000 Hz	•	•	•			•								35
1000 Hz	•	•	•			•			•					35
1000 Hz	•	•	•			•		•		•				37
1000 Hz	•	•	•			•		•						37
1000 Hz	•	•		•		•		•						37
1000 Hz	•	•		•		•		•						37
20 Hz	•	•		•		•								39
20 Hz	•	•		•		•			•					39
20 Hz	•	•		•		•								41
20 Hz	•	•		•		•			•					41
20 Hz	•	•		•										41
1000 Hz	•	•		•		•						•	•	43
1000 Hz	•	•	•			•						•	•	43
20 Hz	•	•		•		•			•			•	•	45
1000 Hz	•	•		•		•						•	•	47
1000 Hz	•	•	•			•						•	•	47
20 Hz	•	•		•		•						•	•	49
1000 Hz/AS-i	•	•	•		•	•								51
500 Hz	•	•		•		•						•	•	53
500 Hz	•	•	•			•						•	•	53

Operating principle	Designation	c UL us LISTED	Typ. oper. range limit/ typ. scan. range limit	Housing		Light source		Operating voltage			Output			
				Metal	Plastic	Red light	Infrared	10 … 30 VDC	AS-i system	20 … 230 V AC/DC	PNP transistor	NPN transistor	Relay	AS-interface
	RT 96M/P-1374-500-42	•	0.03 … 0.7m	•		•		•			•			
	RT 96M/P-1474-800-42	•	0.02 … 1.2m	•			•	•			•			
	RT 96K/P-1444-800-21	•	0.02 … 1.2m		•		•	•			•			
	RT 96K/P-1444-800-41	•	0.02 … 1.2m		•		•	•			•			
	RT 96K/N-1444-800-46	•	0.02 … 1.2m		•		•	•				•		
	RT 96K/P-1444.1-800-41 5)	•	0.02 … 1.2m		•		•	•			•			
	RT 96M/R-1574-800-25	•	0.02 … 1.2m	•			•			•			•	
	HRT 96M/P-1630-800-41	•	0.1 … 1.2m	•		•		•			•			
	HRT 96M/P-1636-800-41	•	0.1 … 1.2m	•		•		•			•			
	HRT 96M/P-1640-800-21	•	0.1 … 1.2m	•		•		•			•			
	HRT 96M/P-1640-800-41	•	0.1 … 1.2m	•		•		•			•			
	HRT 96M/P-1635-800-45 5)	•	0.1 … 1.2m	•		•		•			•			
	HRT 96M/P-1610-1200-21	•	0.1 … 1.8m	•			•	•			•			
	HRT 96M/P-1610-1200-41	•	0.1 … 1.8m	•			•	•			•			
	HRT 96M/P-1620-1200-21	•	0.1 … 1.8m	•			•	•			•			
	HRT 96M/P-1620-1200-41	•	0.1 … 1.8m	•			•	•			•			
	HRT 96M/N-1606-1200-27	•	0.1 … 1.8m	•			•	•				•		
	HRT 96K/P-1600-1200-21	•	1.8m		•		•	•			•			
	HRT 96K/P-1600-1200-41	•	1.8m		•		•	•			•			
	HRT 96K/P-1630-800-21	•	1.2m		•	•		•			•			
	HRT 96K/P-1630-800-41	•	1.2m		•	•		•			•			
	HRT 96K/P-1631-800-47	•	1.2m		•	•		•			•			
	HRT 96K/P-1640-800-41	•	1.2m		•	•		•			•			
	HRT 96K/P-1605-1200-45 5)	•	1.8m		•		•	•			•			
	HRT 96K/P-1607-1200-49 5)	•	1.8m		•		•	•			•			
	HRT 96K/P-1600.1-1200-41 5)	•	1.8m		•		•	•			•			
	HRT 96M/R-1680-1200-25	•	1.8m	•			•			•			•	
	HRT 96M/R-1690-1200-25	•	1.8m	•			•			•			•	
	HRT 96K/R-1680-1200-25	•	1.8m		•		•			•			•	
	HRT 96K/R-1690-1200-25	•	1.8m		•		•			•			•	
	HRT 96M/R-1689-1200-25	•	1.8m	•			•			•			•	
	HRT 96M/A-1660-1200-44	•	1.8m	•			•		•					•
	HRT 96M/A-1670-800-44	•	1.2m	•		•			•					•
	HRT 96M/P-1600-2000-42 1)	•	0.10 … 2.5m	•			•	•			•			
	HRT 96M/P-3604-2000-42 2)	•	0.01 … 2.5m	•			•	•			•			
	HRT 96M/P-3360-5000-426 3)		5.5m	•		•		•			•			
	HRT 96M/P-3370-5000-436 4)		5.5m	•		•		•			•			
	HRT 96M/P-3375-5000-436 4)		5.5m	•		•		•			•			
	HRT 96M/P-336W.21-5000-426 3)		2.5m/5.0m	•		•		•			•			
	HRT 96M/P-3360-2500-426 3)		2.5m	•		•		•			•			

1) 1 Switching point / switching output
2) 2 Switching points / switching outputs, short range
3) 2 Switching points / switching outputs, 1 analogue output
4) 3 Switching points / switching outputs
5) For direct connection to AS-interface I/O coupling modules

Switching frequency	Switching		Connection			Options							Page
	Light	Dark	M12 connector	M18 connector	Terminals	Warning output	Polarisation filter	Background suppression	Activation input	Switching delay	Low temp./optics heating	Safety application	
1000 Hz	•		•			•							**55**
1000 Hz	•		•			•				•			**55**
1000 Hz	•	•			•								**57**
1000 Hz	•	•	•										**57**
1000 Hz	•	•	•										**57**
1000 Hz	•	•	•										**57**
20 Hz	•	•			•					•			**59**
300 Hz	•	•	•					•					**61**
300 Hz	•	•	•					•			•		**61**
300 Hz	•	•			•			•		•			**61**
300 Hz	•	•	•					•		•			**61**
300 Hz	•	•	•					•					**61**
300 Hz	•	•			•			•		•			**61**
300 Hz	•	•	•					•		•			**61**
300 Hz	•	•			•			•		•	•		**61**
300 Hz	•	•	•					•		•	•		**61**
300 Hz	•	•			•			•			•		**61**
300 Hz	•	•			•			•					**63**
300 Hz	•	•	•					•					**63**
300 Hz	•	•			•			•					**63**
300 Hz	•	•	•					•					**63**
300 Hz	•	•	•					•	•				**63**
300 Hz	•	•	•					•		•			**63**
300 Hz		•	•					•					**63**
300 Hz	•		•					•					**63**
300 Hz	•	•	•					•					**63**
20 Hz	•	•			•			•					**65**
20 Hz	•	•			•			•		•			**65**
20 Hz	•	•			•			•					**65**
20 Hz	•	•			•			•		•			**65**
20 Hz	•	•			•			•					**65**
300 Hz/AS-i	•	•	•					•	•				**67**
300 Hz/AS-i	•	•	•					•	•				**67**
300 Hz	•	•	•					•		•			**69**
300 Hz	•	•	•					•		•			**69**
20 Hz	•	•	•					•					**71**
20 Hz	•	•	•					•					**71**
20 Hz		•	•					•					**71**
10 Hz	•	•	•					•					**73**
40 Hz	•	•	•					•					**75**

LS 96 — Throughbeam photoelectric sensors

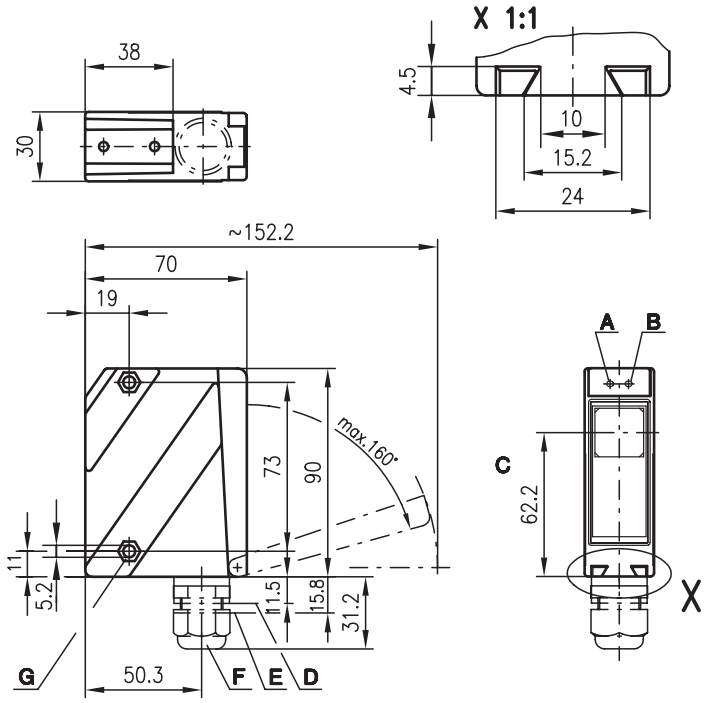
39 m
65 m

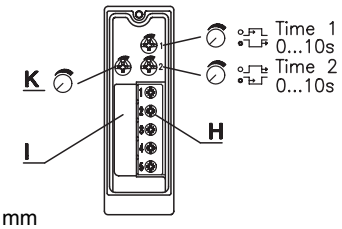
10 - 30 V DC

HF A²LS

- Throughbeam photoelectric sensors with high performance reserve in visible red light or infrared light
- Robust metal housing with glass cover or plastic housing, protection class IP 67/ IP 69K for industrial application
- Complementary outputs, sensitivity adjustment and delay before start-up for optimal adaptation to the application
- Connection via M12 connector or terminal compartment
- Multiple options with warning output, activation input, switching delays and optics heating for use at low temperatures

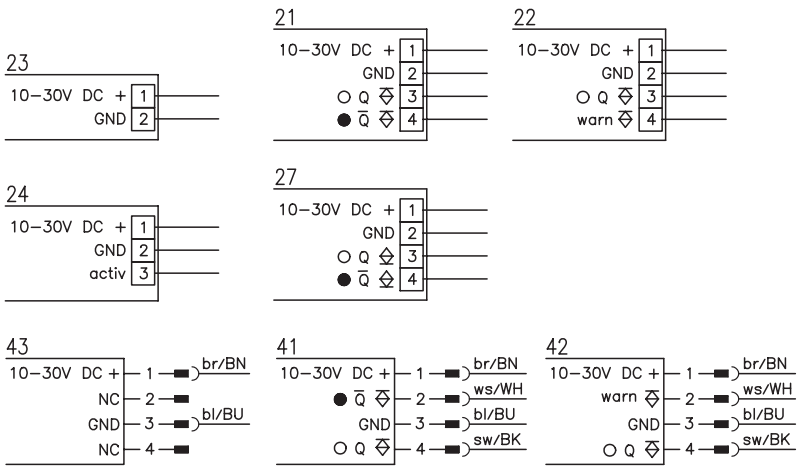
Dimensioned drawing





A Indicator diode green
B Indicator diode yellow
C Optical axis
D Device plug M12x1
E Device plug M18x1
F Screwed cable gland M16x1.5 for Ø 5 … 10 mm
G Countersinking for SK nut M5, 4.2 deep
H Connection terminals
I Cable entry
K Sensitivity adjustment

Electrical connection



IEC 60947... IEC 60947... IP 69K IP 67

Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)
- Alignment aid ARH 96

Specifications

	Infrared light	Red light
Optical data		
Typ. operating range limit [1]	0 … 65m	0 … 39m
Operating range [2]	0 … 50m	0 … 30m
Light source	LED (modulated light)	LED (modulated light)
Wavelength	880nm	660nm
Timing		
Switching frequency	500Hz	
Response time	1ms	
Delay before start-up	≤ 200ms	
Electrical data		
Operating voltage U_B	10 … 30VDC (incl. residual ripple)	
Residual ripple	≤ 15% of U_B	
Bias current	≤ 50mA, ≤ 130mA with optional optics heating	
Switching output	NPN or PNP transistor	
Function characteristics	light/dark switching	
Signal voltage high/low	≥ (U_B-2V)/≤ 2V (PNP)	
Output current	max. 100mA	
Sensitivity	adjustable	
Indicators		
LED green	ready	
LED yellow	light path free	
LED yellow flashing	light path free, no performance reserve	
Mechanical data	**Metal housing**	
Housing	diecast zinc	
Optics cover	glass	
Weight	380g	
Connection type	terminals or M12 connector	
Environmental data		
Ambient temp. (operation/storage)	-20°C … +60°C/-40°C … +70°C	
Protective circuit [3]	1, 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	
Options		
Activation input activ		
Transmitter active/not active	≥ 8V/≤ 2V (≥ 2V/≤ 2V) [6]	
Activation/disable delay	≤ 0.5ms	
Input resistance	47KΩ ± 10%	
Warning output autoControl warn	PNP transistor, 100mA, counting principle	
Optics heating	for temperature changes, prevents fogging	
Low temperature	to -35°C	
Switching delay (slow oper./release)	0 … 10s (separately adjustable)	

1) Typ. operating range limit: max. attainable range without performance reserve
2) Operating range: recommended range with performance reserve
3) 1=transient protection, 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
6) Active high

Order guide

Selection table Equipment ↓	Order code →	LS 96M/P-1040-4 Part No. 500 25228 (Tr) Part No. 500 25205 (Re)	LS 96M/P-1130-2 Part No. 500 25223 (Tr) Part No. 500 25201 (Re)	LS 96M/P-1170-2 Part No. 500 25217 (Tr) Part No. 500 25195 (Re)	LS 96M/P-1170-4 Part No. 500 25219 (Tr) Part No. 500 25197 (Re)	LS 96M/N-1010-2 Part No. 500 25225 (Tr) Part No. 500 31295 (Re)		
Housing	metal	●	●	●	●	●		
	plastic							
Light source	red light (30m)			●	●			
	infrared light (50m)	●	●			●		
Connection	terminals		●	●		●		
	M12 connector	●			●			
Features	optics heating/low temp.		●					
	switching delay	●	●	●	●			
	warning output	●	●	●	●			
	activation input		● [6]					
	NPN switching output					●		

Tables

Red light

0	30	39

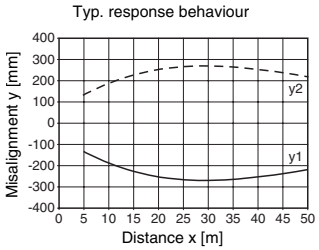
Infrared light

0	50	65

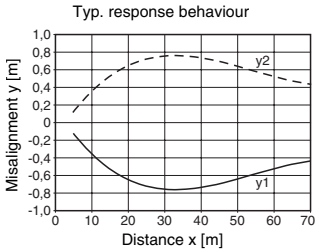
Operating range [m]
Typ. operating range limit [m]

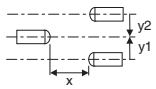
Diagrams

Red light



Infrared light





Remarks

- The throughbeam photoelectric sensor is also available with integrated AS-i chip for direct connection to the AS-i system.

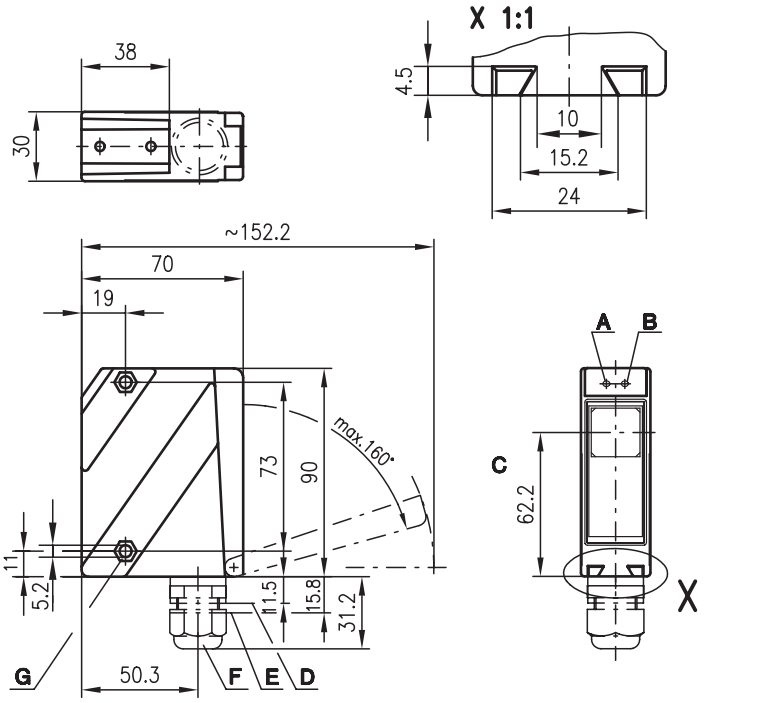
39 m
65 m

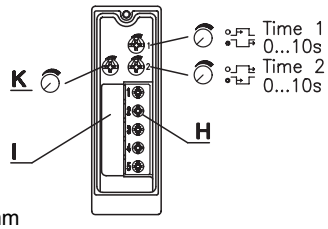
10 - 30 V DC

HF A² LS

- Throughbeam photoelectric sensors with high performance reserve in visible red light or infrared light
- Robust metal housing with glass cover or plastic housing, protection class IP 67 for industrial application
- Complementary outputs for standard applications and a wide range of input and output variants for optimum adaptation to the application
- Multiple options with warning output, activation input, switching delays and optics heating for use at low temperatures

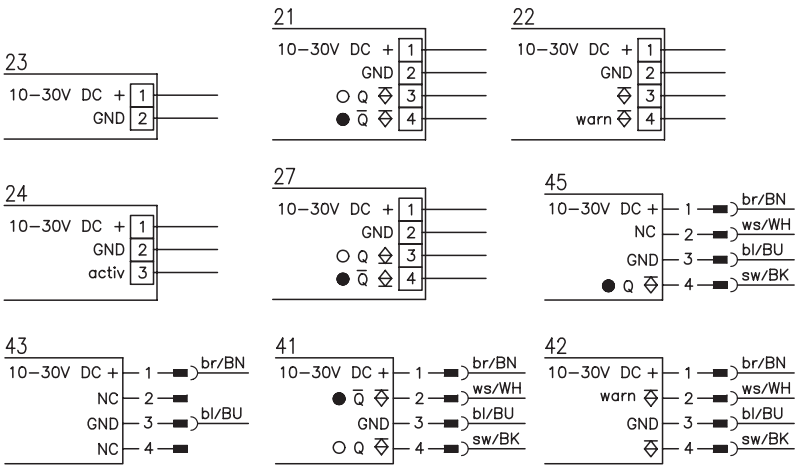
Dimensioned drawing





A Indicator diode green
B Indicator diode yellow
C Optical axis
D Device plug M12x1
E Device plug M18x1
F Screwed cable gland M16x1.5 for Ø 5 … 10mm
G Countersinking for SK nut M5, 4.2 deep
H Connection terminals
I Cable entry
K Sensitivity adjustment

Electrical connection



IEC 60947... IEC 60947... IP 67

Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)
- Alignment aid ARH 96

Specifications

	Infrared light	Red light
Optical data		
Typ. operating range limit [1]	0 … 65m	0 … 39m
Operating range [2]	0 … 50m	0 … 30m
Light source	LED (modulated light)	LED (modulated light)
Wavelength	880nm	660nm
Timing		
Switching frequency	500Hz	
Response time	1ms	
Delay before start-up	≤ 200ms	
Electrical data		
Operating voltage U_B	10 … 30VDC (incl. residual ripple)	
Residual ripple	≤ 15% of U_B	
Bias current	≤ 50mA, ≤ 130mA with optional optics heating	
Switching output	NPN or PNP transistor	
Function characteristics	light/dark switching	
Signal voltage high/low	≥ (U_B-2V)/≤ 2V (PNP)	
Output current	max. 100mA	
Sensitivity	adjustable	
Indicators		
LED green	ready	
LED yellow	light path free	
LED yellow flashing	light path free, no performance reserve	
Mechanical data	**Plastic housing**	
Housing	polycarbonate	
Optics cover	plastic	
Weight	150g	
Connection type	terminals or M12 connector	
Environmental data		
Ambient temp. (operation/storage)	-20°C … +60°C/-40°C … +70°C	
Protective circuit [3]	1, 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	
Options		
Activation input activ		
Transmitter active/not active	≤ 2V/≥ 8V [5]	
Activation/disable delay	≤ 0.5ms	
Input resistance	47KΩ ± 10%	
Warning output autoControl warn	PNP transistor, 100mA, counting principle	
Optics heating	for temperature changes, prevents fogging	
Low temperature	to -35°C	
Switching delay (slow oper./release)	0 … 10s (separately adjustable)	

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

Order guide

Selection table Equipment ↓	Order code →	**LS 96K/P-1010-4** Part No. 500 25254 (Tr) Part No. 500 25258 (Re)	**LS 96K/P-1030-2** Part No. 500 25255 (Tr) Part No. 500 25259 (Re)	**LS 96K/P-1030-4** Part No. 500 25254 (Tr) Part No. 500 80483 (Re)	**LS 96K/P-1140-2** Part No. 500 80657 (Tr) Part No. 500 31295 (Re)	**LS 96K/P-1015-4** Part No. 500 25254 (Tr) Part No. 501 03004 (Re)	**LS 96K/P-1010.1-4** Part No. 500 25254 (Tr) Part No. 501 03218 (Re)
Housing	metal						
	plastic	●	●	●	●	●	●
Light source	red light (30m)				●		
	infrared light (50m)	●	●	●		●	●
Connection	terminals		●		●		
	M12 connector	●		●		●	●
Features	switching delay		●	●			
	warning output						
	activation input				● [5]		
	PIN 2 = NC *					●	●
	PIN 4 = dark switching					●	
	PIN 4 = light/dark reversible						●

Tables

Red light

0	30	39

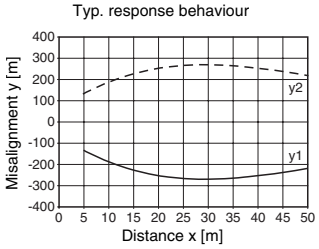
Infrared light

0	50	65

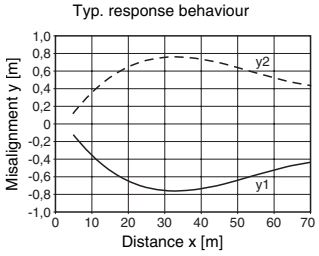
Operating range [m]
Typ. operating range limit [m]

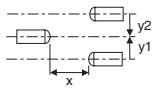
Diagrams

Red light



Infrared light





Remarks

- The throughbeam photoelectric sensor is also available with integrated AS-i chip for direct connection to the AS-i system.
- *For direct connection to AS-i I/O coupling modules (LS 96K/P-1015-4 and LS 96K/P-1010.1-4)

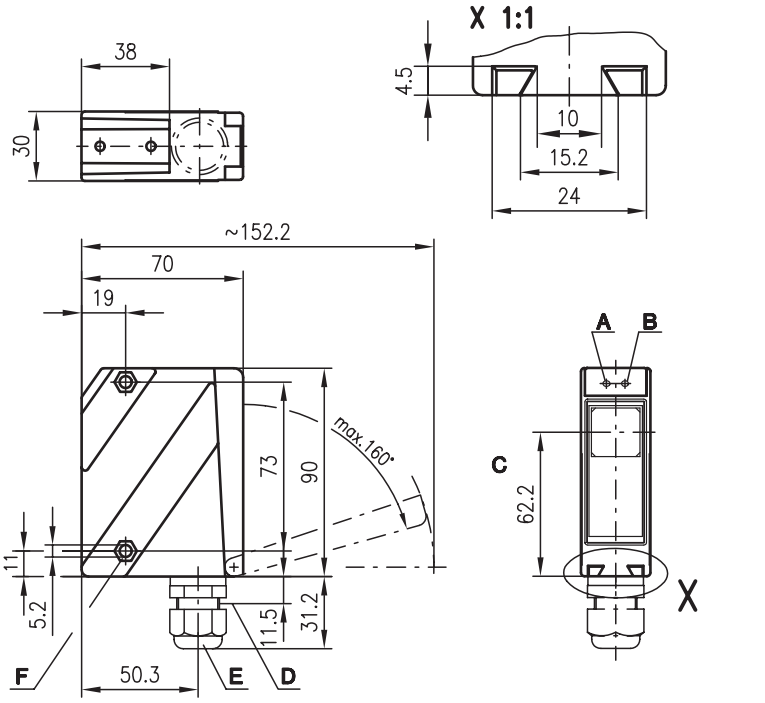
150m

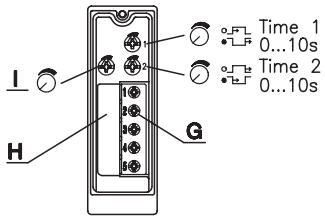
10 - 30 V DC

HF A²LS

- Throughbeam photoelectric sensors with high performance reserve in infrared light
- Robust metal housing with glass cover, protection class IP 67/IP 69K for industrial application
- Complementary outputs, sensitivity adjustment and delay before start-up for optimal adaptation to the application
- Connection via M12 connector or terminal compartment
- Multiple options with warning output, activation input, switching delays and optics heating for use at low temperatures

Dimensioned drawing

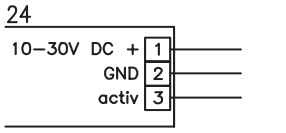


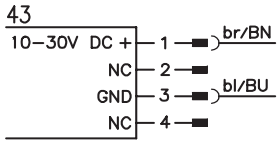


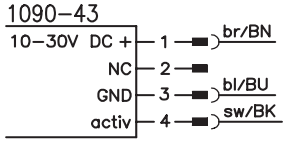
A Indicator diode green
B Indicator diode yellow
C Optical axis
D Device plug M12x1
E Screwed cable gland M16x1.5 for Ø 5 … 10mm
F Countersinking for SK nut M5, 4.2 deep
G Connection terminals
H Cable entry
I Sensitivity adjustment

Electrical connection

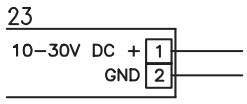
Transmitter

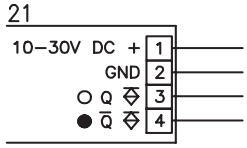


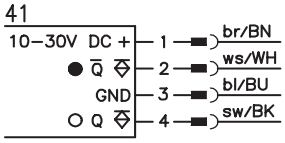




Receiver







CE ISO 9001 cULus LISTED

IEC 60947... IEC 60947... IP 69K IP 67

Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)
- Alignment aid ARH 96

Specifications

Optical data — **Infrared light**
- Typ. operating range limit [1] — 0 … 150 m
- Operating range [2] — 0 … 120 m
- Light source — LED (modulated light)
- Wavelength — 880 nm

Timing
- Switching frequency — 500 Hz
- Response time — 1 ms
- Delay before start-up — ≤ 200 ms

Electrical data
- Operating voltage U_B — 10 … 30 V DC (incl. residual ripple)
- Residual ripple — ≤ 15% of U_B
- Bias current — ≤ 50 mA, ≤ 130 mA with optional optics heating
- Switching output — PNP transistor
- Function characteristics — light/dark switching
- Signal voltage high/low — ≥ (U_B-2V)/≤ 2V (PNP)
- Output current — max. 100 mA
- Sensitivity — adjustable

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

Mechanical data — **Metal housing**
- Housing — diecast zinc
- Optics cover — glass
- Weight — 380 g
- Connection type — terminals, M12 connector

Environmental data
- Ambient temp. (operation/storage) — -20 °C … +60 °C/-40 °C … +70 °C
- Protective circuit [3] — 1, 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

Options
- **Activation input** activ
- Transmitter active/not active — ≥ 8V/≤ 2V (≥ 2V/≤ 2V) [6]
- Activation/disable delay — ≤ 0.5 ms
- Input resistance — 47 KΩ ± 10%
- **Warning output autoControl** warn — PNP transistor, 100 mA, counting principle
- **Optics heating** — for temperature changes, prevents fogging
- **Low temperature** — to -35 °C
- **Switching delay** (slow oper./release) — 0 … 10 s (separately adjustable)

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

Order guide

Selection table Equipment ↓	Order code →	LS 96M/P-3010-2 Part No. 500 25225 (Tr) Part No. 500 34128 (Re)	LS 96M/P-3010-4 Part No. 500 25228 (Tr) Part No. 500 34128 (Re)	LS 96M/P-3012-2 Part No. 500 25223 (Tr) Part No. 500 33328 (Re)	LS 96M/P-3012-4 Part No. 501 03290 (Tr) Part No. 501 03291 (Re)		
Housing	metal	●	●	●	●		
Light source	infrared light (120 m)	●	●	●	●		
Connection	terminals	●		●			
	M12 connector		●		●		
Features	optics heating/low temp.			●	●		
	activation input			● 6)	● 6)		

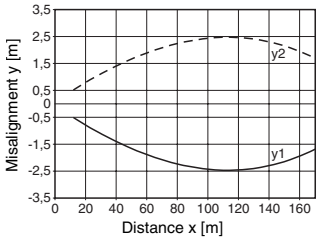
Tables

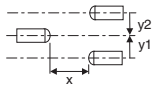
0	120	150

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

Diagrams

Typ. response behaviour





Remarks

LS = Pair consisting of
LSS = Transmitter
LSE = Receiver

LS 96M/P-3010-2
LSS 96M-1070-23
LSE 96M/P-3010-21

LS 96M/P-3010-4
LSS 96M-1070-43
LSE 96M/P-3010-41

LS 96M/P-3012-2
LSS 96M-1090-24
LSE 96M/P-3012-21

LS 96M/P-3012-4
LSS 96M-1090-43
LSE 96M/P-3012-41

LS 96 — Throughbeam photoelectric sensors

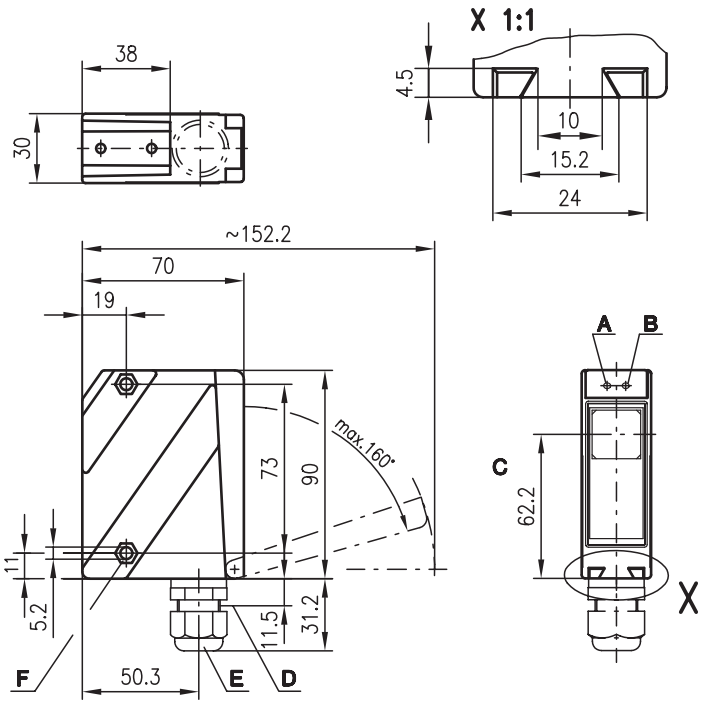
39 m

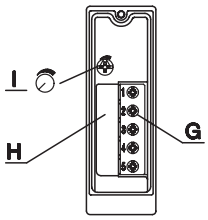
10 - 30 V DC

HF A² LS

- Powerful throughbeam photoelectric sensors with performance reserve in visible red light
- Wide angle version for easy alignment
- Robust metal housing with glass cover, protection class IP 67/IP 69K for industrial application
- Complementary outputs, sensitivity adjustment and delay before start-up for optimal adaptation to the application
- Connection via M12 connector or comfortable terminal compartment up to 1.5 mm²

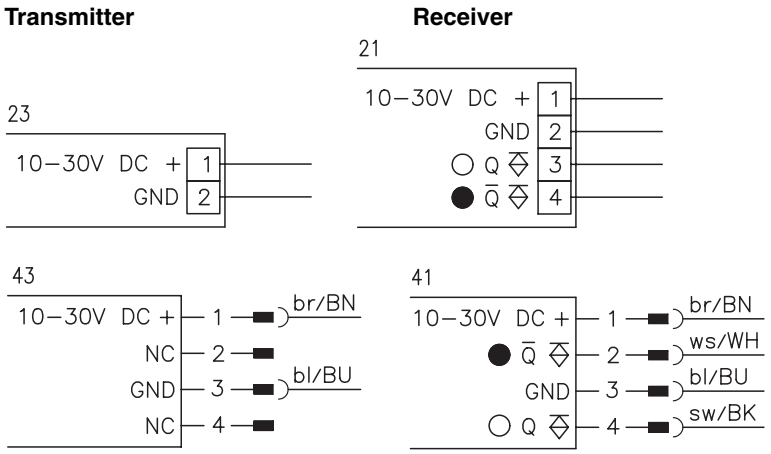
Dimensioned drawing





A Indicator diode green
B Indicator diode yellow
C Optical axis
D Device plug M12x1
E Screwed cable gland M16x1.5 for Ø 5 … 10 mm
F Countersinking for SK nut M5, 4.2 deep
G Connection terminals
H Cable entry
I Sensitivity adjustment

Electrical connection



CE ISO 9001 cULus LISTED

IEC 60947... IEC 60947... IP 69K IP 67

Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)
- Alignment aid ARH 96

Specifications

Optical data	**Red light**
Typ. operating range limit [1]	0 … 39m
Operating range [2]	0 … 30m
Light source	LED (modulated light)
Wavelength	660nm
Timing	
Switching frequency	500Hz
Response time	1ms
Delay before start-up	≤ 200ms
Electrical data	
Operating voltage U_B	10 … 30VDC (incl. residual ripple)
Residual ripple	≤ 15% of U_B
Bias current	≤ 50mA
Switching output	PNP transistor
Function characteristics	light/dark switching
Signal voltage high/low	≥ (U_B-2V)/≤ 2V (PNP)
Output current	max. 100mA
Sensitivity	adjustable
Indicators	
LED green	ready
LED yellow	light path free
LED yellow flashing	light path free, no performance reserve
Mechanical data	**Metal housing**
Housing	diecast zinc
Optics cover	glass
Weight	380g
Connection type	terminals, M12 connector
Environmental data	
Ambient temp. (operation/storage)	-20°C … +60°C/-40°C … +70°C
Protective circuit [3]	1, 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. operating range limit: max. attainable range without performance reserve
2) Operating range: recommended range with performance reserve
3) 1=transient protection, 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

Selection table Equipment ↓	Order code →	LS 96M/P-181W-4 Part No. 500 31574 (Tr) Part No. 500 31575 (Re)	LS 96M/P-181W-2 Part No. 500 32835 (Tr) Part No. 500 32741 (Re)	LS 96M/P-1816-4 Part No. 500 32129 (Tr) Part No. 500 32128 (Re)			
Housing	metal	●	●	●			
Light source	red light (30m)	●	●	●			
Connection	terminals		●				
	M12 connector	●		●			
Features	fixed sensitivity setting	●	●	●			
	optics heating/low temp.			●			

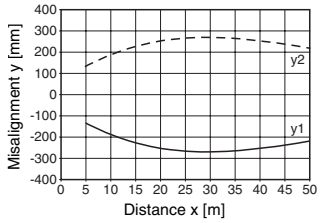
Tables

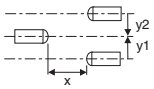
0	30	39

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

Diagrams

Typ. response behaviour





Remarks

- Angle at a distance of 3m:
  transmitter:
  angle of radiation typ. 10°
  receiver:
  receiving angle typ. 12°

LS = Pair consisting of
LSS = Transmitter
LSE = Receiver

LS 96M/P-181W-4
LSS 96M-120W-43
LSE 96M/P-181W-41

LS 96M/P-181W-2
LSS 96M-120W-23
LSE 96M/P-181W-21

LS 96M/P-1816-4
LSS 96M-1206-43
LSE 96M/P-1816-41

LS 96 — Throughbeam photoelectric sensors

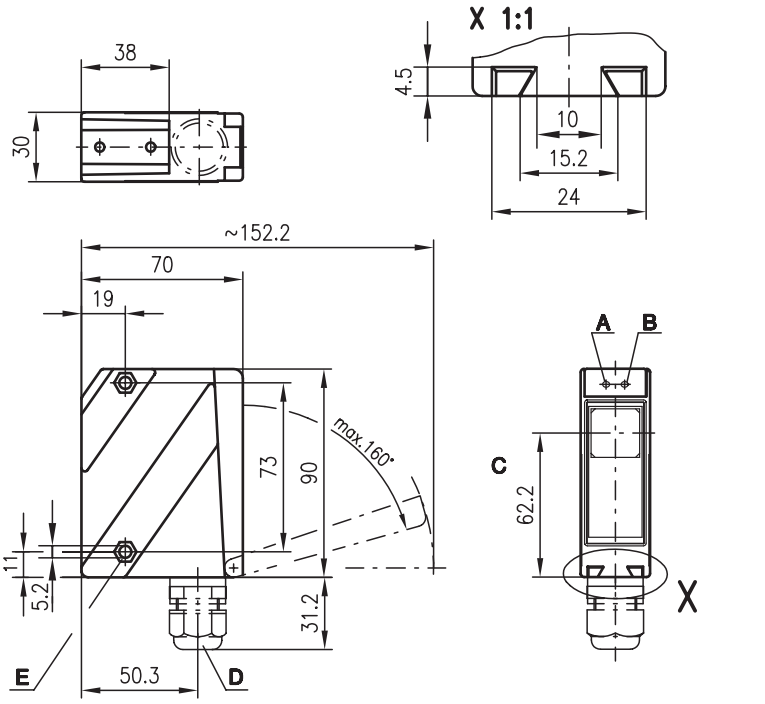
65 m
150 m

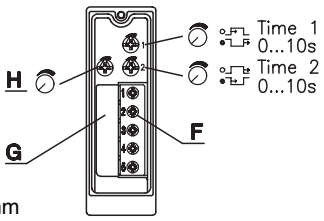
20-230 V AC / DC

HF A²LS

- Throughbeam photoelectric sensors with high performance reserve in infrared light
- Robust metal housing with glass cover or plastic housing, protection class IP 67/ IP 69K for industrial application
- All-mains design 20 … 230 VAC/DC
- Relay with change-over contact, sensitivity adjustment and delay before start-up for optimal adaptation to the application
- Connection via comfortable terminal compartment up to 1.5 mm²
- Version with additional switching delay

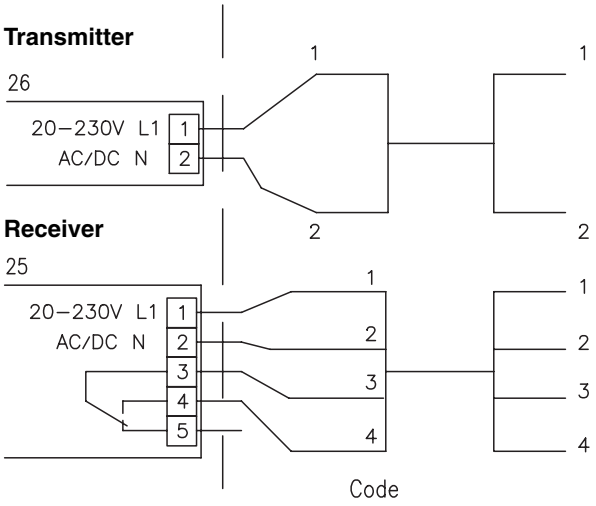
Dimensioned drawing





A Indicator diode green
B Indicator diode yellow
C Optical axis
D Screwed cable gland M16x1.5 for Ø 5 … 10 mm
E Countersinking for SK nut M5, 4.2 deep
F Connection terminals
G Cable entry
H Sensitivity adjustment

Electrical connection (example)



CE ISO 9001 cULus LISTED

IEC 60947... IEC 60947... IP 69K IP 67

Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- Spark extinction
- Alignment aid ARH 96

Specifications

	65m	150m
Optical data		
Typ. operating range limit [1]	0 … 65m	0 … 150m
Operating range [2]	0 … 50m	0 … 120m
Light source	LED (modulated light)	
Wavelength	880nm (infrared)	
Timing		
Switching frequency	20Hz	
Response time	25ms	
Delay before start-up	≤ 200ms	
Electrical data		
Operating voltage U_B	20 … 230VAC, 50/60Hz 20 … 230VDC	
Power consumption	≤ 1.5VA	
Switching output [3]	relay, 1 change-over contact	
Function characteristics	break-contact/make-contact	
Switching voltage, relay	250VAC/DC	
Switching current, relay	250VAC, 3A/30V, 3A	
Bias current	750VA, cosφ=1	
Sensitivity	adjustable	
Indicators		
LED green	ready	
LED yellow	light path free	
LED yellow flashing	light path free, no performance reserve	
Mechanical data	**Metal housing**	**Plastic housing**
Housing	diecast zinc	polycarbonate
Optics cover	glass	plastic
Weight	380g	150g
Connection type	terminals	terminals
Environmental data		
Ambient temp. (operation/storage)	-20°C … +60°C/-40°C … +70°C	
Protective circuit [4]	1, 2, 3	
VDE safety class [5]	II, all-insulated	
Protection class	IP 67, IP 69K [6]	IP 67
LED class	1 (acc. to EN 60825-1)	
Standards applied	IEC 60947-5-2	
Options		
Switching delay (slow oper./release)	0 … 10s (separately adjustable)	

1) Typ. operating range limit: max. attainable range without performance reserve
2) Operating range: recommended range with performance reserve
3) Suitable spark extinction must be provided with inductive or capacitive loads
4) 1=transient protection, 2=polarity reversal protection, 3=short-circuit protection for all outputs
5) Rating voltage 250VAC
6) 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

Tables

65m models

0	50	65

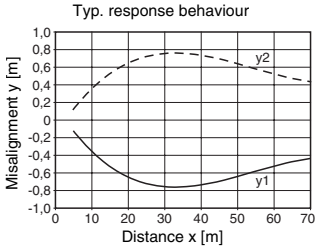
150m models

0	120	150

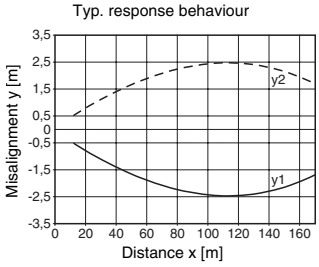
Operating range [m]
Typ. operating range limit [m]

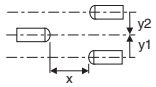
Diagrams

65m models



150m models





Remarks

- LS 96K/R-131P-2
  P = Reduction M16

Order guide

Selection table Equipment ↓	Order code →	LS 96K/R-1310-2 Part No. 500 25253 (Tr) Part No. 500 25257 (Re)	LS 96K/R-1320-2 Part No. 500 25253 (Tr) Part No. 500 25256 (Re)	LS 96M/R-1310-2 Part No. 500 80081 (Tr) Part No. 500 80080 (Re)	LS 96M/R-3310-2 Part No. 500 80081 (Tr) Part No. 500 31651 (Re)	LS 96K/R-131P-2 Part No. 500 30405 (Tr) Part No. 500 30406 (Re)		
Housing	metal			●	●			
	plastic	●	●			●		
Light source	infrared light (50m)	●	●	●		●		
	infrared light (120m)				●			
Connection	terminals	●	●	●	●	●		
Features	switching delay		●					
	UL homologation	●	●	●		●		

LS = **Pair consisting of**
LSS = **Transmitter**
LSE = **Receiver**

LS 96K/R-1310-2
LSS 96K-1350-26
LSE 96K/R-1310-25

LS 96K/R-1320-2
LSS 96K-1350-26
LSE 96K/R-1320-25

LS 96M/R-1310-2
LSS 96M-1350-26
LSE 96M/R-1310-25

LS 96M/R-3310-2
LSS 96M-1350-26
LSE 96M/R-3310-25

LS 96K/R-131P-2
LSS 96K-135P-26
LSE 96K/R-131P-25

LS 96 — Throughbeam photoelectric sensors

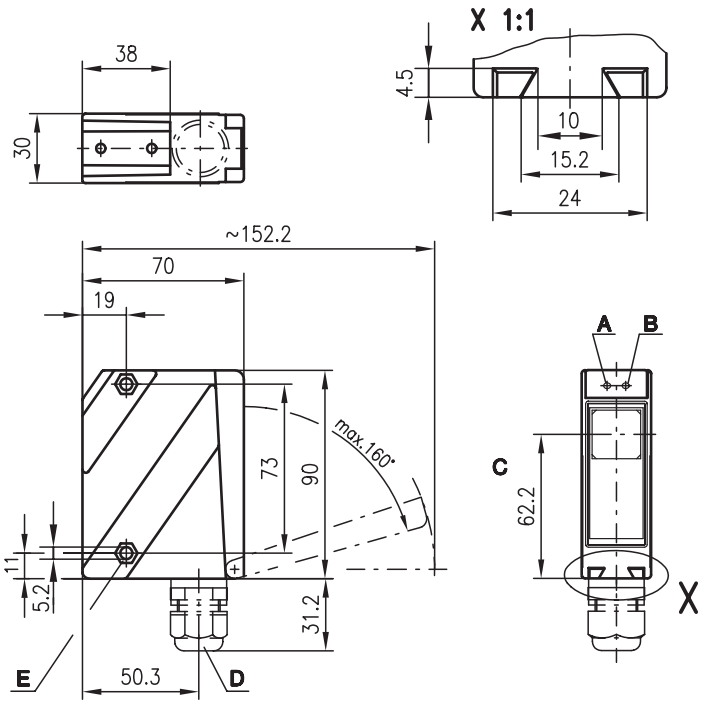
39 m

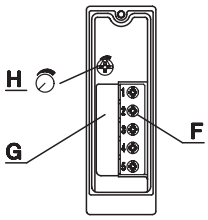
20-230 V AC / DC

HF A² LS

- Throughbeam photoelectric sensors with high performance reserve in red light
- Wide angle version for easy alignment
- Robust metal housing with glass cover, protection class IP 67/IP 69K for industrial application
- All-mains design 20 … 230 VAC/DC with relay output
- Relay with change-over contact, sensitivity adjustment and delay before start-up for optimal adaptation to the application
- Connection via comfortable terminal compartment up to 1.5 mm²

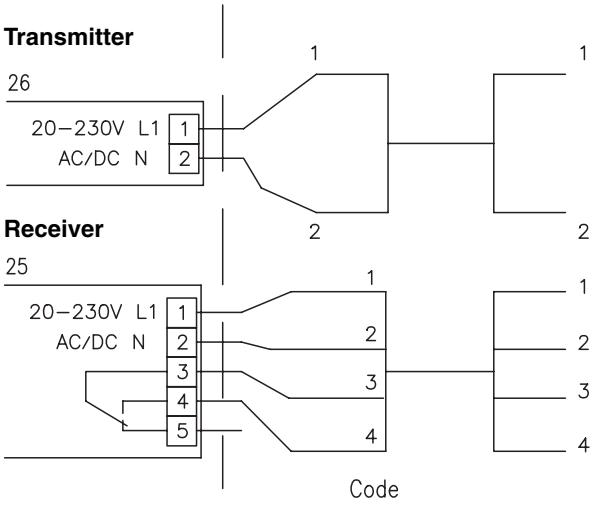
Dimensioned drawing





A Indicator diode green
B Indicator diode yellow
C Optical axis
D Screwed cable gland M16x1.5 for Ø 5 … 10 mm
E Countersinking for SK nut M5, 4.2 deep
F Connection terminals
G Cable entry
H Sensitivity adjustment

Electrical connection (example)



CE ISO 9001 cULus LISTED

IEC 60947... IEC 60947... IP 69K IP 67

Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, BT 96.4, UMS 96, BT 450.1-96)
- Spark extinction
- Alignment aid ARH 96

Specifications

Optical data

Typ. operating range limit [1]	0 … 39m
Operating range [2]	0 … 30m
Light source	LED (modulated light)
Wavelength	660nm (red light)

Timing

Switching frequency	20Hz
Response time	25ms
Delay before start-up	≤ 200ms

Electrical data

Operating voltage U_B	20 … 230VAC, 50/60Hz 20 … 230VDC
Power consumption	≤ 1.5VA
Switching output [3]	relay, 1 change-over contact
Function characteristics	break-contact/make-contact
Switching voltage, relay	250VAC/DC
Switching current, relay	250VAC, 3A/30V, 3A
Bias current	750VA, cosφ=1
Sensitivity	adjustable

Indicators

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

Mechanical data — **Metal housing**

Housing	diecast zinc
Optics cover	glass
Weight	380g
Connection type	terminals transmitter cable 3x0.5mm² (oil flex 110), 1.5m receiver cable 3x0.5mm² (oil flex 110), 1.5m

Environmental data

Ambient temp. (operation/storage)	-20°C … +60°C/-40°C … +70°C
Protective circuit [4]	1, 2, 3
VDE safety class [5]	II, all-insulated
Protection class	IP 67, IP 69K [6]
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) Suitable spark extinction must be provided with inductive or capacitive loads
4) 1=transient protection, 2=polarity reversal protection, 3=short-circuit protection for all outputs
5) Rating voltage 250VAC
6) 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

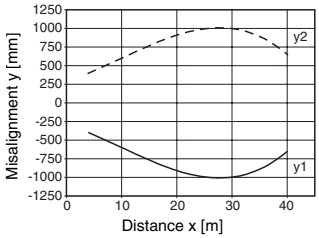
Tables

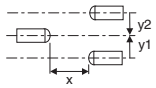
0	30	39

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

Diagrams

Typ. response behaviour





Order guide

Selection table Equipment ↓	Order code →	LS 96M/R-176W-2 Part No. 500 32004 (Tr) Part No. 500 32003 (Re)					
Housing	metal	●					
Light source	red light (30m)	●					
Connection	terminals	●					
	cable tail 1.5m						

Remarks

- Angle at a distance of 3m:
  transmitter:
  angle of radiation typ. 10°
  receiver:
  receiving angle typ. 12°
- Cable version
  wire assignment:
  1,2 = supply
  3,4 = break-contact

LS = Pair consisting of
LSS = Transmitter
LSE = Receiver

LS 96M/R-176W-2
LSS 96M-175W-26
LSE 96M/R-176W-25

SLS 96 — Protective throughbeam photoelectric sensors

65 m
39 m

10 - 30 V DC

BG geprüft

- Protective throughbeam photoelectric sensor cat. 2 (testing) with high performance reserve in visible red light or infrared light
- Robust metal housing with glass cover or plastic housing, protection class IP 67 for industrial application
- 2 indicators each at the transmitter and receiver for displaying their status when commissioning and in operation
- Optics heating for use with low temperatures
- Connection via M12 connector or terminal compartment

IEC 60947...

IEC 60947...

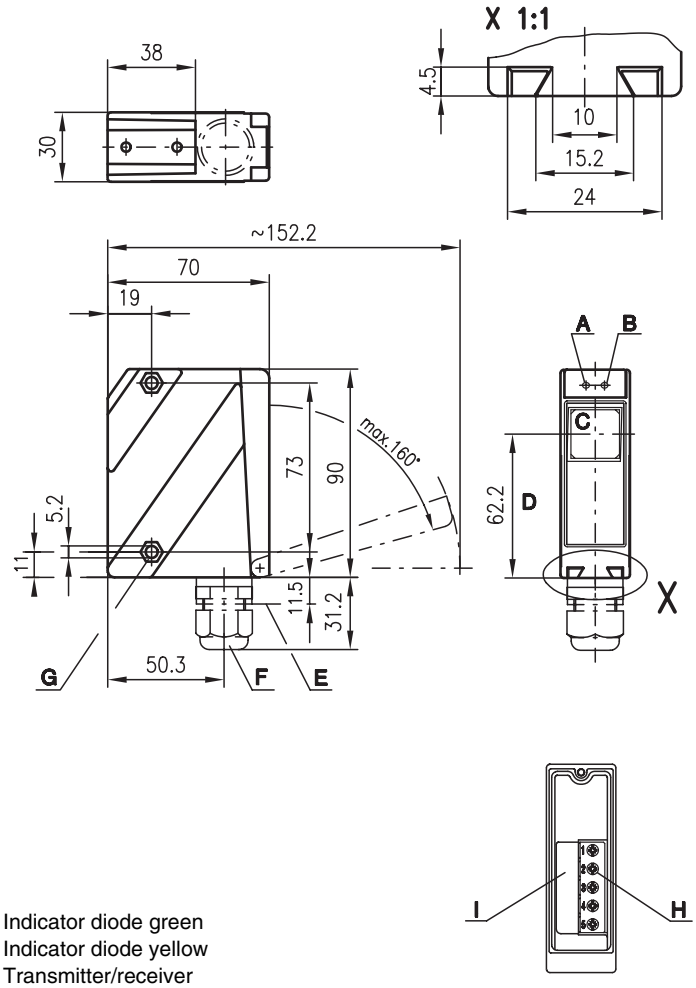
IP 67

Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)
- Alignment aid ARH 96
- Test-monitoring units:
  - available only from Leuze lumiflex

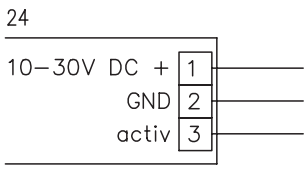
Dimensioned drawing



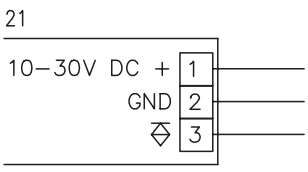
A Indicator diode green
B Indicator diode yellow
C Transmitter/receiver
D Optical axis
E Device plug M12x1
F Screwed cable gland M16x1.5 for Ø 5 … 10mm
G Countersinking for SK nut M5, 4.2 deep
H Connection terminals
I Cable entry

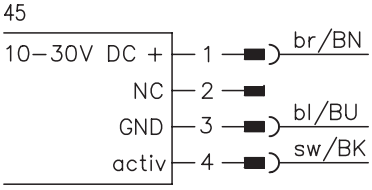
Electrical connection

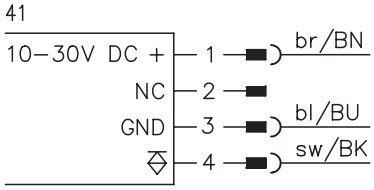
Transmitter



Receiver







Specifications

	Infrared light	Red light
Optical data		
Typ. operating range limit [1]	0 … 65m	0 … 39m
Operating range [2]	0 … 50m	0 … 30m
Light source	LED (modulated light)	LED (modulated light)
Wavelength	880nm	660nm
Timing		
Sensor switching frequency	500Hz	
Sensor response time	1ms	
Delay before start-up	≤ 200ms	
Electrical data		
Operating voltage U_B	10 … 30VDC (incl. residual ripple)	
Residual ripple	≤ 15% of U_B	
Bias current	≤ 50mA	
Switching output	PNP transistor	
Function characteristics	light switching	
Signal voltage high/low	≥ (U_B-2V)/≤ 2V	
Output current	max. 100mA	
Indicators		
LED green	ready	
Receiver		
LED yellow	light path free	
LED yellow flashing	light path free, no performance reserve	
Transmitter		
LED yellow	transmitter active	
Mechanical data	**Metal housing**	
Housing	diecast zinc	
Optics cover	glass	
Weight	380g	
Connection type	terminals or M12 connector	
Environmental data		
Ambient temp. (operation/storage)	-20°C … +60°C/-40°C … +70°C	
Protective circuit [3]	1, 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	
Options		
Optics heating	for temperature changes, prevents fogging	
Low temperature	to -35°C	
Activation input activ		
Transmitter active/not active	≥ 8V/≤ 2V	
Activation/disable delay	≤ 1ms	
Input resistance	10KΩ ± 10%	

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

Order guide

Selection table Equipment ↓		Order code →	**SLS 96M/P-1070-T2-2** Part No. 500 25213 (Tr) Part No. 500 25192 (Re)	**SLS 96M/P-1070-T2-4** Part No. 500 25215 (Tr) Part No. 500 25193 (Re)	**SLS 96M/P-1071-T2-2** Part No. 500 29454 (Tr) Part No. 500 29455 (Re)	**SLS 96M/P-1071-T2-4** Part No. 500 80478 (Tr) Part No. 500 80479 (Re)	**SLS 96M/P-1200-T2-2** Part No. 500 25209 (Tr) Part No. 500 31562 (Re)	**SLS 96M/P-1200-T2-4** Part No. 500 31249 (Tr) Part No. 500 31250 (Re)
Housing	metal		●	●	●	●	●	●
	plastic							
Light source	red light (30m)						●	●
	infrared light (50m)		●	●	●	●		
Connection	terminals		●		●		●	
	M12 connector			●		●		●
Features	optics heating/low temperature				●	●		
	activation input		●	●	●	●	●	●
	filter for multi-axis operation							

Tables

Remarks

- The protective through-beam photoelectric sensor is a contactless active protective device only in connection with a safety-relevant control system, in which the cyclical testing of transmitter and receiver is carried out according to EN 61496-1, category 2 (testing).
- The power supply unit used to operate the photoelectric sensor has to be able to compensate for changes and interruptions of the supply voltage acc. to EN 61496-1.
  Minimum blackening object dia: Ø 28mm.

SLS = Pair consisting of
SLSS = Transmitter
SLSE = Receiver

SLS 96M/P-1070-T2-2
SLSS 96M-1080-T2-24
SLSE 96M/P-1070-T2-21

SLS 96M/P-1070-T2-4
SLSS 96M-1080-T2-45
SLSE 96M/P-1070-T2-41

SLS 96M/P-1071-T2-2
SLSS 96M-1090-T2-24
SLSE 96M/P-1071-T2-21

SLS 96M/P-1071-T2-4
SLSS 96M-1090-T2-45
SLSE 96M/P-1071-T2-41

SLS 96M/P-1200-T2-2
SLSS 96M-1210-T2-24
SLSE 96M/P-1200-T2-21

SLS 96M/P-1200-T2-4
SLSS 96M-1210-T2-45
SLSE 96M/P-1200-T2-41

SLS 96 — Protective throughbeam photoelectric sensors

65 m
39 m

10 - 30 V DC

BG geprüft

- Protective throughbeam photoelectric sensor cat. 2 (testing) with high performance reserve in visible red light or infrared light
- Robust metal housing with glass cover or plastic housing, protection class IP 67 for industrial application
- 2 indicators each at the transmitter and receiver for displaying their status when commissioning and in operation
- Optics heating for use with low temperatures
- Connection via M12 connector or terminal compartment

IEC 60947...

IEC 60947...

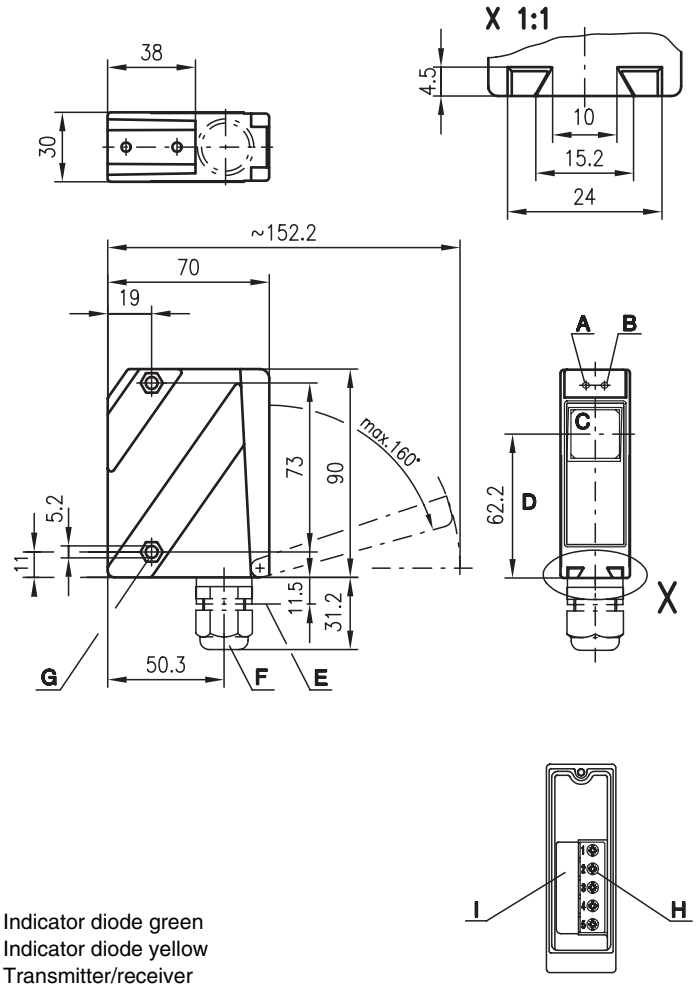
IP 67

Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)
- Alignment aid ARH 96
- Test-monitoring units:
  - available only from Leuze lumiflex

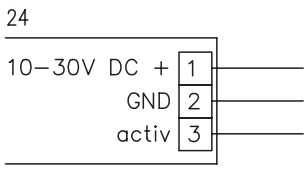
Dimensioned drawing



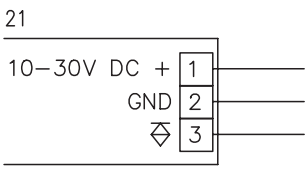
A Indicator diode green
B Indicator diode yellow
C Transmitter/receiver
D Optical axis
E Device plug M12x1
F Screwed cable gland M16x1.5 for Ø 5 … 10mm
G Countersinking for SK nut M5, 4.2 deep
H Connection terminals
I Cable entry

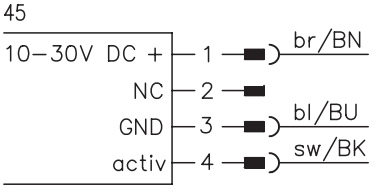
Electrical connection

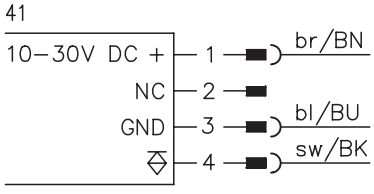
Transmitter



Receiver







Specifications

	Infrared light	Red light
Optical data		
Typ. operating range limit [1]	0 … 65m	0 … 39m
Operating range [2]	0 … 50m	0 … 30m
Light source	LED (modulated light)	LED (modulated light)
Wavelength	880nm	660nm
Timing		
Sensor switching frequency	500Hz	
Sensor response time	1ms	
Delay before start-up	≤ 200ms	
Electrical data		
Operating voltage U_B	10 … 30VDC (incl. residual ripple)	
Residual ripple	≤ 15% of U_B	
Bias current	≤ 50mA	
Switching output	PNP transistor	
Function characteristics	light switching	
Signal voltage high/low	≥ (U_B-2V)/≤ 2V	
Output current	max. 100mA	
Indicators		
LED green	ready	
Receiver		
LED yellow	light path free	
LED yellow flashing	light path free, no performance reserve	
Transmitter		
LED yellow	transmitter active	
Mechanical data	**Plastic housing**	
Housing	polycarbonate	
Optics cover	plastic	
Weight	150g	
Connection type	terminals or M12 connector	
Environmental data		
Ambient temp. (operation/storage)	-20°C … +60°C/-40°C … +70°C	
Protective circuit [3]	1, 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	
Options		
Optics heating	for temperature changes, prevents fogging	
Low temperature	to -35°C	
Activation input activ		
Transmitter active/not active	≥ 8V/≤ 2V	
Activation/disable delay	≤ 1ms	
Input resistance	10KΩ ± 10%	

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

Order guide

Selection table Equipment ↓	Order code →	**SLS 96K/P-1070-T2-2** Part No. 500 81292 (Tr) Part No. 500 81293 (Re)	**SLS 96K/P-1070-T2-4** Part No. 500 31559 (Tr) Part No. 500 31561 (Re)	**SLS 96K/P-1200-T2-2** Part No. 500 28009 (Tr) Part No. 500 28010 (Re)	**SLS 96K/P-1200-T2-4** Part No. 500 28011 (Tr) Part No. 500 28012 (Re)	**SLS 96K/P-1207-T2-2** Part No. 500 28009 (Tr) Part No. 500 35078 (Re)	**SLS 96K/P-1207-T2-4** Part No. 500 28011 (Tr) Part No. 500 41109 (Re)
Housing	metal						
	plastic	●	●	●	●	●	●
Light source	red light (30m)			●	●	●	●
	infrared light (50m)	●	●				
Connection	terminals	●		●		●	
	M12 connector		●		●		●
Features	optics heating/low temp.						
	activation input	●	●	●	●	●	●
	filter for multi-axis operation					●	●

Tables

Remarks

- The protective through-beam photoelectric sensor is a contactless active protective device only in connection with a safety-relevant control system, in which the cyclical testing of transmitter and receiver is carried out according to EN 61496-1, category 2 (testing).
- The power supply unit used to operate the photoelectric sensor has to be able to compensate for changes and interruptions of the supply voltage acc. to EN 61496-1.
  Minimum blackening object dia: Ø 28mm.

SLS = Pair consisting of
SLSS = Transmitter
SLSE = Receiver

SLS 96K/P-1070-T2-2
SLSS 96K-1080-T2-24
SLSE 96K/P-1070-T2-21

SLS 96K/P-1070-T2-4
SLSS 96K-1080-T2-45
SLSE 96K/P-1070-T2-41

SLS 96K/P-1200-T2-2
SLSS 96K-1210-T2-24
SLSE 96K/P-1200-T2-21

SLS 96K/P-1200-T2-4
SLSS 96K-1210-T2-45
SLSE 96K/P-1200-T2-41

SLS 96K/P-1207-T2-2
SLSS 96K-1210-T2-24
SLSE 96K/P-1207-T2-21

SLS 96K/P-1207-T2-4
SLSS 96K-1210-T2-45
SLSE 96K/P-1207-T2-41

LS 96 — Throughbeam photoelectric sensors

39 m

- Throughbeam photoelectric sensors with high performance reserve in red light
- Robust metal housing with glass cover, protection class IP 67/IP 69K for industrial application
- Receiver with integrated AS-i slave technology
- Transmitter without integrated AS-i slave technology; receives voltage supply via AS-i line
- Wide angle version to simplify the alignment

IEC 60947... IEC 60947... IP 69K IP 67

Accessories:

(available separately • see page 76)

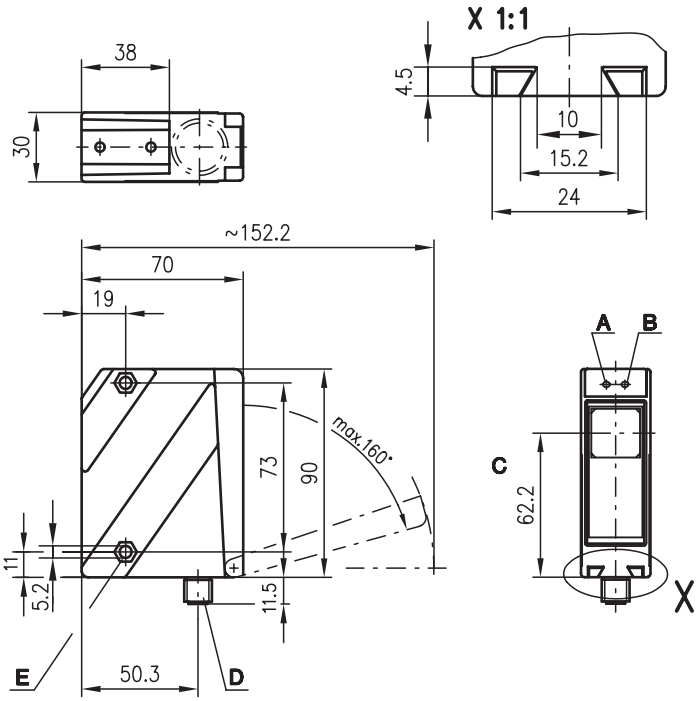
- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors
- Ready-made cables (K-D …)
- Alignment aid ARH 96

AS-i Accessories:

(available separately)

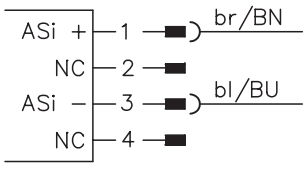
- Bus terminals
- AS-i ribbon cable
- Address programming device
- Coupling modules, intermediate cables, etc.

Dimensioned drawing



A Indicator diode green
B Indicator diode yellow
C Optical axis
D Device plug M12x1
E Countersinking for SK nut M5, 4.2 deep

Electrical connection



Specifications

Optical data

Typ. operating range limit [1]	0 … 39 m
Operating range [2]	0 … 30 m
Light source	LED (modulated light)
Wavelength	660 nm (red light)

Timing

Sensor switching frequency	500 Hz
Sensor response time	1 ms
Delay before start-up	≤ 200 ms

Electrical data

Operating voltage U_B	26.5 … 31.6 V (according to AS-i specification)
Bias current receiver	≤ 35 mA
Bias current transmitter	≤ 15 mA

Indicators

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

Mechanical data	**Metal housing**
Housing	diecast zinc
Optics cover	glass
Weight	380 g
Connection type	M12 connector

Environmental data

Ambient temp. (operation/storage)	-20 °C … +60 °C/-40 °C … +70 °C
Protective circuit [3]	1, 2
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

AS-i data for receiver

I/O code	1
ID code	1
Cycle time acc. to AS-i specification	5 ms
AS-i standard according to profile	S-1.1

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

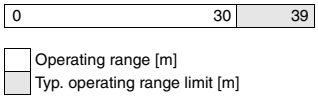
Assignment: data bits				Assignment: parameter bits			
		Programming (host level)				Programming (host level)	
D_0	**Switching output**	Ø no reflection	System input	$*P_0$	**NC**	Ø	System parameter
		1 reflection				1	
D_1	**Warning output autoControl**	Ø active	System input	$*P_1$	**Light/dark switching**	Ø dark switching	System parameter
		1 not active				1 light switching	
D_2	**Ready output**	Ø sensor not ready	System input	$*P_2$	**NC**	Ø	System parameter
		1 sensor ready				1	
$*D_3$	**NC**	Ø		$*P_3$	**NC**	Ø	System parameter
		1				1	

* default = 1

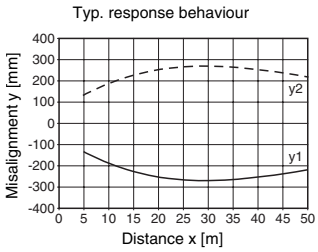
Order guide

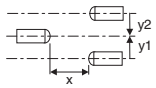
	Designation	Part No.
Transmitter and receiver	**LS 96M/A-182W-4**	
Transmitter	LSS 96 M-180W-44	500 82040
Receiver	LSE 96 M/A-182W-44	500 82039

Tables



Diagrams





Remarks

- The transmitter has no integrated AS-i slave technology.
- The low current consumption of the transmitter enables power supply via AS-i line.
- Transmitter and receiver behave like a slave in an AS-i branch.

  Angle at 3 m distance:
  Transmitter:
  Angle of radiation typ.: 10°
  Receiver:
  Receiving angle typ.: 12°

RK 96 — Retro-reflective photoelectric sensors

18m

10 - 30 V DC

HF A² LS

- Retro-reflective photoelectric sensors with a long operating range
- Invisible infrared light
- Robust metal housing with glass cover or plastic housing, protection class IP 67/ IP 69K for industrial application
- Complementary outputs, sensitivity adjustment and delay before start-up for optimal adaptation to the application
- Connection via comfortable terminal compartment up to 1.5mm²

CE ISO 9001 cULus LISTED

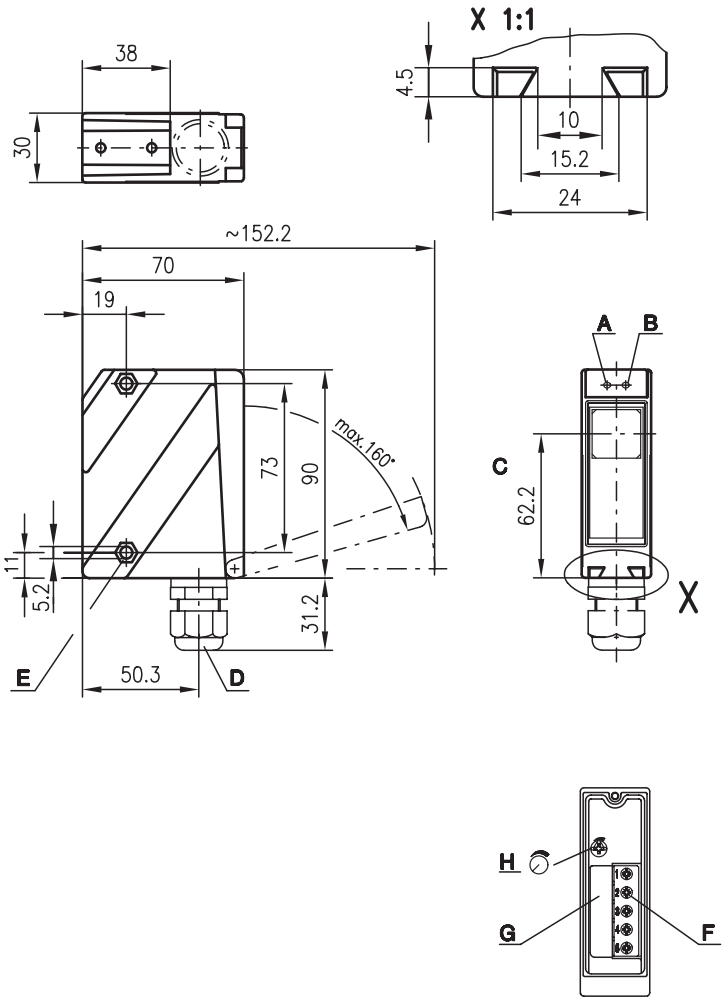
IEC 60947... IEC 60947... IP 69K IP 67

Accessories:

(available separately • see page 76)

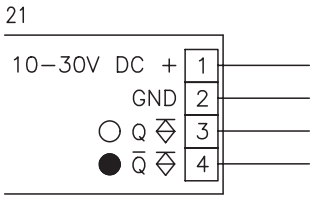
- Mounting systems (BT 96, UMS 96, BT 450.1-96)
- Reflectors
- Reflective tapes

Dimensioned drawing



A Indicator diode green
B Indicator diode yellow
C Optical axis
D Screwed cable gland M16x1.5 for Ø 5 … 10mm
E Countersinking for SK nut M5, 4.2 deep
F Connection terminals
G Cable entry
H Sensitivity adjustment

Electrical connection



Specifications

Optical data

Typ. operating range limit (TK(S) 100x100) [1]	18m
Operating range [2]	see tables
Light source	LED (modulated light)
Wavelength	880nm (infrared)

Timing

Switching frequency	1000Hz
Response time	0.5ms
Delay before start-up	≤ 200ms

Electrical data

Operating voltage U_B	10 … 30VDC (incl. residual ripple)
Residual ripple	≤ 15% of U_B
Bias current	≤ 40mA
Switching output	PNP transistor
Function characteristics	light/dark switching
Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Output current	max. 100mA
Sensitivity	adjustable

Indicators

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

Mechanical data	**Metal housing**
Housing	diecast zinc
Optics cover	glass
Weight	380g
Connection type	terminals

Environmental data

Ambient temp. (operation/storage)	-20°C … +55°C/-40°C … +55°C
Protective circuit [3]	1, 2, 3, 4
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. operating range limit: max. attainable range without performance reserve
2) Operating range: recommended range with performance reserve
3) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs, 4=interference blanking
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

Tables

Reflectors			Operating range
1	TK(S)	100x100	0.3 … 15m
2	MTK(S)	50x50	0.3 … 11m
3	TK(S)	30x50	0.3 … 6m
4	TK(S)	20x40	0.3 … 5m
5	TK(S)	82	0.3 … 11m
6	Tape 2	100x100	0.3 … 6m

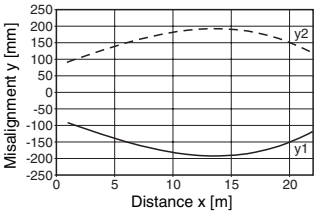
1	0.1														15		18
2	0.1													11			12
3	0.1											6		7.1			
4	0.1					5		6									
5	0.1													11			12
6	0.1											6		8			

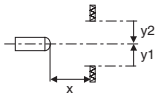
Operating range [m]
Typ. operating range limit [m]

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

Diagrams

Typ. response behaviour (TKS 100x100)





Order guide

	Designation	Part No.
Metal housing	RK 96M/P-1440-21	500 30648

Remarks

18m

20-230 V AC / DC

HF A²LS

- Retro-reflective photoelectric sensor with a large operating range
- Robust plastic housing, protection class IP 67 for industrial application
- All-mains design 20 … 230VAC/DC with relay output
- Relay with change-over contact, sensitivity adjustment and delay before start-up for optimal adaptation to the application
- Connection via comfortable terminal compartment up to 1.5mm²

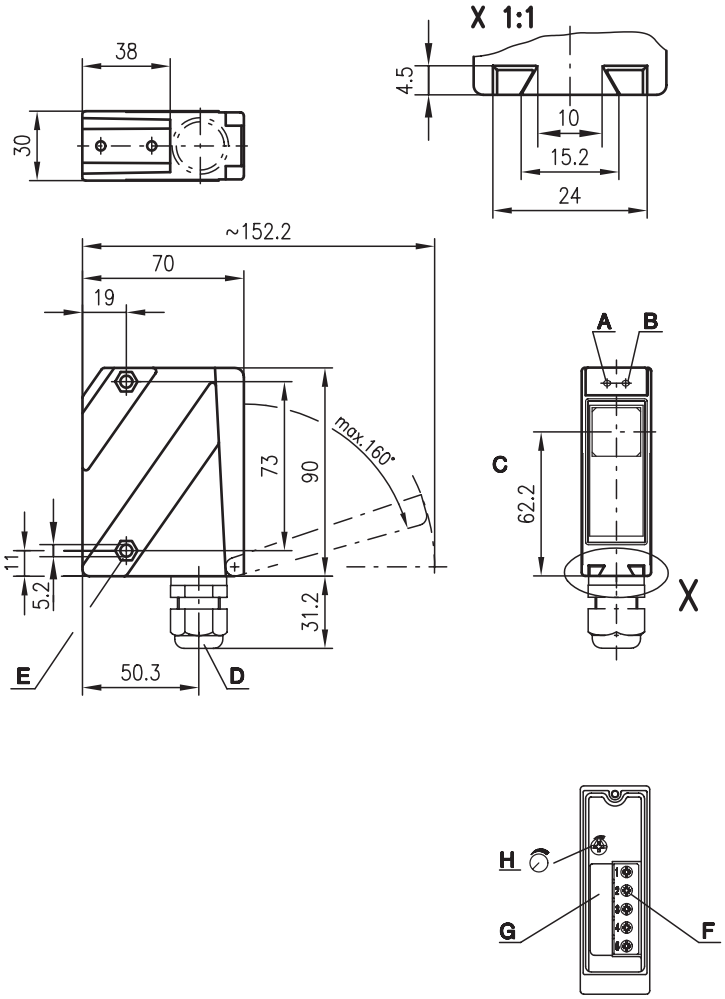
IEC 60947... IEC 60947... IP 67

Accessories:

(available separately • see page 76)

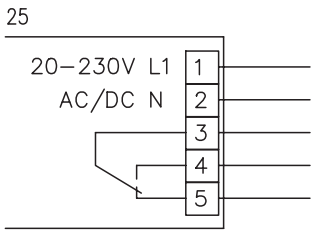
- Mounting systems (BT 96, UMS 96, BT 450.1-96)
- Spark extinction
- Reflectors
- Reflective tapes

Dimensioned drawing



A Indicator diode green
B Indicator diode yellow
C Optical axis
D Screwed cable gland M16x1.5 for Ø 5 … 10mm
E Countersinking for SK nut M5, 4.2 deep
F Connection terminals
G Cable entry
H Sensitivity adjustment

Electrical connection



Specifications

Optical data

Typ. operating range limit (TK(S) 100x100) [1]	18m
Operating range [2]	see tables
Light source	LED (modulated light)
Wavelength	880nm (infrared)

Timing

Switching frequency	20Hz
Response time	25ms
Delay before start-up	≤ 200ms

Electrical data

Operating voltage U_B	20 … 230VAC, 50/60Hz 20 … 230VDC
Power consumption	≤ 1.5VA
Switching output [3]	relay, 1 change-over contact
Function characteristics	break-contact/make-contact
Switching voltage, relay	250VAC/DC
Switching current, relay	250VAC, 3A/30VDC, 3A
Switching power, relay	750VA, cosφ=1
Sensitivity	adjustable

Indicators

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

Mechanical data — **Plastic housing**

Housing	polycarbonate
Optics cover	plastic
Weight	150g
Connection type	terminals

Environmental data

Ambient temp. (operation/storage)	-20°C … +55°C/-40°C … +55°C
Protective circuit [4]	1, 4
VDE safety class [5]	II, all-insulated
Protection class	IP 67
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) Suitable spark extinction must be provided with inductive or capacitive loads
4) 1=transient protection, 4=interference blanking
5) Rating voltage 250VAC

Tables

Reflectors			Operating range
1	TK(S)	100x100	0.3 … 15m
2	MTK(S)	50x50	0.3 … 11m
3	TK(S)	30x50	0.3 … 6m
4	TK(S)	20x40	0.3 … 5m
5	TK(S)	82	0.3 … 11m
6	Tape 2	100x100	0.3 … 6m

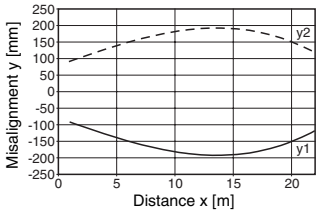
1	0.1															15		18
2	0.1														11		12	
3	0.1											6		7.1				
4	0.1					5		6										
5	0.1														11		12	
6	0.1											6		8				

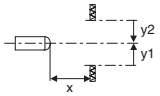
Operating range [m]
Typ. operating range limit [m]

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

Diagrams

Typ. response behaviour (TKS 100x100)





Order guide

Designation	Part No.
RK 96K/R-1560-25	500 80484
RK 96K/R-156P-25	500 30404

Remarks

- PRK 96 K/R-156P-25
  P = Reduction M16

PRK 96 — Retro-reflective photoelectric sensors with polarisation filter

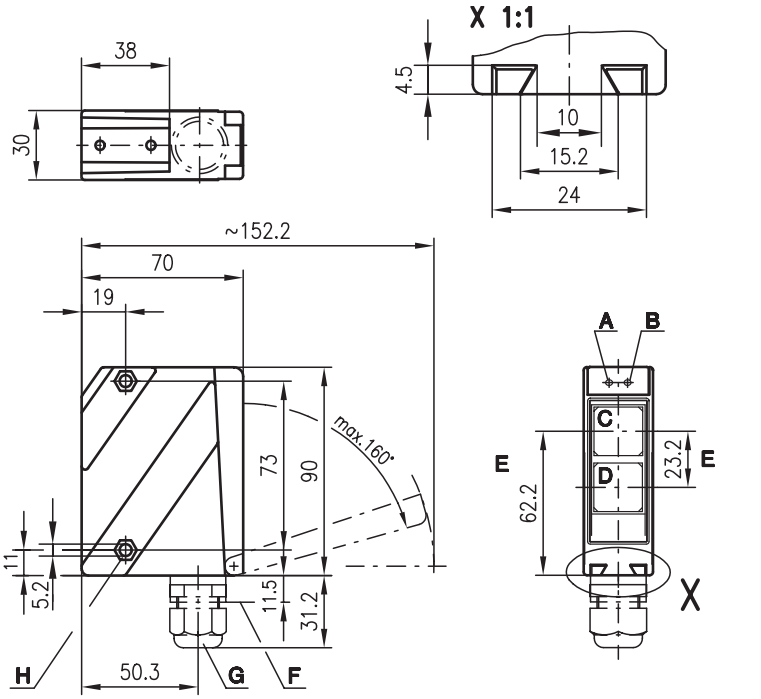
10m
18m

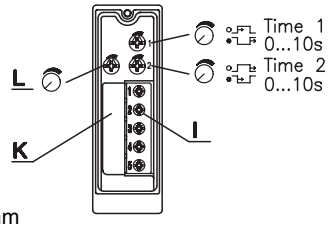
10 - 30 V DC

HF A²LS

- Polarised retro-reflective photoelectric sensor with large operating range in visible red light
- Robust metal housing with glass cover or plastic housing, protection class IP 67/ IP 69K for industrial application
- Complementary outputs, sensitivity adjustment and delay before start-up for optimal adaptation to the application
- Connection via M12 connector or terminal compartment
- Multiple options with warning output, activation input, switching delays and optics heating for use at low temperatures

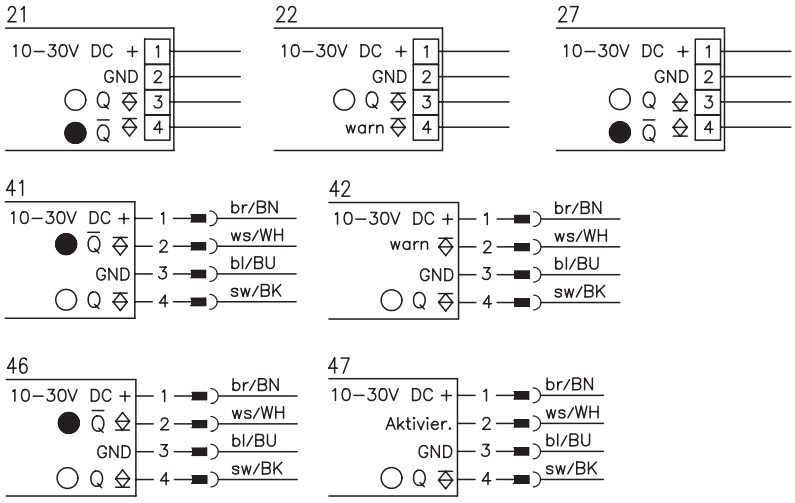
Dimensioned drawing





A Indicator diode green
B Indicator diode yellow
C Receiver
D Transmitter
E Optical axis
F Device plug M12x1
G Screwed cable gland M16x1.5 for Ø 5 … 10mm
H Countersinking for SK nut M5, 4.2 deep
I Connection terminals
K Cable entry
L Sensitivity adjustment

Electrical connection



IEC 60947... IEC 60947... IP 69K IP 67

Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)
- Reflectors
- Reflective tapes

Specifications

Optical data

Typ. operating range limit (TK(S) 100x100) [1]	10m/18m
Operating range [2]	see tables
Light spot diameter	approx. 130mm at 6m
Light source	LED (modulated light)
Wavelength	660nm (visible red light, polarised)

Timing

Switching frequency	1000Hz
Response time	0.5ms
Delay before start-up	≤ 200ms

Electrical data

Operating voltage U_B	10 … 30VDC (incl. residual ripple)
Residual ripple	≤ 15% of U_B
Bias current	≤ 40mA, ≤ 75mA with optics heating
Switching output	PNP or NPN transistor
Function characteristics	light/dark switching
Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Output current	max. 100mA
Sensitivity	adjustable

Indicators

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

Mechanical data	**Metal housing**
Housing	diecast zinc
Optics cover	glass
Weight	380g
Connection type	terminals or M12 connector

Environmental data

Ambient temp. (operation/storage)	-20°C … +55°C/-40°C … +55°C
Protective circuit [3]	1, 2, 3, 4
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

Warning output autoControl warn	PNP transistor, 100mA, counting principle
Optics heating	for temperature changes, prevents fogging
Low temperature	to -35°C
Switching delay (slow oper./release)	0 … 10s (separately adjustable)

1) Typ. operating range limit: max. attainable range without performance reserve
2) Operating range: recommended range with performance reserve
3) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs, 4=interference blanking
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

Selection table Equipment ↓	Order code →	PRK 96M/P-1370-22 Part No. 500 25182	PRK 96M/P-1370-42 Part No. 500 25186	PRK 96M/P-1400-22 Part No. 500 25178	PRK 96M/P-1400-42 Part No. 500 31549	PRK 96M/P-3360-21 Part No. 500 82065	PRK 96M/N-3366-27 Part No. 501 02379	PRK 96M/P-3380-41 Part No. 500 61452	PRK 96M/P-1361.1-47 Part No. 501 04279
Housing	metal	●	●	●	●	●	●	●	●
	plastic								
Light source	red light (8m)	●	●	●	●				●
	red light (15m)					●	●	●	
Connection	terminals	●		●		●	●		
	M12 connector		●		●			●	●
Features	optics heating/low temp.			●	●		●		
	switching delay			●	●			●	
	warning output	●	●	●	●				
	activation input								●
	NPN switching output						●		
	Light/dark switching								●

Tables

10m models

	Reflectors		Operating range
1	TK(S)	100x100	0.3 … 8m
2	MTK(S)	50x50	0.3 … 7m
3	TK(S)	30x50	0.3 … 4.5m
4	TK(S)	20x40	0.3 … 3m
5	TK(S)	82	0.3 … 6m
6	Tape 2	100x100	0.3 … 4m

1	0.1				8	10
2	0.1			7	8.5	
3	0.1		4.5	5		
4	0.1	3	4			
5	0.1			6	7.5	
6	0.1		4	5.5		

18m models

	Reflectors		Operating range
1	TK(S)	100x100	0.3 … 15m
2	MTK(S)	50x50	0.3 … 11m
3	TK(S)	30x50	0.3 … 6m
4	TK(S)	20x40	0.3 … 5m
5	TK(S)	82	0.3 … 11m
6	Tape 2	100x100	0.3 … 6m

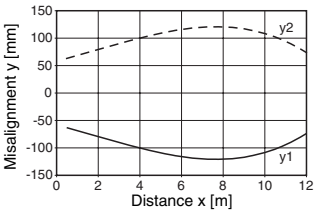
1	0.1				15	18
2	0.1			11	12	
3	0.1		6	7.5		
4	0.1	5	6			
5	0.1			11	11.5	
6	0.1		6	7.5		

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

Diagrams

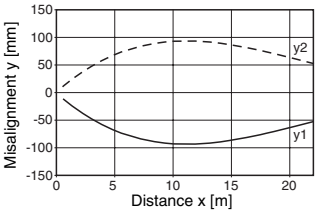
10m models

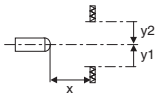
Typ. response behaviour (TKS 100x100)



18m models

Typ. response behaviour (TKS 100x100)





Remarks

- The polarised retro-reflective photoelectric sensor is also available with an integrated AS-i chip for direct connection to the AS-i system.

PRK 96 Retro-reflective photoelectric sensors with polarisation filter

10 m
28 m

10 - 30 V DC

HF A²LS

- Polarised retro-reflective photoelectric sensor with large operating range in visible red light
- Robust metal housing with glass cover or plastic housing, protection class IP 67 for industrial application
- Complementary outputs for standard applications and a wide range of input and output variants for optimum adaptation to the application
- Connection via M12 connector or terminal compartment
- Multiple options with warning output, activation input, switching delays and optics heating for use at low temperatures

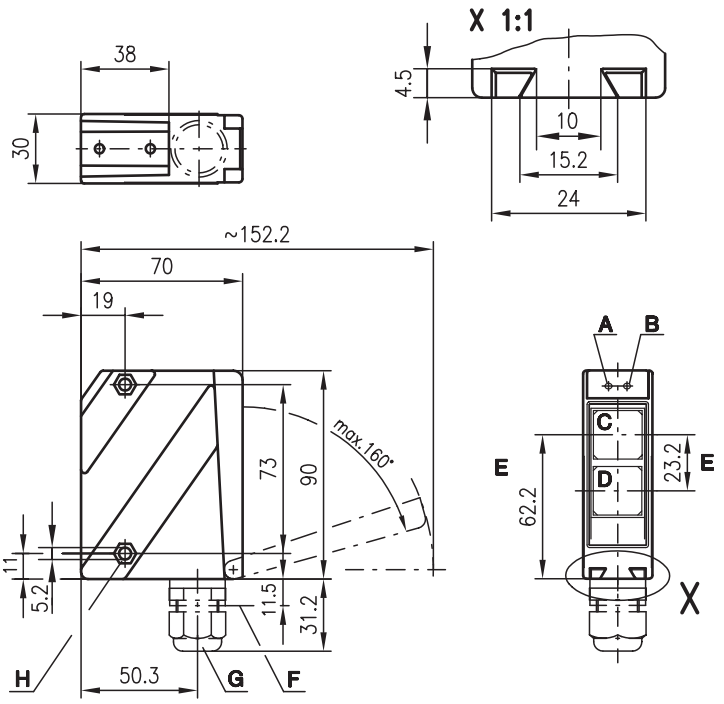
IEC 60947... IEC 60947... IP 67

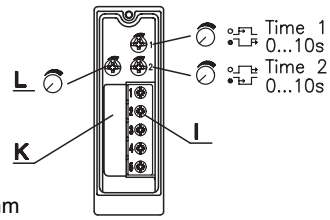
Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)
- Reflectors
- Reflective tapes

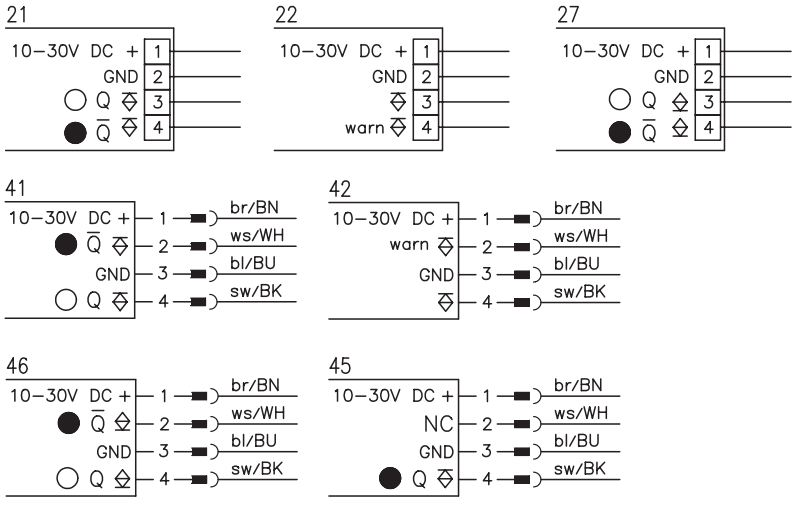
Dimensioned drawing





A Indicator diode green
B Indicator diode yellow
C Receiver
D Transmitter
E Optical axis
F Device plug M12x1
G Screwed cable gland M16x1.5 for Ø 5 … 10mm
H Countersinking for SK nut M5, 4.2 deep
I Connection terminals
K Cable entry
L Sensitivity adjustment

Electrical connection



Specifications

Optical data

Typ. operating range limit (TK(S) 100x100) [1]	10m/28m
Operating range [2]	see tables
Light spot diameter	approx. 130mm at 6m
Light source	LED (modulated light)
Wavelength	660nm (visible red light, polarised)

Timing

Switching frequency	1000Hz/20Hz
Response time	0.5ms/25ms
Delay before start-up	≤ 200ms

Electrical data

Operating voltage U_B	10 … 30VDC (incl. residual ripple)
Residual ripple	≤ 15% of U_B
Bias current	≤ 40mA, ≤ 75mA with optics heating
Switching output	PNP transistor
Function characteristics	light/dark switching (reversible)
Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Output current	max. 100mA
Sensitivity	adjustable

Indicators

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

Mechanical data	**Plastic housing**
Housing	polycarbonate
Optics cover	plastic
Weight	150g
Connection type	terminals or M12 connector

Environmental data

Ambient temp. (operation/storage)	-20°C … +55°C/-40°C … +55°C
Protective circuit [3]	1, 2, 3, 4
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

Options

Warning output autoControl warn	PNP transistor, 100mA, counting principle
Optics heating	for temperature changes, prevents fogging
Low temperature	to -35°C
Switching delay (slow oper./release)	0 … 10s (separately adjustable)

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

Order guide

Selection table Equipment ↓	Order code →	PRK 96K/P-1360-21 Part No. 500 25163	PRK 96K/P-1360-41 Part No. 500 25165	PRK 96K/P-3368-41 Part No. 500 41042	PRK 96K/P-1380-21 Part No. 500 25164	PRK 96K/P-1380-41 Part No. 500 25166	PRK 96K/P-1365-45 Part No. 501 03003	PRK 96K/P-1360.1-41 Part No. 501 03216	PRK 96K/N-1380-46 Part No. 500 81325
Housing	metal								
	plastic	●	●	●	●	●	●	●	●
Light source	red light (10m)	●	●		●	●	●	●	●
	red light (28m)			●					
Connection	terminals	●			●				
	M12 connector		●	●		●	●	●	●
Features	switching delay				●	●			●
	warning output								
	activation input								
	PIN 2 = NC *						●	●	
	PIN 4 = dark switching						●		
	PIN 4 = light/dark reversible							●	
	NPN switching output								●

Tables

10m models

	Reflectors		Operating range
1	TK(S)	100x100	0.3 … 8m
2	MTK(S)	50x50	0.3 … 7m
3	TK(S)	30x50	0.3 … 4.5m
4	TK(S)	20x40	0.3 … 3m
5	TK(S)	82	0.3 … 6m
6	Tape 2	100x100	0.3 … 4m

1	0.1							8		10
2	0.1						7		8.5	
3	0.1				4.5		5			
4	0.1		3		4					
5	0.1						6		7.5	
6	0.1				4		5.5			

28m models

	Reflectors		Operating range
1	TK(S)	100x100	0.3 … 28m

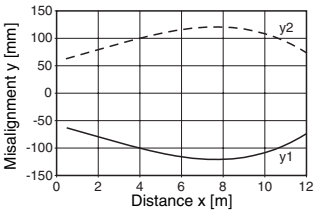
1	0.1								26	28

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

Diagrams

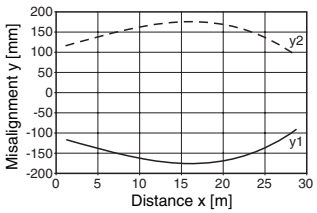
10m models

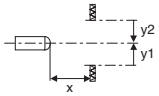
Typ. response behaviour (TKS 100x100)



28m models

Typ. response behaviour (TKS 100x100)





Remarks

- The polarised retro-reflective photoelectric sensor is also available with an integrated AS-i chip for direct connection to the AS-i system.
- *For direct connection to AS-i I/O coupling modules (PRK 96K/P-1365-45 and PRK 96K/P-1360.1-41)

PRK 96 Retro-reflective photoelectric sensors with polarisation filter

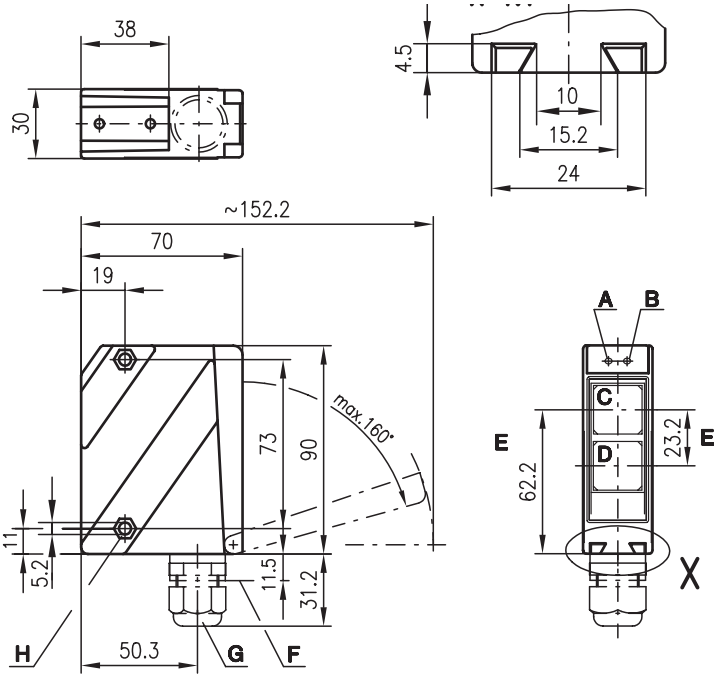
10 m

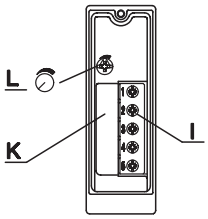
10 - 30 V DC

HF A²LS

- Polarised retro-reflective photoelectric sensor with large operating range in visible red light
- Robust metal housing with glass cover or plastic housing, protection class IP 67/ IP 69K for industrial application
- Sensitivity adjustment and delay before start-up for optimal adaptation to the application
- Connection via M12 connector or terminal compartment
- Activation input for e.g. muting applications

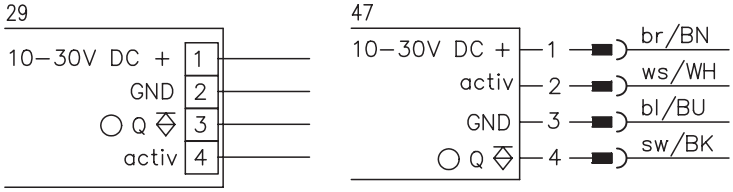
Dimensioned drawing





A Indicator diode green
B Indicator diode yellow
C Receiver
D Transmitter
E Optical axis
F Device plug M12x1
G Screwed cable gland M16x1.5 for Ø 5 … 10mm
H Countersinking for SK nut M5, 4.2 deep
I Connection terminals
K Cable entry
L Sensitivity adjustment

Electrical connection



CE ISO 9001 cULus LISTED

IEC 60947... IEC 60947... IP 69K IP 67

Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)
- Reflectors
- Reflective tapes

Specifications

Optical data

Typ. operating range limit (TK(S) 100x100) [1]	10m
Operating range [2]	see tables
Light spot diameter	approx. 130mm at 6m
Light source	LED (modulated light)
Wavelength	660nm (visible red light, polarised)

Timing

Switching frequency	1000Hz
Response time	0.5ms
Delay before start-up	≤ 200ms

Electrical data

Operating voltage U_B	10 … 30VDC (incl. residual ripple)
Residual ripple	≤ 15% of U_B
Bias current	≤ 40mA
Switching output	PNP transistor
Function characteristics	light switching
Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Output current	max. 100mA
Sensitivity	adjustable

Indicators

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

Mechanical data	**Metal housing**	**Plastic housing**
Housing	diecast zinc	polycarbonate
Optics cover	glass	plastic
Weight	380g	150g
Connection type	terminals or M12 connector	

Environmental data

Ambient temp. (operation/storage)	-20°C … +55°C/-40°C … +55°C	
Protective circuit [3]	1, 2, 3, 4	
VDE safety class [4]	II, all-insulated	
Protection class	IP 67, IP 69K [5]	IP 67
LED class	1 (acc. to EN 60825-1)	
Standards applied	IEC 60947-5-2	

Options

Activation input activ	
Transmitter active/not active	≥ 8V/≤ 2V (≥ 2V/≤ 2V) [6]
Activation/disable delay	≤ 0.5ms
Input resistance	47KΩ ± 10%

1) Typ. operating range limit: max. attainable range without performance reserve
2) Operating range: recommended range with performance reserve
3) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs, 4=interference blanking
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
6) Active low

Tables

	Reflectors		Operating range
1	TK(S)	100x100	0.3 … 8m
2	MTK(S)	50x50	0.3 … 7m
3	TK(S)	30x50	0.3 … 4.5m
4	TK(S)	20x40	0.3 … 3m
5	TK(S)	82	0.3 … 6m
6	Tape 2	100x100	0.3 … 4m

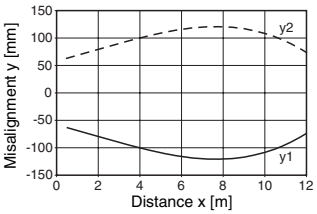
1	0.1								8	10
2	0.1							7	8.5	
3	0.1					4.5	5			
4	0.1			3	4					
5	0.1							6	7.5	
6	0.1					4	5.5			

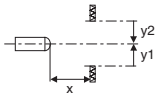
Operating range [m]
Typ. operating range limit [m]

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

Diagrams

Typ. response behaviour (TKS 100x100)





Order guide

Selection table Equipment ↓		Order code → PRK 96K/P-1361-29 Part No. 500 80476	PRK 96M/P-1361-47 Part No. 500 82092	PRK 96K/P-1363-29 Part No. 500 80656	PRK 96M/P-1362-47 Part No. 500 80477	
Housing	metal		●		●	
	plastic	●		●		
Light source	red light (8m)	●	●	●	●	
Connection	terminals	●		●		
	M12 connector		●		●	
Features	activation input	●	●	● [6]	●	
	optics heating/low temperature				●	

Remarks

- The polarised retro-reflective photoelectric sensor is also available with an integrated AS-i chip for direct connection to the AS-i system.
- PRK 96K/P-1363-29
  Activation via active low signal

PRK 96 Retro-reflective photoelectric sensors with polarisation filter

10m
18m

20-230 V AC / DC

HF A²LS

- Polarised retro-reflective photoelectric sensor with large operating range in visible red light
- Robust metal housing with glass cover or plastic housing, protection class IP 67/ IP 69K for industrial application
- All-mains design 20 … 230VAC/DC with relay output
- Relay with change-over contact, sensitivity adjustment, delay before start-up and various options for optimal adaptation to the application
- Connection via comfortable terminal compartment up to 1.5mm²

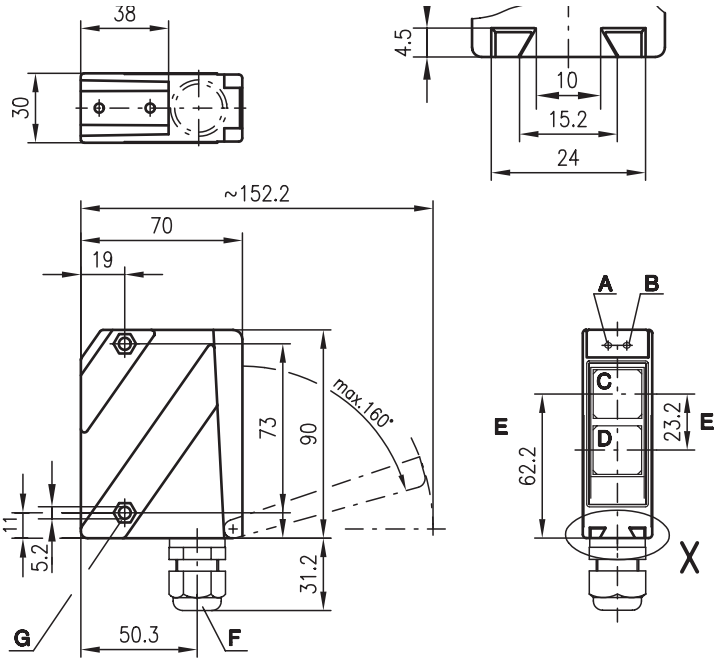
IEC 60947... IEC 60947... IP 69K IP 67

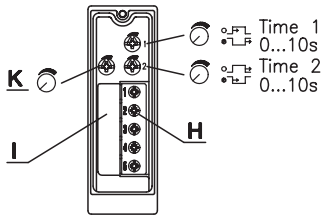
Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- Spark extinction
- Reflectors
- Reflective tapes

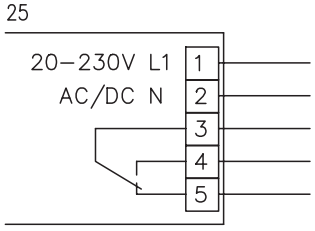
Dimensioned drawing





A Indicator diode green
B Indicator diode yellow
C Receiver
D Transmitter
E Optical axis
F Screwed cable gland M16x1.5 for Ø 5 … 10mm
G Countersinking for SK nut M5, 4.2 deep
H Connection terminals
I Cable entry
K Sensitivity adjustment

Electrical connection



Specifications

Optical data

Typ. operating range limit (TK(S) 100x100) [1]	10m/18m
Operating range [2]	see tables
Light spot diameter	approx. 130mm at 6m
Light source	LED (modulated light)
Wavelength	660nm (visible red light, polarised)

Timing

Switching frequency	20Hz
Response time	25ms
Delay before start-up	≤ 200ms

Electrical data

Operating voltage U_B	20 … 230VAC, 50/60Hz 20 … 230VDC ± 10%
Power consumption	≤ 1.5VA
Switching output [3]	relay, 1 change-over contact
Function characteristics	break-contact/make-contact
Switching voltage, relay	250VAC/DC
Switching current, relay	250VAC, 3A/30VDC, 3A
Switching power, relay	750VA, cosφ=1
Sensitivity	adjustable

Indicators

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

Mechanical data — **Metal housing**

Housing	diecast zinc
Optics cover	glass
Weight	380g
Connection type	terminals

Environmental data

Ambient temp. (operation/storage)	-20°C … +55°C/-40°C … +55°C
Protective circuit [4]	1, 4
VDE safety class [5]	II, all-insulated
Protection class	IP 67, IP 69K [6]
LED class	1 (acc. to EN 60825-1)
Standards applied	IEC 60947-5-2

Options

Switching delay (slow oper./release)	0 … 10s (separately adjustable)

1) Typ. operating range limit: max. attainable range without performance reserve
2) Operating range: recommended range with performance reserve
3) Suitable spark extinction must be provided with inductive or capacitive loads
4) 1=transient protection, 4=interference blanking
5) Rating voltage 250VAC
6) 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

Selection table Equipment ↓	Order code →	PRK 96M/R-3420-25 Part No. 500 82066	PRK 96M/R-3430-25 Part No. 500 61111				
Housing	metal	●	●				
	plastic						
Light source	red light (8m)						
	red light (15m)	●	●				
	red light (20m)						
Connection	terminals	●	●				
	M12 connector						
Features	optics heating/low temperature						
	switching delay		●				

Tables

10m models

	Reflectors		Operating range
1	TK(S)	100x100	0.3 … 8m
2	MTK(S)	50x50	0.3 … 7m
3	TK(S)	30x50	0.3 … 4.5m
4	TK(S)	20x40	0.3 … 3m
5	TK(S)	82	0.3 … 6m
6	Tape 2	100x100	0.3 … 4m

1	0.1						8	10
2	0.1					7	8.5	
3	0.1			4.5	5			
4	0.1		3	4				
5	0.1					6	7.5	
6	0.1			4	5.5			

18m models

	Reflectors		Operating range
1	TK(S)	100x100	0.3 … 15m
2	MTK(S)	50x50	0.3 … 11m
3	TK(S)	30x50	0.3 … 6m
4	TK(S)	20x40	0.3 … 5m
5	TK(S)	82	0.3 … 11m
6	Tape 2	100x100	0.3 … 6m

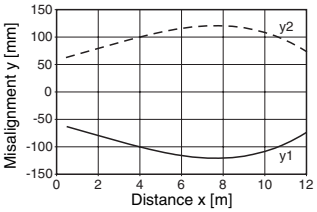
1	0.1						15	18
2	0.1					11	12	
3	0.1				6	7.5		
4	0.1		5	6				
5	0.1					11	11.5	
6	0.1				6	7.5		

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

Diagrams

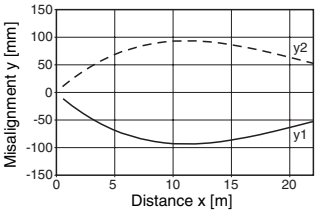
10m models

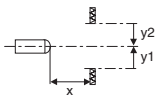
Typ. response behaviour (TKS 100x100)



18m models

Typ. response behaviour (TKS 100x100)





Remarks

PRK 96 — Retro-reflective photoelectric sensors with polarisation filter

10m
24m

20-230 V AC / DC

HF A²LS

- Polarised retro-reflective photoelectric sensor with large operating range in visible red light
- Robust metal housing with glass cover or plastic housing, protection class IP 67 for industrial application
- All-mains design 20 … 230VAC/DC with relay output
- Relay with change-over contact, sensitivity adjustment, delay before start-up and various options for optimal adaptation to the application
- Connection via comfortable terminal compartment up to 1.5mm²

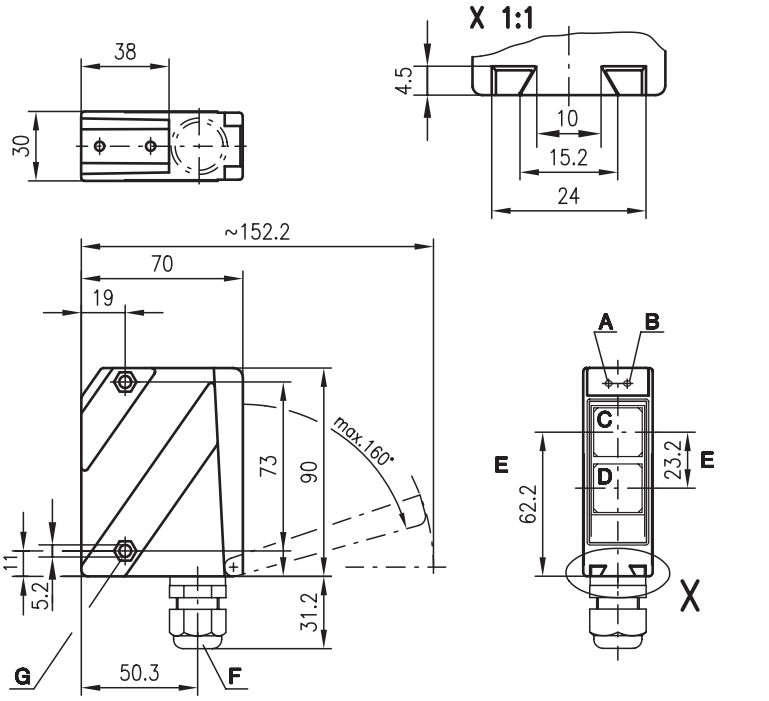
IEC 60947... IEC 60947... IP 67

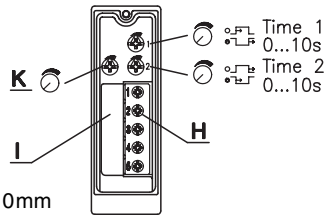
Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- Spark extinction
- Reflectors
- Reflective tapes

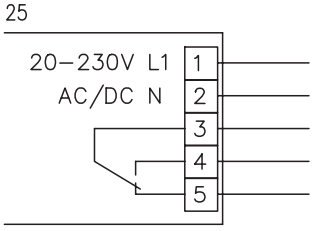
Dimensioned drawing





A Indicator diode green
B Indicator diode yellow
C Receiver
D Transmitter
E Optical axis
F Screwed cable gland M16x1.5 for Ø 5 … 10mm
G Countersinking for SK nut M5, 4.2 deep
H Connection terminals
I Cable entry
K Sensitivity adjustment

Electrical connection



Specifications

Optical data

Typ. operating range limit (TK(S) 100x100) [1]	10m/24m
Operating range [2]	see tables
Light spot diameter	approx. 130mm at 6m
Light source	LED (modulated light)
Wavelength	660nm (visible red light, polarised)

Timing

Switching frequency	20Hz
Response time	25ms
Delay before start-up	≤ 200ms

Electrical data

Operating voltage U_B	20 … 230VAC, 50/60Hz 20 … 230VDC ± 10%
Power consumption	≤ 1.5VA
Switching output [3]	relay, 1 change-over contact
Function characteristics	break-contact/make-contact
Switching voltage, relay	250VAC/DC
Switching current, relay	250VAC, 3A/30VDC, 3A
Switching power, relay	750VA, cosφ=1
Sensitivity	adjustable

Indicators

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

Mechanical data — **Plastic housing**

Housing	polycarbonate
Optics cover	plastic
Weight	150g
Connection type	terminals

Environmental data

Ambient temp. (operation/storage)	-20°C … +55°C/-40°C … +55°C
Protective circuit [4]	1, 4
VDE safety class [5]	II, all-insulated
Protection class	IP 67
LED class	1 (acc. to EN 60825-1)
Standards applied	IEC 60947-5-2

Options

Switching delay (slow oper./release)	0 … 10s (separately adjustable)

1) Typ. operating range limit: max. attainable range without performance reserve
2) Operating range: recommended range with performance reserve
3) Suitable spark extinction must be provided with inductive or capacitive loads
4) 1=transient protection, 4=interference blanking
5) Rating voltage 250VAC

Order guide

Selection table Equipment ↓ / Order code →		PRK 96K/R-1420-25 Part No. 500 25167	PRK 96K/R-1430-25 Part No. 500 25168	PRK 96K/R-3428-25 Part No. 500 35351					
Housing	metal								
	plastic	●	●	●					
Light source	red light (8m)	●	●						
	red light (15m)								
	red light (20m)			●					
Connection	terminals	●	●	●					
	M12 connector								
Features	optics heating/low temp.								
	switching delay		●						
	UL homologation	●	●						

Tables

10m models

	Reflectors		Operating range
1	TK(S)	100x100	0.3 … 8m
2	MTK(S)	50x50	0.3 … 7m
3	TK(S)	30x50	0.3 … 4.5m
4	TK(S)	20x40	0.3 … 3m
5	TK(S)	82	0.3 … 6m
6	Tape 2	100x100	0.3 … 4m

1	0.1							8	10
2	0.1						7		8.5
3	0.1				4.5		5		
4	0.1		3		4				
5	0.1						6		7.5
6	0.1				4		5.5		

24m models

	Reflectors		Operating range
1	TK(S)	100x100	0.3 … 20m
2	MTK(S)	50x50	0.3 … 15m
3	TK(S)	30x50	0.3 … 10m
4	TK(S)	20x40	0.3 … 8m
5	TK(S)	82	0.3 … 15m
6	Tape 2	100x100	0.3 … 10m

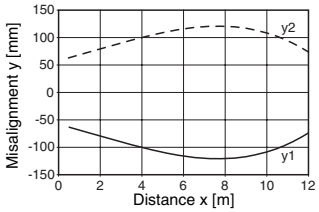
1	0.1							20	24
2	0.1						15		16
3	0.1				10		12		
4	0.1		8		9				
5	0.1						15		17
6	0.1				10		12		

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

Diagrams

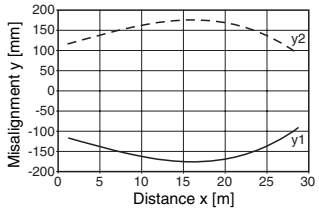
10m models

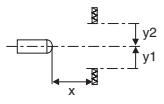
Typ. response behaviour (TKS 100x100)



24m models

Typ. response behaviour (TKS 100x100)





Remarks

PRK 96 — Retro-reflective photoelectric sensors with polarisation filter

0 … 1.85 m

10 - 30 V DC

- Retro-reflective photoelectric sensor for safe detection of transparent media (e.g. clear glass, PE, foil)
- Reliable detection of the smallest gaps between transparent objects
- User controlled sensitivity adjustment with high resolution
- The autocollimation principle used ensures that the device functions reliably over the entire range (0 … max.)
- High switching frequency for detection of fast events
- Connection via M12 connector or terminal compartment

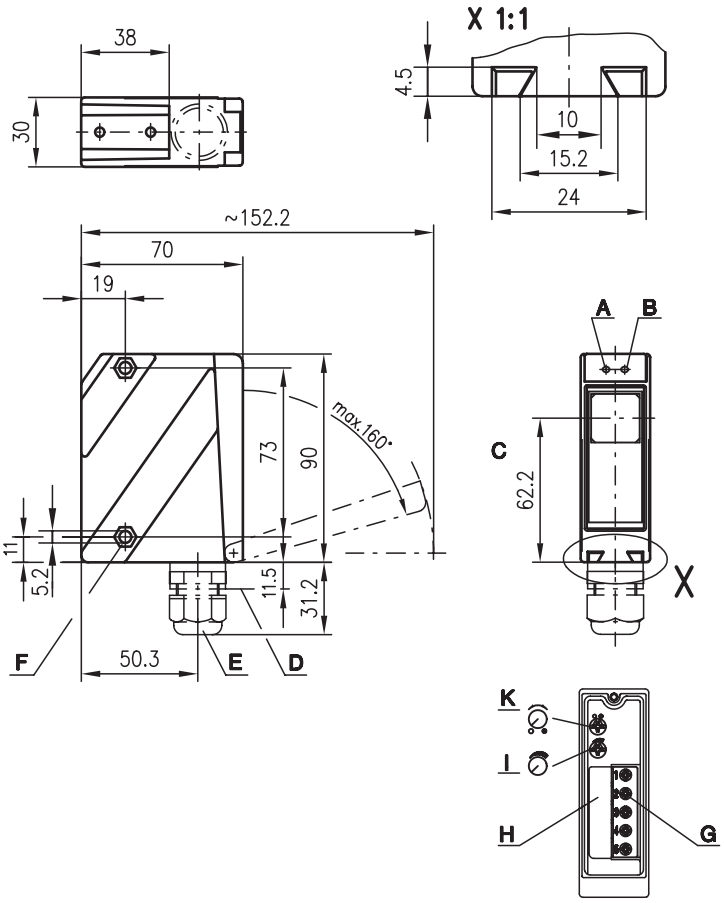
IEC 60947... IEC 60947... IP 69K IP 67

Accessories:

(available separately • see page 76)

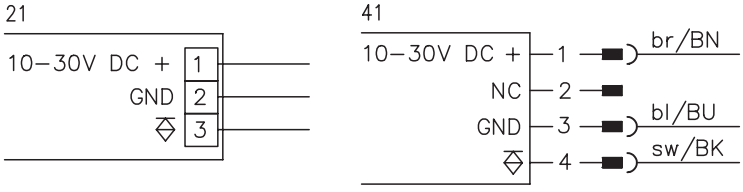
- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)
- Reflectors
- Reflective tapes
- Alignment aid ARH 96

Dimensioned drawing



A Indicator diode green
B Indicator diode yellow
C Optical axis
D Device plug M12x1
E Screwed cable gland M16x1.5 for Ø 5 … 10 mm
F Countersinking for SK nut M5, 4.2 deep
G Connection terminals
H Cable entry
I Sensitivity adjustment
K Light/dark switching

Electrical connection



Specifications

Optical data

Typ. operating range limit (TK(S) 50x50) [1]	0 … 1.85m
Operating range [2]	0 … 1.5m
Light source	LED (modulated light)
Wavelength	660nm (visible red light/polarised)

Timing

Switching frequency	1000Hz
Response time	0.5ms
Delay before start-up	≤ 200ms

Electrical data

Operating voltage U_B	10 … 30VDC (incl. residual ripple)
Residual ripple	≤ 15% of U_B
Bias current	≤ 40mA
Switching output	PNP transistor
Function characteristics	light/dark switching (reversible)
Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Output current	max. 100mA
Sensitivity	adjustable with 10-turn potentiometer

Indicators

LED green	ready
LED yellow	**clear glass** - adjustment range 1 transition from quickly flashing to slowly flashing **coloured glass** - adjustment range 2 transition from cont. illuminated to quickly flashing **other** - adjustment range 3 continuously illuminated

Mechanical data	**Metal housing**
Housing	diecast zinc
Optics cover	glass
Weight	380g
Connection type	terminals or M12 connector

Environmental data

Ambient temp. (operation/storage)	-20°C … +55°C/-40°C … +55°C
Protective circuit [3]	1, 2, 3, 4
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. operating range limit: max. attainable range without performance reserve
2) Operating range: recommended range with performance reserve
3) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs, 4=interference blanking
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

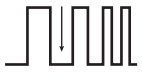
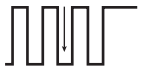
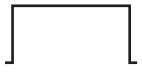
	Designation	**Part No.**
With terminals	PRK 96M/P-1830-21	500 28975
With M12 connector	PRK 96M/P-1830-41	500 80469

Tables

Diagrams

Remarks

- Integrated slit diaphragm: 3.7x20mm

Objects	**Adjustment** (indicator LED yellow)
Clear glass, PE, foil	Range 1 Operating pt. 1 
Coloured glass	Range 2 Operating pt. 2 
Other	Range 3 

PRK 96 — Retro-reflective photoelectric sensors with polarisation filter

0 … 1.85 m

20-230 V AC / DC

- Retro-reflective photoelectric sensor for safe detection of transparent media (e.g. clear glass, PE, foil)
- Reliable detection of the smallest gaps between transparent objects
- User controlled sensitivity adjustment with high resolution
- The autocollimation principle used ensures that the device functions reliably over the entire range (0 … max.)
- All-mains design 20 … 230 VAC/DC with relay output
- Connection via comfortable terminal compartment up to 1.5 mm²

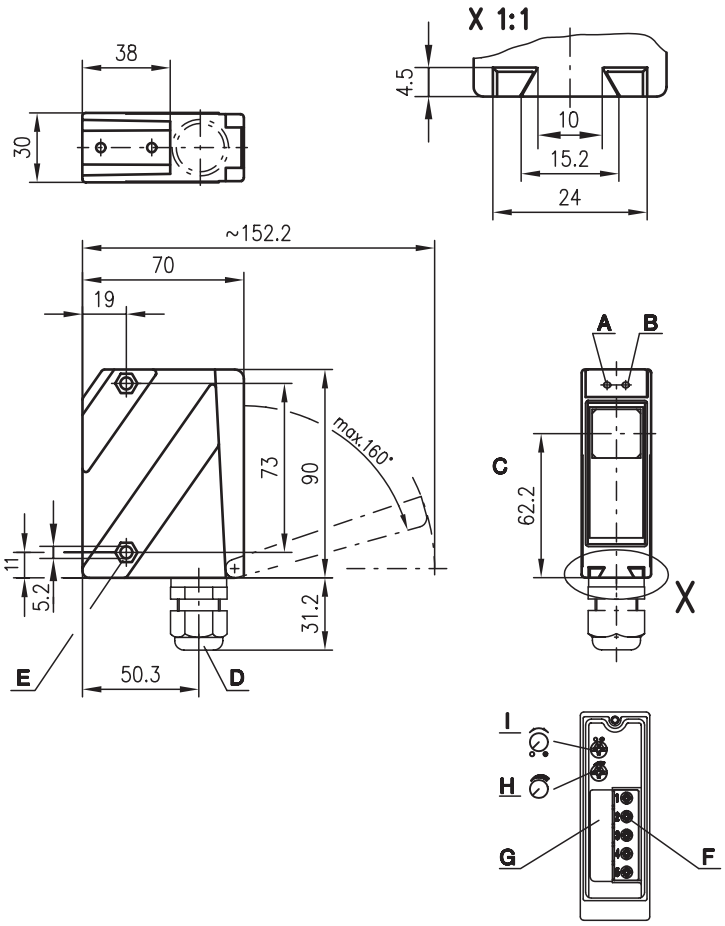
IEC 60947... IEC 60947... IP 69K IP 67

Accessories:

(available separately • see page 76)

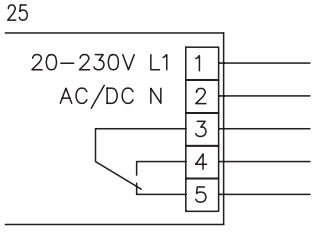
- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- Spark extinction
- Reflectors
- Reflective tapes
- Alignment aid ARH 96

Dimensioned drawing



A Indicator diode green
B Indicator diode yellow
C Optical axis
D Screwed cable gland M16x1.5 for Ø 5 … 10 mm
E Countersinking for SK nut M5, 4.2 deep
F Connection terminals
G Cable entry
H Sensitivity adjustment
I Light/dark switching

Electrical connection



Specifications

Optical data

Typ. operating range limit (TK(S) 50x50) [1]	0 … 1.85m
Operating range [2]	0 … 1.5m
Light source	LED (modulated light)
Wavelength	660nm (visible red light/polarised)

Timing

Switching frequency	20Hz
Response time	25ms
Delay before start-up	≤ 200ms

Electrical data

Operating voltage U_B	20 … 230VAC, 50/60Hz 20 … 230VDC ±10%
Power consumption	≤ 1.5VA
Switching output [3]	relay, 1 change-over contact
Function characteristics	light/dark switching (reversible)
Switching voltage, relay	250VAC/DC
Switching current, relay	250VAC, 3A/30VDC, 3A
Switching power, relay	750VA, cos φ=1
Sensitivity	adjustable with 10-turn potentiometer

Indicators

LED green	ready
LED yellow	**clear glass** - adjustment range 1 transition from quickly flashing to slowly flashing **coloured glass** - adjustment range 2 transition from cont. illuminated to quickly flashing **other** - adjustment range 3 continuously illuminated

Mechanical data	**Metal housing**
Housing	diecast zinc
Optics cover	glass
Weight	380g
Connection type	terminals

Environmental data

Ambient temp. (operation/storage)	-20°C … +55°C/-40°C … +55°C
Protective circuit [4]	1, 4
VDE safety class [5]	II, all-insulated
Protection class	IP 67, IP 69K [6]
LED class	1 (acc. to EN 60825-1)
Standards applied	IEC 60947-5-2

Options

Switching delay (slow oper./release)	0 … 10s (separately adjustable)

1) Typ. operating range limit: max. attainable range without performance reserve
2) Operating range: recommended range with performance reserve
3) Suitable spark extinction must be provided with inductive or capacitive loads
4) 1=transient protection, 4=interference blanking
5) Rating voltage 250VAC
6) 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

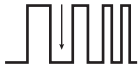
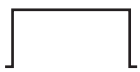
Designation	Part No.
PRK 96M/R-1850-25	500 80470

Tables

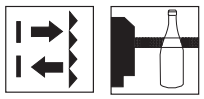
Diagrams

Remarks

- Integrated slit diaphragm: 3.7x20mm

Objects	**Adjustment** (indicator LED yellow)
Clear glass, PE, foil	Range 1 Operating pt. 1 
Coloured glass	Range 2 Operating pt. 2 
Other	Range 3 

PRK 96 — Retro-reflective photoelectric sensors with polarisation filter

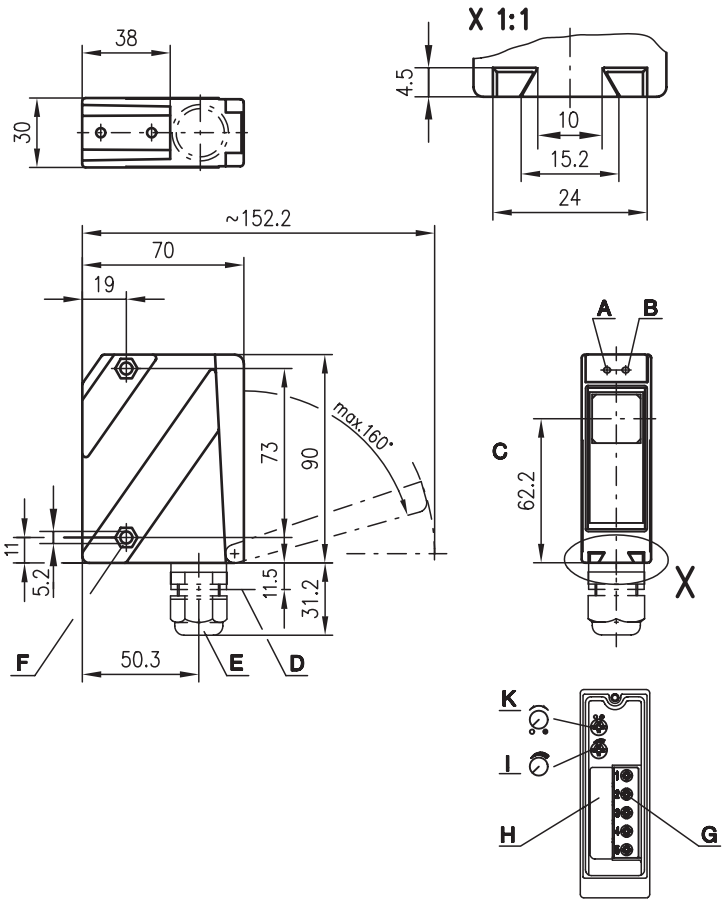


0 … 8.5 m

10 - 30 V DC

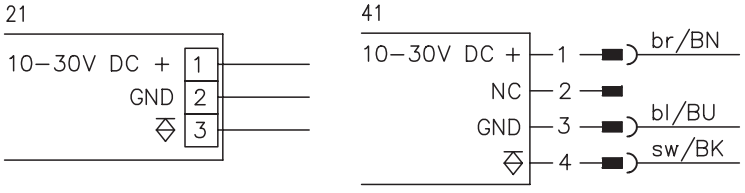
- Retro-reflective photoelectric sensor for safe detection of transparent media (e.g. clear glass, PE, foil)
- User controlled sensitivity adjustment with high resolution
- The autocollimation principle used ensures that the device functions reliably over the entire range (0 … max.)
- High switching frequency for detection of fast events
- Connection via M12 connector or terminal compartment

Dimensioned drawing



A Indicator diode green
B Indicator diode yellow
C Optical axis
D Device plug M12x1
E Screwed cable gland M16x1.5 for Ø 5 … 10 mm
F Countersinking for SK nut M5, 4.2 deep
G Connection terminals
H Cable entry
I Sensitivity adjustment
K Light/dark switching

Electrical connection



IEC 60947... IEC 60947... IP 69K IP 67

Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)
- Spark extinction
- Reflectors
- Reflective tapes
- Alignment aid ARH 96

Specifications

Optical data

Typ. operating range limit (TK(S) 50x50) [1]	0 … 8.5m
Operating range [2]	see tables
Light source	LED (modulated light)
Wavelength	660nm (visible red light/polarised)

Timing

Switching frequency	1000Hz
Response time	0.5ms
Delay before start-up	≤ 200ms

Electrical data

Operating voltage U_B	10 … 30VDC (incl. residual ripple)
Residual ripple	≤ 15% of U_B
Bias current	≤ 40mA
Switching output	PNP transistor
Function characteristics	light/dark switching (reversible)
Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Output current	max. 100mA
Sensitivity	adjustable with 10-turn potentiometer

Indicators

LED green	ready
LED yellow	**clear glass** - adjustment range 1 transition from quickly flashing to slowly flashing **coloured glass** - adjustment range 2 transition from cont. illuminated to quickly flashing **other** - adjustment range 3 continuously illuminated

Mechanical data	**Metal housing**
Housing	diecast zinc
Optics cover	glass
Weight	380g
Connection type	terminals or M12 connector

Environmental data

Ambient temp. (operation/storage)	-20°C … +55°C/-40°C … +55°C
Protective circuit [3]	1, 2, 3, 4
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. operating range limit: max. attainable range without performance reserve
2) Operating range: recommended range with performance reserve
3) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs, 4=interference blanking
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

Tables

	Reflectors		Operating range
1	TK(S)	100x100	0 … 7m
2	MTK(S)	50x50	0 … 6m
3	TK(S)	30x50	0 … 4m
4	TK(S)	20x40	0 … 3.5m
5	TK(S)	82	0 … 5m
6	Tape 2	100x100	0 … 3m

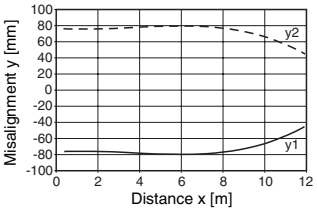
1	0.1					7	8.5
2	0.1				6	7.5	
3	0.1			4	5		
4	0.1		3.5	4			
5	0.1			5	6		
6	0.1		3	3.5			

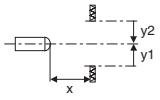
Operating range [m]
Typ. operating range limit [m]

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

Diagrams

Typ. response behaviour (TKS 100x100)





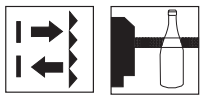
Order guide

	Designation	Part No.
With terminals	PRK 96M/P-1838-21	500 29880
With M12 connector	PRK 96M/P-1838-41	500 80760

Remarks

Objects	Adjustment (indicator LED yellow)
Clear glass, PE, foil	Range 1 Operating pt. 1
Coloured glass	Range 2 Operating pt. 2
Other	Range 3

PRK 96 Retro-reflective photoelectric sensors with polarisation filter



0 … 8.5m

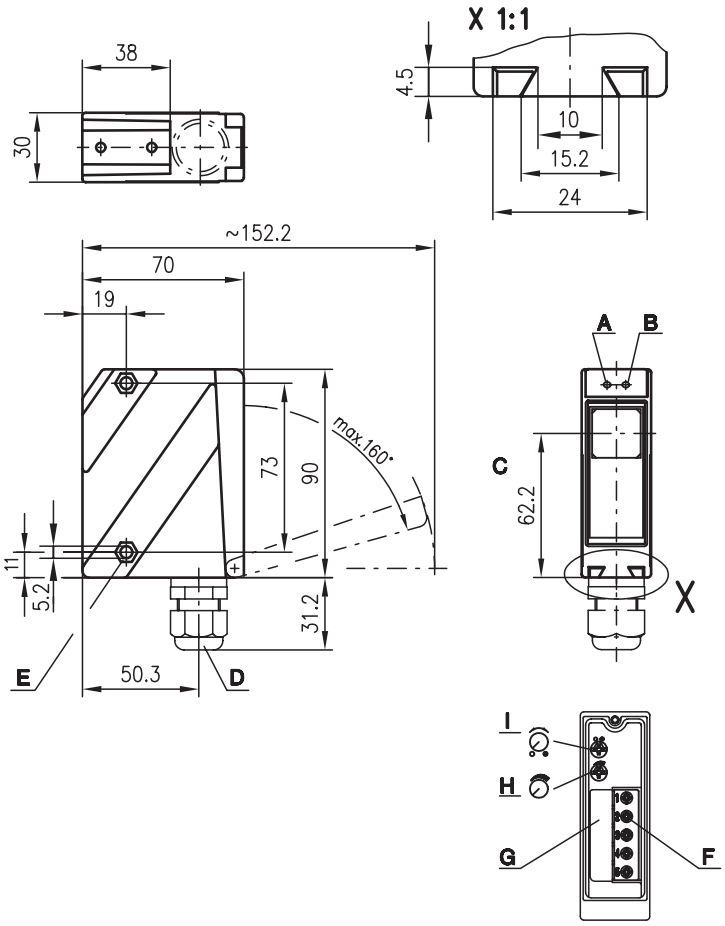
- Retro-reflective photoelectric sensor for safe detection of transparent media (e.g. clear glass, PE, foil)
- User controlled sensitivity adjustment with high resolution
- The autocollimation principle used ensures that the device functions reliably over the entire range (0 … max.)
- All-mains design 20 … 230VAC/DC with relay output
- Connection via comfortable terminal compartment up to 1.5mm²

Accessories:

(available separately • see page 76)

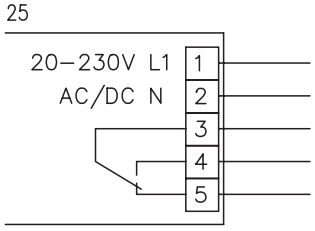
- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- Spark extinction
- Reflectors
- Reflective tapes
- Alignment aid ARH 96

Dimensioned drawing



A Indicator diode green
B Indicator diode yellow
C Optical axis
D Screwed cable gland M16x1.5 for Ø 5 … 10mm
E Countersinking for SK nut M5, 4.2 deep
F Connection terminals
G Cable entry
H Sensitivity adjustment
I Light/dark switching

Electrical connection



Specifications

Optical data

Typ. operating range limit (TK(S) 50x50) [1]	0 … 8.5m
Operating range [2]	see tables
Light source	LED (modulated light)
Wavelength	660nm (visible red light/polarised)

Timing

Switching frequency	20Hz
Response time	25ms
Delay before start-up	≤ 200ms

Electrical data

Operating voltage U_B	20 … 230VAC; 50/60Hz 20 … 230VDC ± 10%
Power consumption	≤ 1.5VA
Switching output [3]	relay, 1 change-over contact
Function characteristics	light/dark switching (reversible)
Switching voltage, relay	250VAC/DC
Switching current, relay	250VAC, 3A/30VDC, 3A
Switching power, relay	750VA, cosφ=1
Sensitivity	adjustable with 10-turn potentiometer

Indicators

LED green	ready
LED yellow	**clear glass** - adjustment range 1 transition from quickly flashing to slowly flashing **coloured glass** - adjustment range 2 transition from cont. illuminated to quickly flashing **other** - adjustment range 3 continuously illuminated

Mechanical data — **Metal housing**

Housing	diecast zinc
Optics cover	glass
Weight	380g
Connection type	terminals

Environmental data

Ambient temp. (operation/storage)	-20°C … +55°C/-40°C … +55°C
Protective circuit [4]	1, 4
VDE safety class [5]	II, all-insulated
Protection class	IP 67, IP 69K [6]
LED class	1 (acc. to EN 60825-1)
Standards applied	IEC 60947-5-2

Options

Switching delay (slow oper./release)	0 … 10s (separately adjustable)

1) Typ. operating range limit: max. attainable range without performance reserve
2) Operating range: recommended range with performance reserve
3) Suitable spark extinction must be provided with inductive or capacitive loads
4) 1=transient protection, 4=interference blanking
5) Rating voltage 250VAC
6) 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

Designation	Part No.
PRK 96M/R-1858-25	500 29881

Tables

	Reflectors		Operating range
1	TK(S)	100x100	0 … 7m
2	MTK(S)	50x50	0 … 6m
3	TK(S)	30x50	0 … 4m
4	TK(S)	20x40	0 … 3.5m
5	TK(S)	82	0 … 5m
6	Tape 2	100x100	0 … 3m

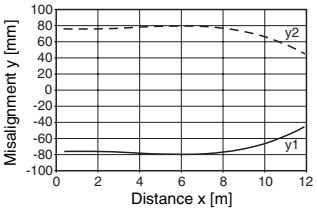
1	0.1					7	8.5
2	0.1				6	7.5	
3	0.1			4	5		
4	0.1		3.5	4			
5	0.1			5	6		
6	0.1		3	3.5			

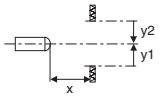
Operating range [m]
Typ. operating range limit [m]

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

Diagrams

Typ. response behaviour (TKS 100x100)





Remarks

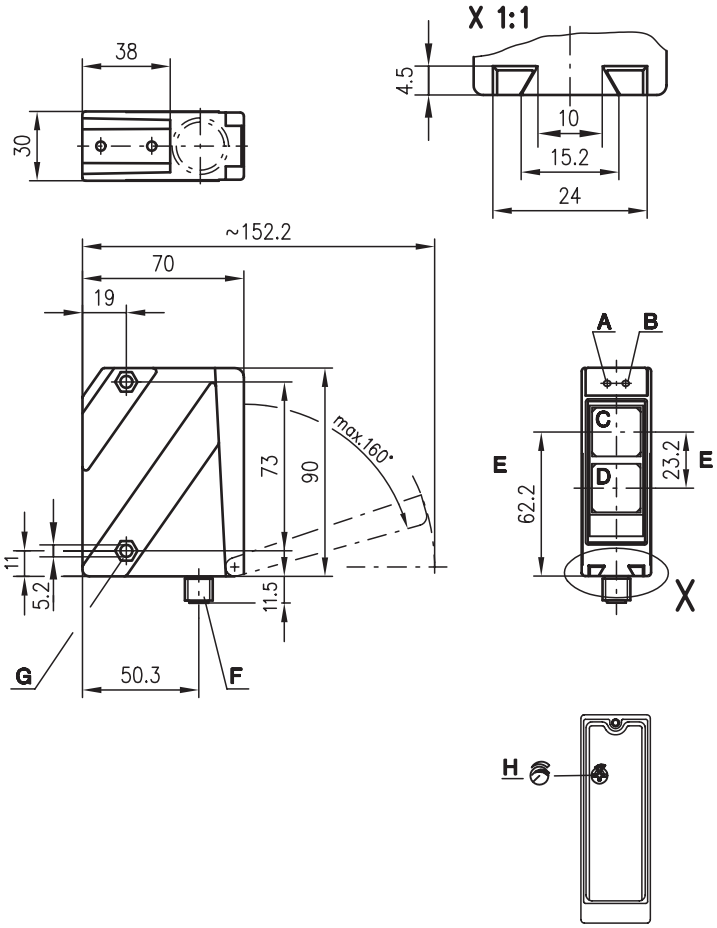
Objects	Adjustment (indicator LED yellow)
Clear glass, PE, foil	Range 1 Operating pt. 1
Coloured glass	Range 2 Operating pt. 2
Other	Range 3

PRK 96 Retro-reflective photoelectric sensors with polarisation filter

18 m

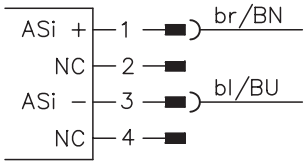
- Metal housing with glass cover, protection class IP 67/IP 69K for industrial application
- Access to all sensor functions via an AS-interface without additional wiring
- Sensitivity adjustment and ready indicator for optimal adaptation to the application
- Common conductor for both power and data reduces installation work

Dimensioned drawing



A Indicator diode green
B Indicator diode yellow
C Receiver
D Transmitter
E Optical axis
F Device plug M12x1
G Countersinking for SK nut M5, 4.2 deep
H Sensitivity adjustment

Electrical connection



Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)
- Spark extinction
- Reflectors and reflective tapes

AS-i Accessories:

(available separately)

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

Specifications

Optical data

Typ. operating range limit (TK(S) 100x100) [1]	18m
Operating range [2]	see tables
Light source	LED (modulated light)
Wavelength	660nm (visible red light, polarised)

Timing

Sensor switching frequency	1000Hz
Sensor response time	0.5ms
Delay before start-up	≤ 200ms

Electrical data

Operating voltage U_B	26.5 … 31.6V (according to AS-i specification)
Bias current	≤ 40mA per sensor

Indicators

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

Mechanical data **Metal housing**

Housing	diecast zinc
Optics cover	glass
Weight	380g
Connection type	M12 connector

Environmental data

Ambient temp. (operation/storage)	-20°C … +55°C/-40°C … +55°C
Protective circuit [3]	1, 4
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

AS-i data for receiver

I/O code	1
ID code	1
Address	programmed by the user in the range of 1 to 31 (default=0)
Cycle time acc. to AS-i specification	5ms
AS-i standard according to profile	S-1.1

1) Typ. operating range limit: max. attainable range without performance reserve
2) Operating range: recommended range with performance reserve
3) 1=transient protection, 4=interference blanking
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

Assignment: data bits				Assignment: parameter bits			
		Programming (host level)				Programming (host level)	
D_0	**Switching output**	Ø no reflection	System input	$*P_0$	**NC**	Ø	System parameter
		1 reflection				1	
D_1	**Warning output autoControl**	Ø active	System input	$*P_1$	**Light/dark switching**	Ø dark switching	System parameter
		1 not active				1 light switching	
D_2	**Ready output**	Ø sensor not ready	System input	$*P_2$	**NC**	Ø	System parameter
		1 sensor ready				1	
$*D_3$	**Activation input**	Ø transmitter on	System output	$*P_3$	**NC**	Ø	System parameter
		1 transmitter off				1	

* default = 1

Order guide

	Designation	Part No.
18m	PRK 96M/A-3410-44	500 82067

Tables

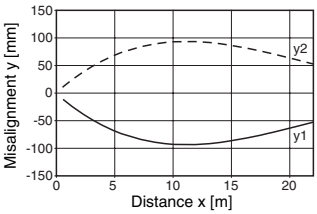
	Reflectors		Operating range
1	TK(S)	100x100	0.3 … 15m
2	MTK(S)	50x50	0.3 … 11m
3	TK(S)	30x50	0.3 … 6m
4	TK(S)	20x40	0.3 … 5m
5	TK(S)	82	0.3 … 11m
6	Tape 2	100x100	0.3 … 6m

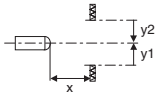
1	0.1					15	18
2	0.1					11	12
3	0.1				6	7.5	
4	0.1			5	6		
5	0.1					11	11.5
6	0.1				6	7.5	

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

Diagrams

Typ. response behaviour (TKS 100x100)





Remarks

PRK 96 Retro-reflective photoelectric sensors with polarisation filter

0 … 8.5 m

10 - 30 V DC

HF A²LS

- Retro-reflective photoelectric sensor for detection of transparent media
- Robust metal housing with glass cover, protection class IP 67/IP 69K for industrial application
- Sensitivity adjustment
- The autocollimation principle used ensures that the device functions reliably over the entire range (0 … max.)
- High switching frequency for detection of fast events
- Connection via M12 connector or terminal compartment

ISO 9001

cULus LISTED

IEC 60947...

IEC 60947...

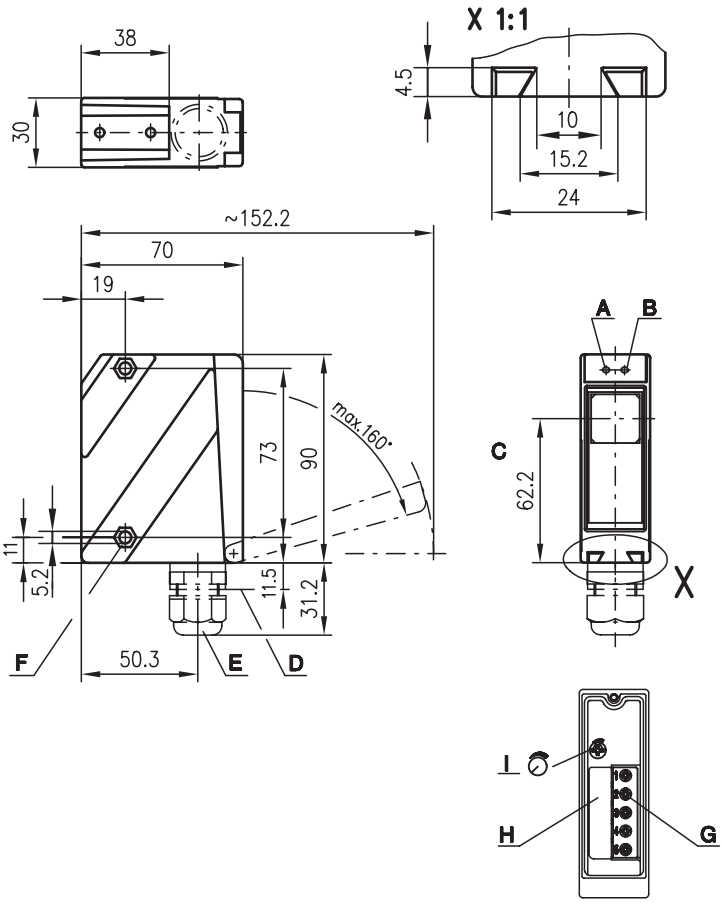
IP 69K IP 67

Accessories:

(available separately • see page 76)

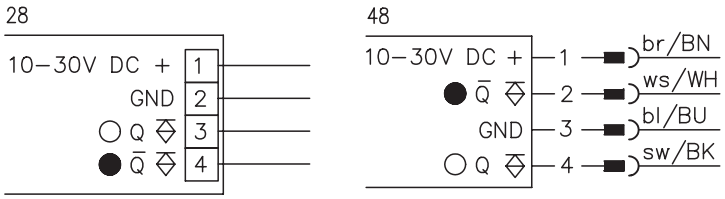
- Mounting systems (BT 96, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)
- Reflectors
- Reflective tapes
- Alignment aid ARH 96

Dimensioned drawing



A Indicator diode green
B Indicator diode yellow
C Optical axis
D Device plug M12x1
E Screwed cable gland M16x1.5 for Ø 5 … 10 mm
F Countersinking for SK nut M5, 4.2 deep
G Connection terminals
H Cable entry
I Sensitivity adjustment

Electrical connection



Specifications

Optical data

Typ. operating range limit (TK(S) 100x100) [1]	0 … 8.5m
Operating range [2]	see tables
Light source	LED (modulated light)
Wavelength	660nm (visible red light/polarised)

Timing

Switching frequency	1000Hz
Response time	0.5ms
Delay before start-up	≤ 200ms

Electrical data

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

Indicators

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

Mechanical data — **Metal housing**

Housing	diecast zinc
Optics cover	glass
Weight	380g
Connection type	terminals or M12 connector

Environmental data

Ambient temp. (operation/storage)	-20°C … +55°C/-40°C … +55°C
Protective circuit [3]	1, 2, 3, 4
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. operating range limit: max. attainable range without performance reserve
2) Operating range: recommended range with performance reserve
3) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs, 4=interference blanking
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

Tables

	Reflectors		Operating range
1	TK(S)	100x100	0 … 7m
2	MTK(S)	50x50	0 … 6m
3	TK(S)	30x50	0 … 4m
4	TK(S)	20x40	0 … 3.5m
5	TK(S)	82	0 … 5m
6	Tape 2	100x100	0 … 3m

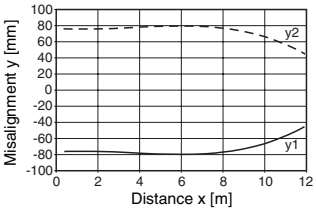
1	0.1					7	8.5
2	0.1					6	7.5
3	0.1			4		5	
4	0.1		3.5	4			
5	0.1			5		6	
6	0.1		3	3.5			

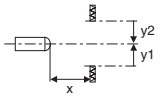
Operating range [m]
Typ. operating range limit [m]

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

Diagrams

Typ. response behaviour (TKS 100x100)





Order guide

	Designation	Part No.
With terminals	PRK 96M/P-2838-28	500 82060
With M12 connector	PRK 96M/P-2838-48	(optional)

Remarks

RT 96 — Energetic diffuse reflection light scanners

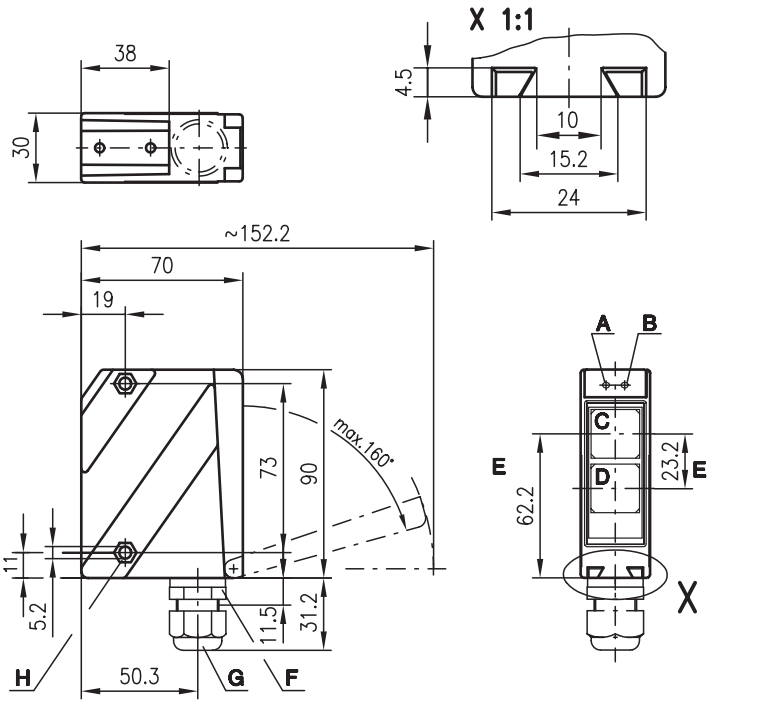
30 … 700 mm
20 … 1200 mm

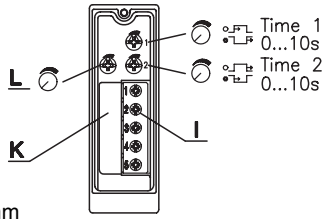
10 - 30 V DC

HF A²LS

- Robust metal housing with glass cover or plastic housing, protection class IP 67/ IP 69K for industrial application
- Sensitivity adjustment and delay before start-up for optimal adaptation to the application
- Minimal short range
- Connection via M12 connector or terminal compartment
- Multiple options with warning output, activation input, switching delays and optics heating for use at low temperatures

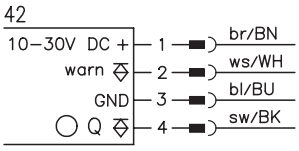
Dimensioned drawing





A Indicator diode green
B Indicator diode yellow
C Receiver
D Transmitter
E Optical axis
F Device plug M12
G Screwed cable gland M16x1.5 for Ø 5 … 10mm
H Countersinking for SK nut M5, 4.2 deep
I Connection terminals
K Cable entry
L Sensitivity adjustment

Electrical connection



Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)

Specifications

	Infrared light	Red light
Optical data		
Typ. scanning range limit (white 90%) [1]	20 … 1200mm	30 … 700mm
Scanning range [2]	20 … 800mm	30 … 500mm
Adjustment range	0 … 100%	0 … 100%
Light source	LED (modulated light)	LED (modulated light)
Wavelength	880nm	660nm
Timing		
Switching frequency	1000Hz	
Response time	0.5ms	
Delay before start-up	≤ 200ms	
Electrical data		
Operating voltage U_B	10 … 30VDC (incl. residual ripple)	
Residual ripple	≤ 15% of U_B	
Bias current	≤ 40mA, ≤ 75mA with optics heating	
Switching output	PNP transistor	
Function characteristics	light switching	
Signal voltage high/low	≥ (U_B-2V)/≤ 2V	
Output current	max. 100mA	
Sensitivity	adjustable	
Indicators		
LED green	ready	
LED yellow	reflection	
LED yellow flashing	reflection, no performance reserve	
Mechanical data	**Metal housing**	
Housing	diecast zinc	
Optics cover	glass	
Weight	380g	
Connection type	terminals or M12 connector	
Environmental data		
Ambient temp. (operation/storage)	-20°C … +60°C/-40°C … +70°C	
Protective circuit [3]	1, 2, 3, 4	
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		
Warning output autoControl warn	PNP transistor, 100mA, counting principle	
Optics heating	for temperature changes, prevents fogging	
Low temperature	to -35°C	
Switching delay (slow oper./release)	0 … 10s (separately adjustable)	

1) Typ. scanning range limit: max. attainable range without performance reserve
2) Scanning range: recommended range with performance reserve
3) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs, 4=interference blanking
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

Selection table / Equipment ↓	Order code →	RT 96M/P-1374-500-42 Part No. 500 41596	RT 96M/P-1474-800-42 Part No. 500 41597				
Housing	metal	●	●				
	plastic						
Light source	red light (500mm)	●					
	infrared light (800mm)		●				
Connection	terminals						
	M12 connector	●	●				
Features	optics heating/low temp.						
	switching delay		●				
	warning output	●	●				
	short range (20mm)	●	●				
	NPN switching output						

Tables

Red light

1	30	500	700
2	65	320	430
3	90	200	370

Infrared light

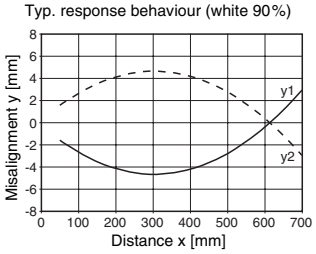
1	20	800	1200
2	60	420	950
3	80	290	570

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

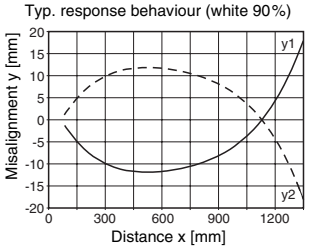
Scanning range [mm]
Typ. scanning range limit [mm]

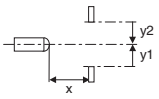
Diagrams

Red light



Infrared light





Remarks

- The upper and lower scanning range limit varies depending on the reflection properties of the material surface.
- **Short range**
  objects are detected down to a minimum distance of 20mm.

RT 96 — Energetic diffuse reflection light scanners

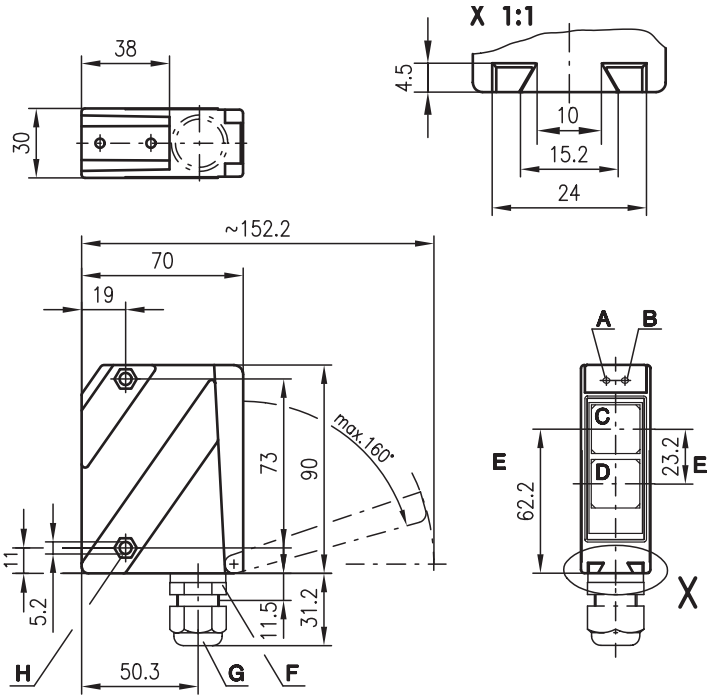
20 … 1200 mm

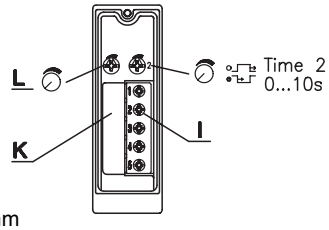
10 - 30 V DC

HF A²LS

- Robust metal housing with glass cover or plastic housing, protection class IP 67 for industrial application
- Complementary outputs, sensitivity adjustment and delay before start-up for optimal adaptation to the application
- Minimal short range
- Connection via M12 connector or terminal compartment

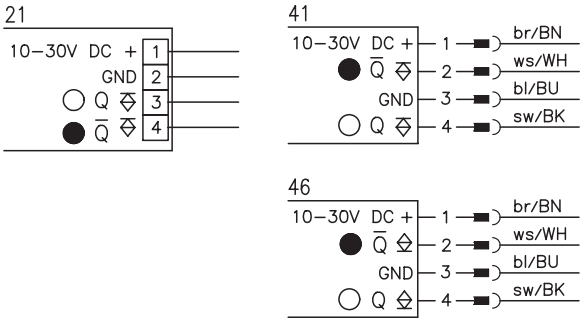
Dimensioned drawing





A Indicator diode green
B Indicator diode yellow
C Receiver
D Transmitter
E Optical axis
F Device plug M12
G Screwed cable gland M16x1.5 for Ø 5 … 10 mm
H Countersinking for SK nut M5, 4.2 deep
I Connection terminals
K Cable entry
L Sensitivity adjustment

Electrical connection



CE ISO 9001 cULus LISTED

IEC 60947... IEC 60947... IP 67

Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)

Specifications

Optical data — **Infrared light**
- Typ. scanning range limit (white 90%) [1]: 20 … 1200 mm
- Scanning range [2]: 20 … 800 mm
- Adjustment range: 0 … 100%
- Light source: LED (modulated light)
- Wavelength: 880 nm

Timing
- Switching frequency: 1000 Hz
- Response time: 0.5 ms
- Delay before start-up: ≤ 200 ms

Electrical data
- Operating voltage U_B: 10 … 30 V DC (incl. residual ripple)
- Residual ripple: ≤ 15% of U_B
- Bias current: ≤ 40 mA
- Switching output: PNP transistor
- Function characteristics: light/dark switching
- Signal voltage high/low: ≥ (U_B-2 V)/≤ 2 V
- Output current: max. 100 mA
- Sensitivity: adjustable

Indicators
- LED green: ready
- LED yellow: reflection
- LED yellow flashing: reflection, no performance reserve

Mechanical data — **Plastic housing**
- Housing: polycarbonate
- Optics cover: plastic
- Weight: 150 g
- Connection type: terminals or M12 connector

Environmental data
- Ambient temp. (operation/storage): -20°C … +60°C/-40°C … +70°C
- Protective circuit [3]: 1, 2, 3, 4
- 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) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs, 4=interference blanking
4) Rating voltage 250 VAC

Tables

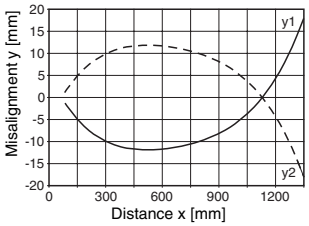
1	20	800	1200
2	60	420	950
3	80	290	570

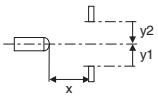
1	white 90%
2	grey 18%
3	black 6%

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

Diagrams

Typ. response behaviour (white 90%)





Order guide

Selection table — Equipment ↓		Order code → RT 96K/P-1444-800-21 Part No. 500 81177	RT 96K/P-1444-800-41 Part No. 500 81178	RT 96K/N-1444-800-46 Part No. 500 41595	RT 96K/P-1444.1-800-41 Part No. 501 03585		
Housing	metal						
	plastic	●	●	●	●		
Light source	red light (500 mm)						
	infrared light (800 mm)	●	●	●	●		
Connection	terminals	●					
	M12 connector		●	●	●		
Features	switching delay						
	warning output						
	short range (20 mm)	●	●	●	●		
	NPN switching output			●			
	PIN 2 = NC *				●		
	PIN 4 = light/dark reversible				●		

Remarks

- The upper and lower scanning range limit varies depending on the reflection properties of the material surface.
- **Short range** objects are detected down to a minimum distance of 20 mm.
- * For direct connection to AS-i I/O coupling modules

RT 96 — Energetic diffuse reflection light scanners

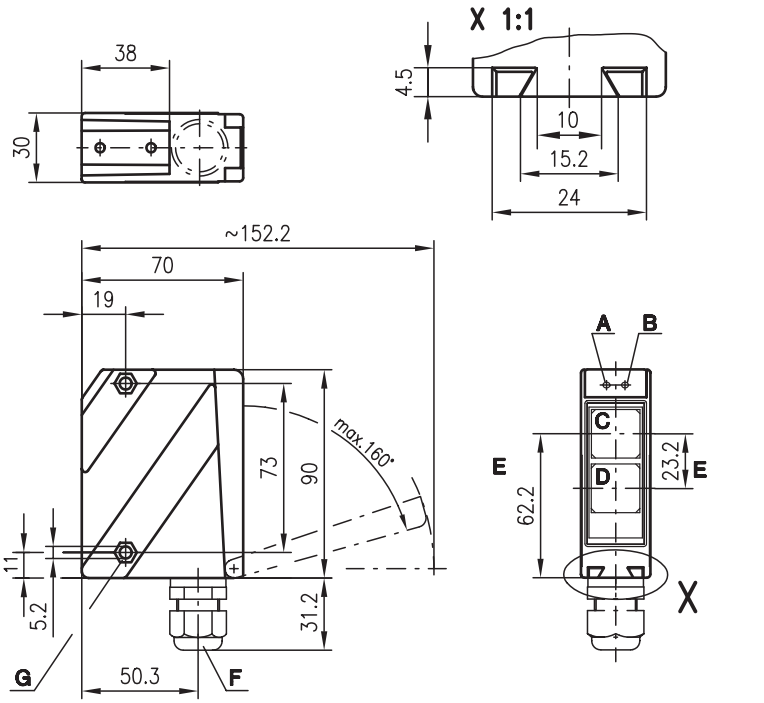
20 … 1200 mm

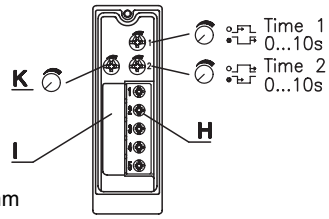
20-230 V AC / DC

HF A²LS

- Robust metal housing with glass cover or plastic housing, protection class IP 67/ IP 69K for industrial application
- Relay with change-over contact, sensitivity adjustment and delay before start-up for optimal adaptation to the application
- Minimal short range
- Version with additional switching delay
- Connection via comfortable terminal compartment up to 1.5 mm²

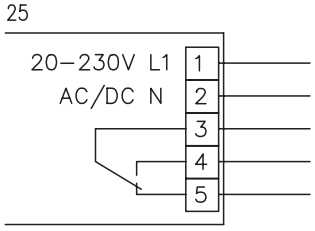
Dimensioned drawing





A Indicator diode green
B Indicator diode yellow
C Receiver
D Transmitter
E Optical axis
F Screwed cable gland M16x1.5 for Ø 5 … 10 mm
G Countersinking for SK nut M5, 4.2 deep
H Connection terminals
I Cable entry
K Sensitivity adjustment

Electrical connection



CE ISO 9001 cULus LISTED

IEC 60947... IEC 60947... IP 69K IP 67

Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- Spark extinction

Specifications

Optical data

Typ. scanning range limit (white 90%) [1]	20 … 1200mm
Scanning range [2]	20 … 800mm
Adjustment range	0 … 100%
Light source	LED (modulated light)
Wavelength	880nm (infrared)

Timing

Switching frequency	20Hz
Response time	25ms
Delay before start-up	≤ 200ms

Electrical data

Operating voltage U_B	20 … 230VAC, 50/60Hz 20 … 230VDC
Power consumption	≤ 2VA
Switching output [3]	relay, 1 change-over contact
Function characteristics	break-contact/make-contact
Switching voltage, relay	250VAC/DC
Switching current, relay	250VAC, 3A/30VDC, 3A
Switching power	750VA, cosφ=1

Indicators

LED green	ready
LED yellow	reflection
LED yellow flashing	reflection, no performance reserve

Mechanical data	**Metal housing**
Housing	diecast zinc
Optics cover	glass
Weight	380g
Connection type	terminals

Environmental data

Ambient temp. (operation/storage)	-20°C … +60°C/-40°C … +70°C
Protective circuit [4]	1, 4
VDE safety class [5]	II, all-insulated
Protection class	IP 67, IP 69K [6]
LED class	1 (acc. to EN 60825-1)
Standards applied	IEC 60947-5-2

Options

Switching delay (slow oper./release)	0 … 10s (separately adjustable)

1) Typ. scanning range limit: max. attainable range without performance reserve
2) Scanning range: recommended range with performance reserve
3) Suitable spark extinction must be provided with inductive or capacitive loads
4) 1=transient protection, 4=interference blanking
5) Rating voltage 250VAC
6) 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

Tables

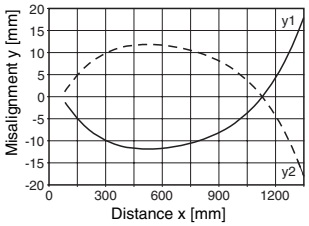
1	20	800	1200
2	60	420	950
3	80	290	570

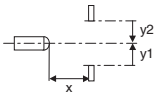
1	white 90%
2	grey 18%
3	black 6%

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

Diagrams

Typ. response behaviour (white 90%)





Order guide

Selection table Equipment ↓		Order code → RT 96M/R-1574-800-25 Part No. 500 41598						
Housing	metal	●						
	plastic							
Light source	red light (500mm)							
	infrared light (800mm)	●						
Connection	terminals	●						
Features	switching delay	●						
	short range (20mm)	●						

Remarks

- The upper and lower scanning range limit varies depending on the reflection properties of the material surface.
- **Short range**
  objects are detected down to a minimum distance of 20mm.

HRT 96 Diffuse reflection light scanner with background suppression

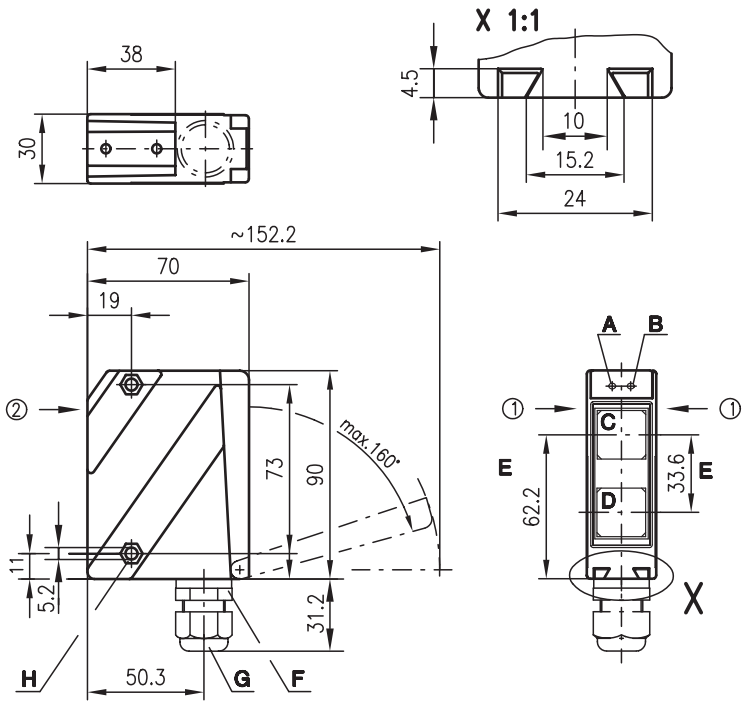
100 … 1800 mm
100 … 1200 mm

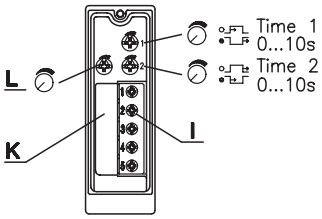
10 - 30 V DC

HF A²LS

- Scanner with adjustable background suppression in visible red light or infrared light
- Robust metal housing with glass cover or plastic housing, protection class IP 67/ IP 69K for industrial application
- Complementary outputs, scanning range adjustment and delay before start-up for optimal adaptation to the application
- Connection via M12 connector or terminal compartment
- Multiple options with switching delays, activation input and optics heating for use at low temperatures

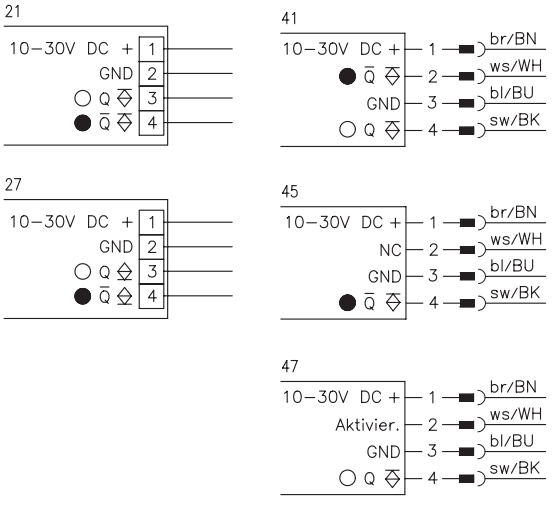
Dimensioned drawing





A Indicator diode green
B Indicator diode yellow
C Transmitter
D Receiver
E Optical axis
F Device plug M12x1
G Screwed cable gland M16x1.5 for Ø 5 … 10 mm
H Countersinking for SK nut M5, 4.2 deep
I Connection terminals
K Cable entry
L Scanning range adjustment
Preferred entry direction for objects ①+②

Electrical connection



IEC 60947... IEC 60947... IP 69K IP 67

Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)

Specifications

	Infrared light	Red light
Optical data		
Typ. scanning range limit (white 90%) [1]	100 … 1800mm	100 … 1200mm
Scanning range [2]	see tables	see tables
Adjustment range	150 … 1200mm	100 … 800mm
Light source	LED (modulated light)	LED (modulated light)
Wavelength	880nm	660nm
Timing		
Switching frequency	300Hz	
Response time	1.67ms	
Delay before start-up	≤ 200ms	
Electrical data		
Operating voltage U_B	10 … 30VDC (incl. residual ripple)	
Residual ripple	≤ 15% of U_B	
Bias current	≤ 35mA, ≤ 75mA with optics heating	
Switching output	PNP transistor	
Function characteristics	light or dark switching (reversible)	
Signal voltage high/low	≥ (U_B-2V)/≤ 2V	
Output current	max. 100mA	
Indicators		
LED green	ready	
LED yellow	reflection	
Mechanical data	**Metal housing**	
Housing	diecast zinc	
Optics cover	glass	
Weight	380g	
Connection type	terminals or M12 connector	
Environmental data		
Ambient temp. (operation/storage)	-20°C … +60°C/-40°C … +70°C	
Protective circuit [3]	1, 2, 3, 4	
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		
Optics heating	for temperature changes, prevents fogging	
Low temperature	to -35°C	
Switching delay (slow oper./release)	0 … 10s (separately adjustable)	
Activation input activ		
Transmitter active/not active	≥ 8V/≤ 2V	
Activation/disable delay	≤ 0.5ms	
Input resistance	47KΩ ± 10%	

1) Typ. scanning range limit: max. attainable range without performance reserve
2) Scanning range: recommended range with performance reserve
3) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs, 4=interference blanking
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

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.
- The diffuse reflection light scanner is also available with integrated AS-i chip for direct connection to the AS-i system.

Order guide

Selection table Order code ➔		**HRT 96M/P-1630-800-41** Part No. 500 80047	**HRT 96M/P-1636-800-41** Part No. 500 32127	**HRT 96M/P-1640-800-21** Part No. 500 25124	**HRT 96M/P-1640-800-41** Part No. 500 25126	**HRT 96M/P-1635-800-45** Part No. 501 04142	**HRT 96M/P-1610-1200-21** Part No. 500 25116	**HRT 96M/P-1610-1200-41** Part No. 500 25118	**HRT 96M/P-1620-1200-21** Part No. 500 25114	**HRT 96M/P-1620-1200-41** Part No. 500 61102	**HRT 96M/N-1606-1200-27** Part No. 500 40358
Equipment ➔											
Light source	red light (800mm)	●	●	●	●	●					
	infrared light (1200mm)						●	●	●	●	●
Connection	terminals			●			●		●		●
	M12 connector	●	●		●	●		●		●	
Features	optics heating/low temp.		●						●	●	●
	switching delay			●	●		●	●	●	●	
	activation input										
	NPN switching output										●
	for AS-i I/O coupling modules					●					

Tables

Red light

1	100	800	1200
2	100	770	1140
3	100	730	1050

Infrared light

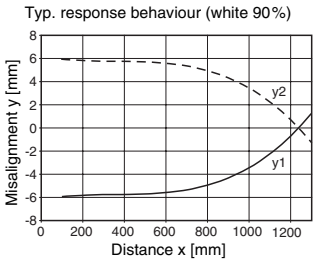
1	100	1200	1800
2	100	1100	1600
3	100	1000	1350

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

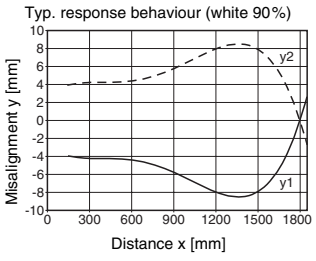
Scanning range [mm]
Typ. scanning range limit [mm]

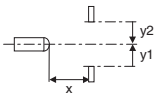
Diagrams

Red light

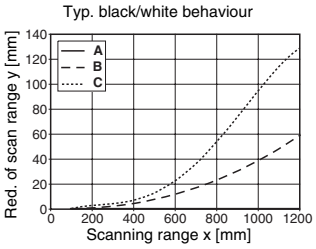


Infrared light

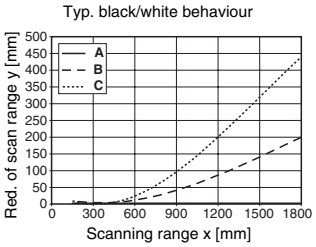




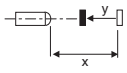
Red light



Infrared light



A white 90%
B grey 18%
C black 6%



HRT 96 Diffuse reflection light scanner with background suppression

100 … 1800 mm
100 … 1200 mm

10 - 30 V DC

HF A²LS

- Scanner with adjustable background suppression in visible red light or infrared light
- Robust metal housing with glass cover or plastic housing, protection class IP 67 for industrial application
- Complementary outputs for standard applications and a wide range of input and output variants for optimum adaptation to the application
- Connection via M12 connector or terminal compartment
- Various options with switching delays, light/dark switching, activation input, and optics heating combined with low temperature

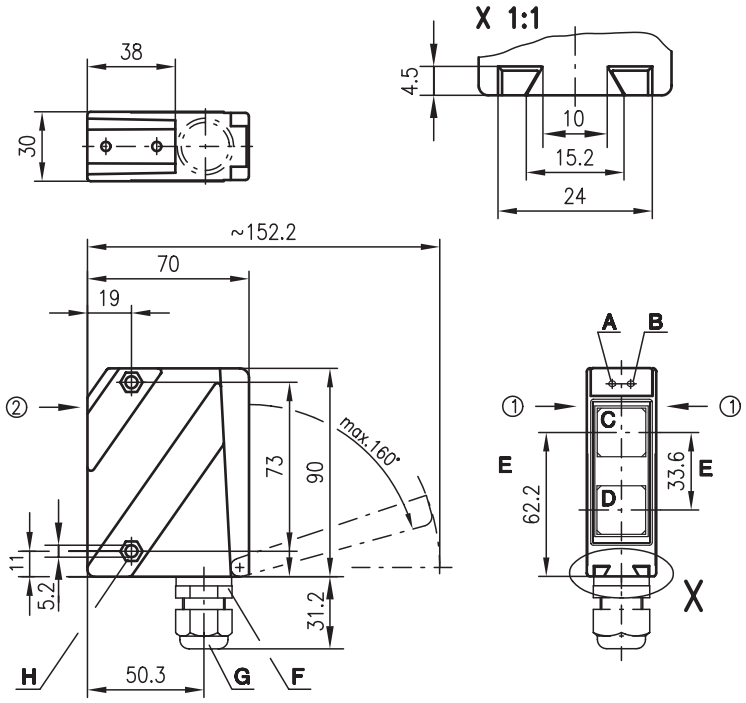
IEC 60947... IEC 60947... IP 67

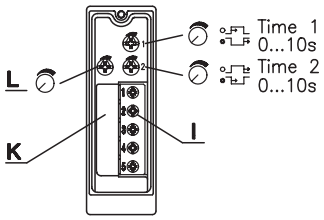
Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)

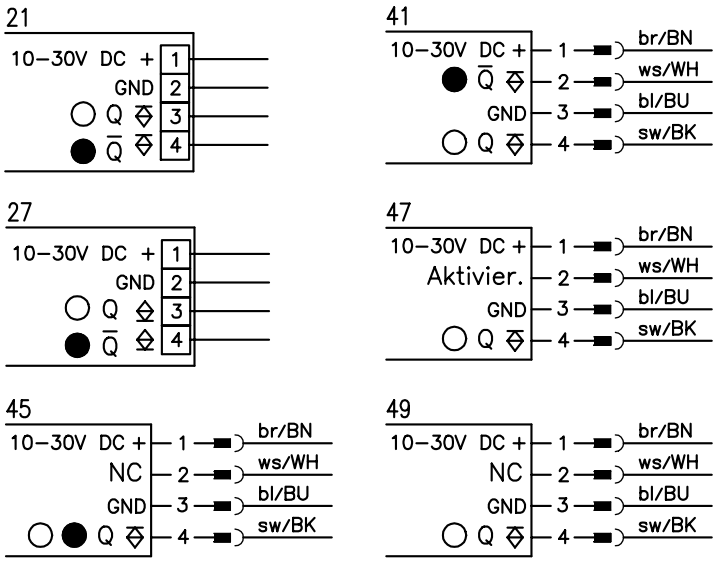
Dimensioned drawing





A Indicator diode green
B Indicator diode yellow
C Transmitter
D Receiver
E Optical axis
F Device plug M12x1
G Screwed cable gland M16x1.5 for Ø 5 … 10 mm
H Countersinking for SK nut M5, 4.2 deep
I Connection terminals
K Cable entry
L Scanning range adjustment
Preferred entry direction for objects ①+②

Electrical connection



Specifications

	Infrared light	Red light
Optical data		
Typ. scanning range limit (white 90%) [1]	100 … 1800mm	100 … 1200mm
Scanning range [2]	see tables	see tables
Adjustment range	150 … 1200mm	100 … 800mm
Light source	LED (modulated light)	LED (modulated light)
Wavelength	880nm	660nm
Timing		
Switching frequency	300Hz	
Response time	1.67ms	
Delay before start-up	≤ 200ms	
Electrical data		
Operating voltage U_B	10 … 30VDC (incl. residual ripple)	
Residual ripple	≤ 15% of U_B	
Bias current	≤ 35mA	
Switching output	PNP transistor	
Function characteristics	light or dark switching	
Signal voltage high/low	≥ (U_B-2V)/≤ 2V	
Output current	max. 100mA	
Indicators		
LED green	ready	
LED yellow	reflection	
Mechanical data	**Plastic housing**	
Housing	polycarbonate	
Optics cover	plastic	
Weight	150g	
Connection type	terminals or M12 connector	
Environmental data		
Ambient temp. (operation/storage)	-20°C … +60°C/-40°C … +70°C	
Protective circuit [3]	1, 2, 3, 4	
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	
Options		
Switching delay (slow oper./release)	0 … 10s (separately adjustable)	
Activation input activ (high)		
Transmitter active/not active	≥ 8V/≤ 2V	
Activation/disable delay	≤ 0.5ms	
Input resistance	47KΩ ± 10%	

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

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.
- The diffuse reflection light scanner is also available with integrated AS-i chip for direct connection to the AS-i system.
- * For direct connection to AS-i I/O coupling modules
- Available as a set together with cable socket

Order guide

Selection table Order code ➔ / Equipment ↓		**HRT 96K/P-1630-800-41** Part No. 500 80242	**HRT 96K/P-1600-1200-21** Part No. 500 25135	**HRT 96K/P-1600-1200-41** Part No. 500 25133	**HRT 96K/P-1630-800-21** Part No. 500 80327	**HRT 96K/P-1640-800-41** Part No. 500 81464	**HRT 96K/P-1631-800-47** Part No. 500 38471	**HRT 96K/P-1605-1200-45** Part No. 501 03002	**HRT 96K/P-1607-1200-49** Part No. 501 03090	**HRT 96K/P-1600.1-1200-41** Part No. 501 03217
Light source	red light (800mm)	●			●	●	●			
	infrared light (1200mm)		●	●				●	●	●
Connection	terminals		●		●					
	M12 connector	●		●		●	●	●	●	●
Features	switching delay					●				
	activation input						●			
	PIN 2 = NC *							●	●	●
	PIN 4 = dark switching							●		
	PIN 4 = light switching								●	
	PIN 4 = light/dark reversible									●
	UL homologation	●	●	●	●	●	●	●	●	●

Tables

Red light

1	100	800	1200
2	100	770	1140
3	100	730	1050

Infrared light

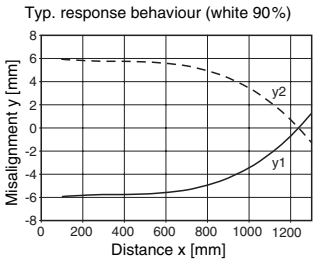
1	100	1200	1800
2	100	1100	1600
3	100	1000	1350

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

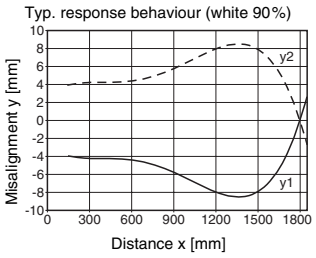
Scanning range [mm]
Typ. scanning range limit [mm]

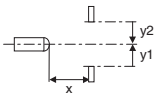
Diagrams

Red light

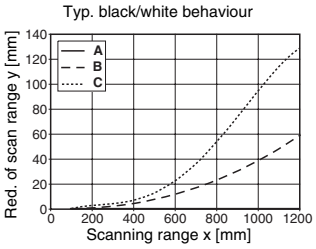


Infrared light

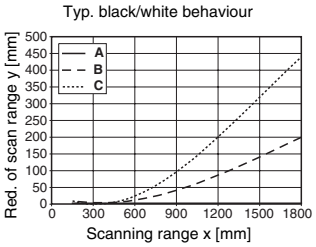




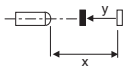
Red light



Infrared light



A white 90%
B grey 18%
C black 6%



HRT 96 Diffuse reflection light scanner with background suppression

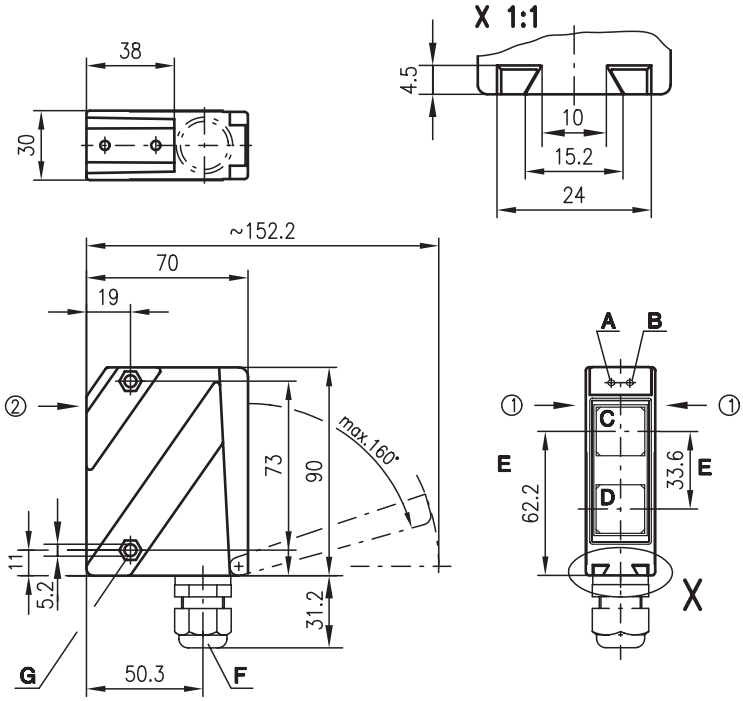
100 … 1800 mm

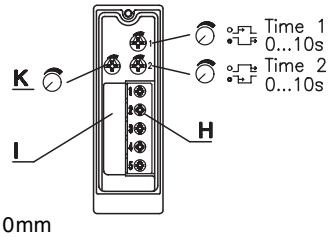
20-230 V AC / DC

HF A²LS

- Scanner with adjustable background suppression in infrared light
- Robust metal housing with glass cover or plastic housing, protection class IP 67/ IP 69K for industrial application
- All-mains design 20 … 230 VAC/DC with relay output
- Relay with change-over contact, scanning range adjustment and delay before start-up for optimal adaptation to the application
- Connection via comfortable terminal compartment up to 1.5 mm²
- Version with additional switching delay

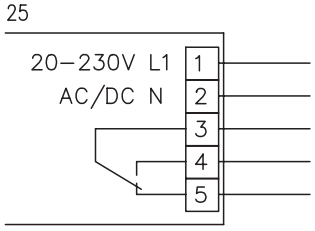
Dimensioned drawing





A Indicator diode green
B Indicator diode yellow
C Transmitter
D Receiver
E Optical axis
F Screwed cable gland M16x1.5 for Ø 5 … 10 mm
G Countersinking for SK nut M5, 4.2 deep
H Connection terminals
I Cable entry
K Scanning range adjustment
Preferred entry direction for objects ①+②

Electrical connection



Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- Spark extinction

IEC 60947...

IEC 60947...

IP 69K IP 67

Specifications

Optical data	**Infrared light**	
Typ. scanning range limit (white 90%) [1]	100 … 1800mm	
Scanning range [2]	see tables	
Adjustment range	150 … 1200mm	
Light source	LED (modulated light)	
Wavelength	880nm (infrared)	
Timing		
Switching frequency	20Hz	
Response time	25ms	
Delay before start-up	≤ 200ms	
Electrical data		
Operating voltage U_B	20 … 230VAC, 50/60Hz 20 … 230VDC	
Power consumption	≤ 1.5VA	
Switching output [3]	relay, 1 change-over contact	
Function characteristics	break-contact/make-contact	
Switching voltage, relay	250VAC/DC	
Switching current, relay	250VAC, 3A/30VDC, 3A	
Switching power, relay	750VA, cosφ=1	
Indicators		
LED green	ready	
LED yellow	reflection	
Mechanical data	**Metal housing**	**Plastic housing**
Housing	diecast zinc	polycarbonate
Optics cover	glass	plastic
Weight	380g	150g
Connection type	terminals	terminals
Environmental data		
Ambient temp. (operation/storage)	-20°C … +60°C/-40°C … +70°C	
Protective circuit [4]	1, 4	
VDE safety class [5]	II, all-insulated	
Protection class	IP 67, IP 69K [6]	IP 67
LED class	1 (acc. to EN 60825-1)	
Standards applied	IEC 60947-5-2	
Options		
Switching delay (slow oper./release)	0 … 10s (separately adjustable)	

1) Typ. scanning range limit: max. attainable range without performance reserve
2) Scanning range: recommended range with performance reserve
3) Suitable spark extinction must be provided with inductive or capacitive loads
4) 1=transient protection, 4=interference blanking
5) Rating voltage 250VAC
6) 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

Selection table **Equipment ↓**	**Order code →**	**HRT 96K/R-1680-1200-25** Part No. 500 25132	**HRT 96K/R-1690-1200-25** Part No. 500 25131	**HRT 96M/R-1680-1200-25** Part No. 500 80076	**HRT 96M/R-1690-1200-25** Part No. 500 80075	**HRT 96M/R-1689-1200-25** Part No. 500 81261	
Housing	metal			●	●		
	plastic	●	●			●	
Light source	infrared light (1200mm)	●	●	●	●	●	
Connection	terminals	●	●	●	●	●	
	without screwed cable gland					●	
Features	switching delay		●		●		

Tables

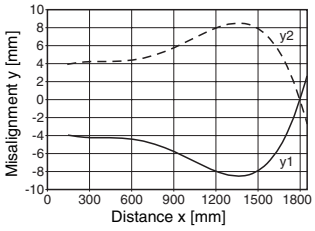
1	100	1200	1800
2	100	1100	1600
3	100	1000	1350

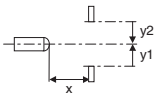
1	white 90%
2	grey 18%
3	black 6%

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

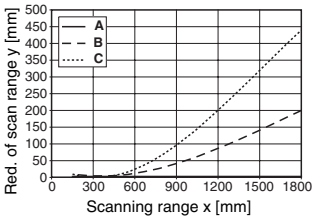
Diagrams

Typ. response behaviour (white 90%)

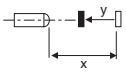




Typ. black/white behaviour



A white 90%
B grey 18%
C black 6%



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.

HRT 96 Diffuse reflection light scanner with background suppression

100 … 1800 mm
100 … 1200 mm

- Robust metal housing with glass cover, protection class IP 67/IP 69K for industrial application
- Access to all sensor functions via an AS-interface without additional wiring
- Scanning range adjustment and ready indicator for optimal adaptation to the application
- Common conductor for both power and data reduces installation work

IEC 60947... IEC 60947... IP 69K IP 67

Accessories:

(available separately • see page 76)

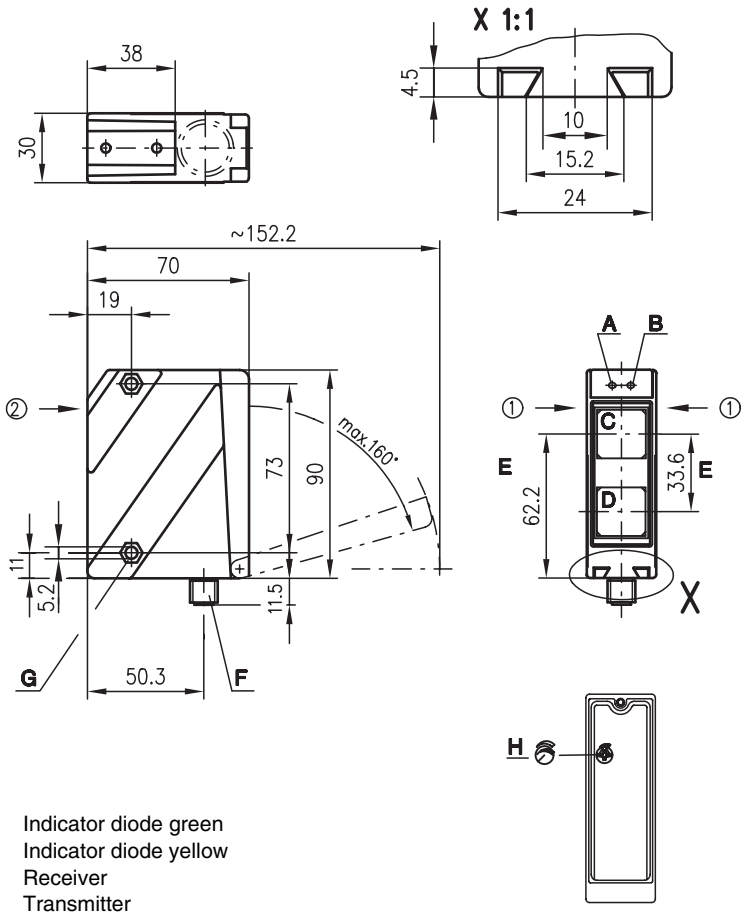
- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)

AS-i Accessories:

(available separately)

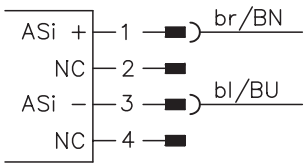
- Bus terminals
- AS-i ribbon cable
- Address programming device
- Coupling modules
- Intermediate cables etc.

Dimensioned drawing



A Indicator diode green
B Indicator diode yellow
C Receiver
D Transmitter
E Optical axis
F Device plug M12x1
G Countersinking for SK nut M5, 4.2 deep
H Scanning range adjustment
Preferred entry direction for objects ①+②

Electrical connection



Specifications

	Infrared	Red light
Optical data		
Typ. scanning range limit (white 90%) [1]	100 … 1800mm	100 … 1200mm
Scanning range [2]	see tables	see tables
Adjustment range	150 … 1200mm	100 … 800mm
Light source	LED (modulated light)	LED (modulated light)
Wavelength	880nm (infrared)	660nm
Timing		
Sensor switching frequency	300Hz	
Sensor response time	1.67ms	
Delay before start-up	≤ 200ms	
Electrical data		
Operating voltage U_B	26.5 … 31.6V (according to AS-i specification)	
Bias current	≤ 40mA per sensor	
Indicators		
LED green	ready	
LED yellow	reflection	
Mechanical data	**Metal housing**	
Housing	diecast zinc	
Optics cover	glass	
Weight	380g	
Connection type	M12 connector	
Environmental data		
Ambient temp. (operation/storage)	-20°C … +60°C/-40°C … +70°C	
Protective circuit [3]	1, 4	
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	
AS-i data for receiver		
I/O code	1	
ID code	1	
Address	programmed by the user in the range of 1 to 31 (default=0)	
Cycle time acc. to AS-i specification	5ms	
AS-i standard according to profile	S-1.1	

1) Typ. scanning range limit: max. attainable range without performance reserve
2) Scanning range: recommended range with performance reserve
3) 1=transient protection, 4=interference blanking
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

Assignment: data bits

		Programming (host level)	
D_0	**Switching output**	Ø no reflection	System input
		1 reflection	
D_1	**NC**	Ø	System input
		1	
D_2	**Ready output**	Ø sensor not ready	System input
		1 sensor ready	
*D_3	**Activation input**	Ø transmitter on	System output
		1 transmitter off	

Assignment: parameter bits

		Programming (host level)	
*P_0	**NC**	Ø	System parameter
		1	
*P_1	**Light/dark switching**	Ø dark switching	System parameter
		1 light switching	
*P_2	**NC**	Ø	System parameter
		1	
*P_3	**NC**	Ø	System parameter
		1	

* default = 1

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.

Order guide

	Designation	Part No.
Infrared light	HRT 96M/A-1660-1200-44	500 25112
Red light	HRT 96M/A-1670-800-44	500 80048

Tables

Red light

1	100	800	1200
2	100	770	1140
3	100	730	1050

Infrared light

1	100	1200	1800
2	100	1100	1600
3	100	1000	1350

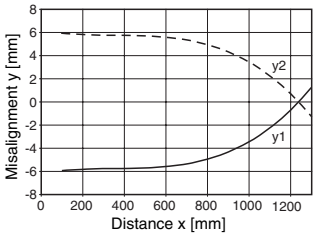
1	white 90%
2	grey 18%
3	black 6%

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

Diagrams

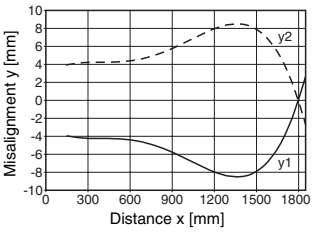
Red light

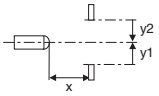
Typ. response behaviour (white 90%)



Infrared light

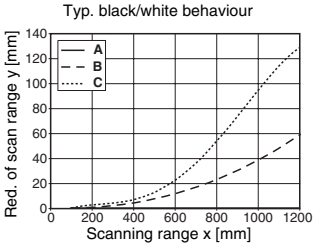
Typ. response behaviour (white 90%)





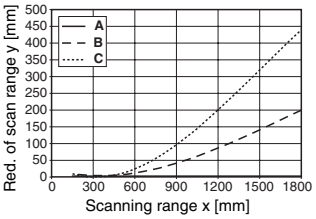
Red light

Typ. black/white behaviour

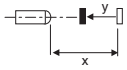


Infrared light

Typ. black/white behaviour



A white 90%
B grey 18%
C black 6%



HRT 96 Diffuse reflection light scanner with background suppression

100 … 2500 mm

10 - 30 V DC

- Scanner with adjustable background suppression
- Two switching points
- Individual adaptation to applications by means of programming and diagnosis software
- Universal sensor application through optional foreground suppression or exact edge detection
- General light/dark switching or complementary switching output, scanning range adjustment and delay before start-up for optimal adaptation to the application
- Robust metal housing with glass cover, protection class IP 67/IP 69K for industrial application

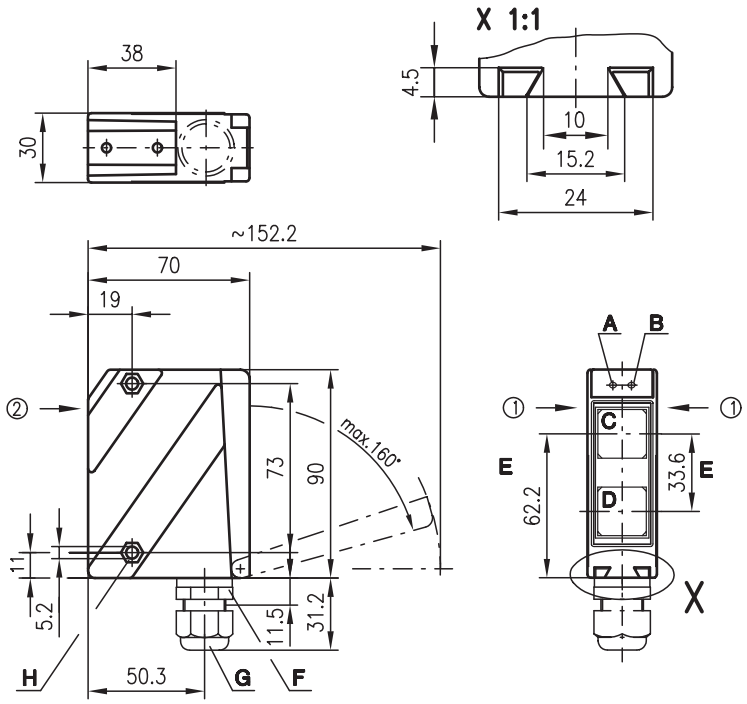
IEC 60947... IEC 60947... IP 69K IP 67

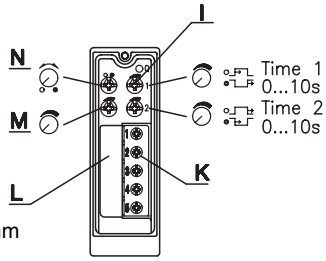
Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, BT 450.1-96, UMS 96)
- Programming device UPG-2, Programming software
- M12 connectors (KD …)
- Ready-made cables (K-D …)

Dimensioned drawing

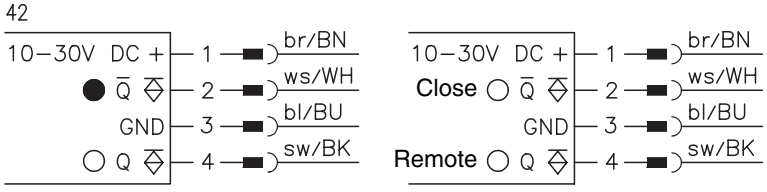




A Indicator diode green
B Indicator diode yellow
C Transmitter
D Receiver
E Optical axis
F Device plug M12x1
G Screwed cable gland M16x1.5 for Ø 5 … 10 mm
H Countersinking for SK nut M5, 4.2 deep
I Output with option switching delay
K Connection terminals
L Cable entry
M Scanning range adjustment
N Light/dark switching

Preferred entry direction for objects ①+②

Electrical connection



see remarks !

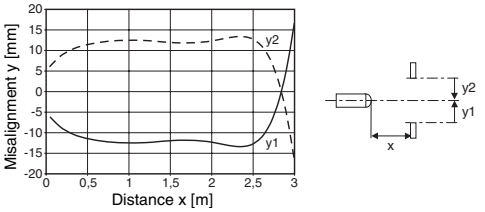
Specifications

	HRT...1600...	HRT...3604...
Optical data		
Typ. scanning range limit (white 90%) [1]	100 … 2500mm	10 … 2500mm
Scanning range [2]	see tables	see tables
Adjustment range	150 … 2000mm	150 … 2000mm
Light source	LED (modulated light)	
Wavelength	880nm	
Timing		
Switching frequency	300Hz	
Response time	1.67ms	
Delay before start-up	≤ 200ms	
Electrical data		
Operating voltage U_B	10 … 30VDC (incl. residual ripple)	
Residual ripple	≤ 15% of U_B	
Bias current	≤ 35mA	
Switching output	PNP transistor	
Function characteristics	light/dark switching (reversible)	
Signal voltage high/low	≥ (U_B-2V)/≤ 2V	
Output current	max. 100mA	
Indicators		
Sensor front		
LED green	ready	ready
LED yellow	reflection	
Sensor back		
LED red/green	see table	reflection
Mechanical data	**Metal housing**	
Housing	diecast zinc	
Optics cover	glass	
Weight	380g	
Connection type	terminals or M12 connector	
Environmental data		
Ambient temp. (operation/storage)	-20°C … +60°C/-40°C … +70°C	
Protective circuit [3]	1, 2, 3, 4	
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		
Switching delay (slow oper./release)	0 … 10s (separately adjustable)	

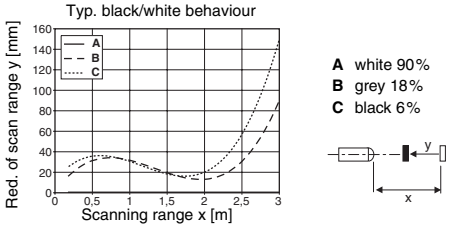
1) Typ. scanning range limit: max. attainable range without performance reserve
2) Scanning range: recommended range with performance reserve
3) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs, 4=interference blanking
4) Rating voltage 250VAC
5) IP 69K 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

Diagrams

Typ. response behaviour (white 90%)



Typ. black/white behaviour



A white 90%
B grey 18%
C black 6%

Order guide

Selection table / Equipment ↓		Order code → HRT 96M/P-1600-2000-42 Part No. 500 60857	HRT 96M/P-3604-2000-42 Part No. 500 60858				
Housing	metal	●	●				
Light source	infrared light (2000mm)	●	●				
Connection	M12 connector	●	●				
Features	short range		●				
	2 switching points		●				
	switching delay	●	●				
	complementary switching outputs	●					

Tables

1	100	2000	2500
2	100	1990	2470
3	100	1980	2430

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

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

Light switching

Switching points	LED red	LED green	LED yellow
no detection (reflection on background)	on	off	off
detection distant range	off	on	on
detection close range	on	on	on

Dark switching

- **LED red/green:** see Light switching
- **LED yellow:** inverted

Remarks

- **General**
  With the set scanning range, a tolerance of the upper scanning range limit is possible depending on the reflection properties of the material surface.
- **Reference scanner**
  Scanner for safe detection of objects under most difficult environmental conditions (e. g. black object on white background).
  Is set through re-parameterisation of the standard HRT 96…3604… sensor via Software "Lupo".

HRT 96…3604…

- **Switching points**
  Fixed ratio between short and distant range
  s.r. ~0.5xd.r. Adjusting the distant range also sets the short range.
- **Switching output**
  Pin/terminal
  4/3=distant range
  2/4=short range (standard)
  2/4=programmable
  (e.g. activation input, compl. switching output)

HRT 96…1600…

- **Switching output**
  Pin/terminal
  4/3=switching output
  2/4=compl. switching output
- Available as a set together with cable socket KD 095

HRT 96 — Laser light scanner with background suppression

100 … 5000 mm

10 - 30 V DC

- Laser scanner with large detection range for universal application
- Phase measurement makes use possible under extreme environmental conditions (brightness, light)
- Three switching points can be set independently of each other
- Analogue output, combined with switching outputs
- Switching behaviour independent of the direction of movement
- Good black/white behaviour over the entire adjustment range

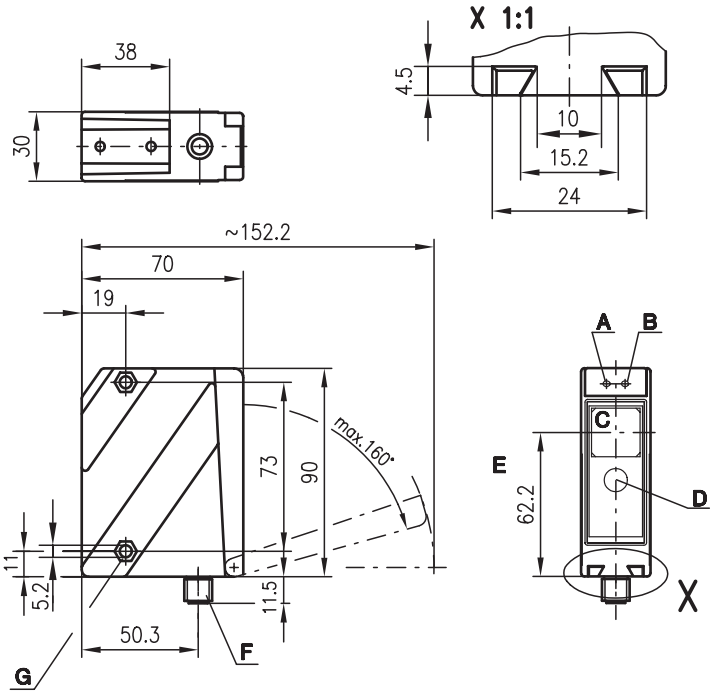
IEC 60947... IEC 60947... IP 69K IP 67

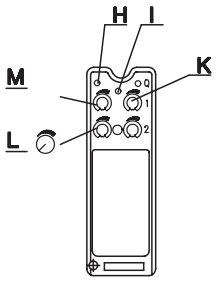
Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)

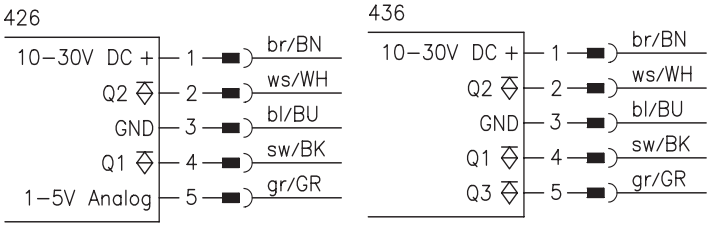
Dimensioned drawing





A Indicator diode green
B Indicator diode yellow
C Receiver
D Transmitter
E Optical axis
F Device plug M12x1
G Countersinking for SK nut M5, 4.2 deep
H Indicator diode red
I Indicator diode yellow
K Scanning range adjustment Q_2
L Scanning range adjustment Q_3
M Scanning range adjustment Q_1

Electrical connection



Specifications

Optical data

Typ. scanning range limit (white 90%) [1]	5500mm
Scanning range [2]	100 … 5000mm/15m [3]
Adjustment range	500 … 5000mm/15m [3]
Light source	laser (red light)
Wavelength	660nm
Laser warning notice	see remarks

Timing

Switching frequency	20Hz
Response time	25ms
Delay before start-up	≤ 200ms

Electrical data

Operating voltage U_B	10 … 30VDC (incl. residual ripple)
Residual ripple	≤ 15% of U_B
Bias current	≤ 40mA
Switching output	PNP transistor
Function characteristics	light or dark switching (adjustable)
Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Output current	max. 100mA

Indicators

Sensor front	
LED green	ready
LED yellow	reflection (Q_1)
Sensor back	see table

Mechanical data	**Metal housing**
Housing	diecast zinc
Optics cover	glass
Weight	380g
Connection type	M12 connector, 5-pin

Environmental data

Ambient temp. (operation/storage)	0°C … +40°C/-30°C … +70°C
Protective circuit [4]	1, 2, 3, 4
VDE safety class [5]	II, all-insulated
Protection class	IP 67, IP 69K [6]
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) Reference: reflective tape
4) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs, 4=interference blanking
5) Rating voltage 250VAC
6) 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

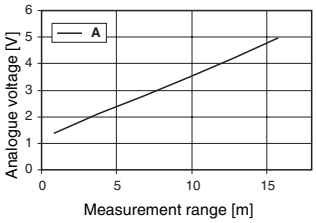
Selection table / **Equipment ↓**		**Order code →** **HRT 96M/P-3360-5000-426** Part No. 500 39470	**HRT 96M/P-3370-5000-436** Part No. 500 40556	**HRT 96M/P-3375-5000-436** Part No. 500 40682				
Housing	metal	●	●	●				
Light source	red light	●	●	●				
Connection	M12 connector	●	●	●				
Outputs	3 switching points 5m		●					
	3 switching points 15m [3]			●				
	dark switching			●				
	analogue output and 2 switching points	●						
	switching points adjustable with potentiometer	●	●	●				

Tables

Switching points	no reflection	object detected
LED yellow Q 1	off	on
LED green Q 2	off	on
LED red Q 3	off	on

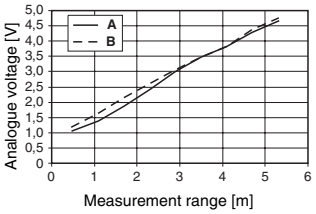
Diagrams

Analogue voltage for range = 15m



A Reflective tape

Analogue voltage for range = 5m

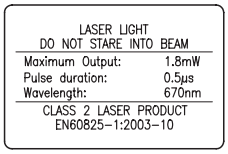


A white 90%
B grey 18%

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.
- Resolution (at 90%): 10mm
- Light spot diameter 30mm at distance of 5m 8mm at distance of 1m
- Switching points can be set as required within the adjustment range.
- Scanning range/reflectivity:

Object/ diffuse reflection	
6 … 90%	0.1 … 5m (standard)
Reflective tape (HG)	0.1 … 15m (parameterisable range adjustment)



HRT 96

Laser light scanner

100 … 2500 mm

10 - 30 V DC

- Detection of reflective tape
- No influences from, e.g., metallic, mirroring, or white surfaces
- Large detection range due to optimised ray geometry
- Reliable detection under inclination, e.g. during curved movement
- Phase measurement permits a high consistency of the switching points
- Teachable switching points for time- and space-saving installation

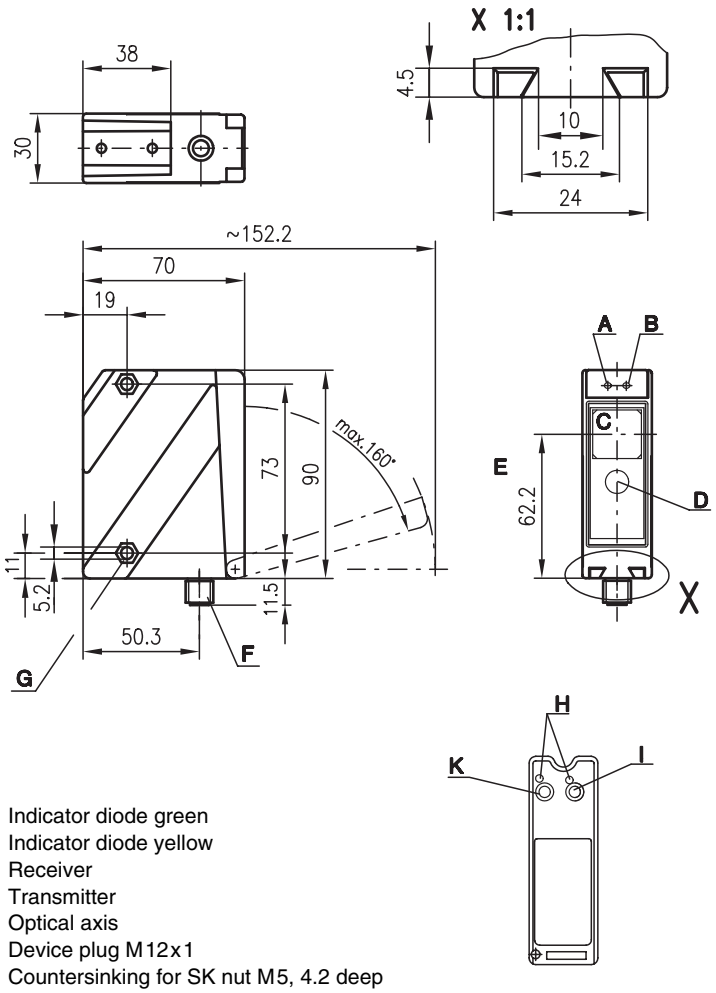
IEC 60947... IEC 60947... IP 69K IP 67

Accessories:

(available separately • see page 76)

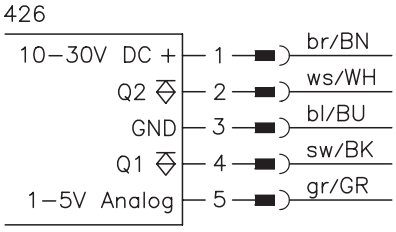
- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)

Dimensioned drawing



A Indicator diode green
B Indicator diode yellow
C Receiver
D Transmitter
E Optical axis
F Device plug M12x1
G Countersinking for SK nut M5, 4.2 deep
H Indicator diodes yellow
I Scanning range adjustment Q_2
K Scanning range adjustment Q_1

Electrical connection



Specifications

Optical data

Typ. scanning range limit (reflective tape) [1]	2500mm/5000mm
Scanning range [2]	50 … 2500mm
Adjustment range [2]	400 … 2500mm
Light source	laser (red light)
Wavelength	660nm
Laser warning notice	see remarks

Timing

Switching frequency	10Hz
Response time	50ms
Delay before start-up	≤ 200ms

Electrical data

Operating voltage U_B	10 … 30VDC (incl. residual ripple)
Residual ripple	≤ 15% of U_B
Bias current	≤ 40mA
Switching output	PNP transistor
Function characteristics	light or dark switching (adjustable)
Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Output current	max. 100mA

Indicators

Sensor front	
LED green	ready
LED yellow	reflection (Q_1)
Sensor back	see table

Mechanical data	**Metal housing**
Housing	diecast zinc
Optics cover	glass
Weight	380g
Connection type	M12 connector, 5-pin

Environmental data

Ambient temp. (operation/storage)	0°C … +40°C/-30°C … +70°C
Protective circuit [3]	1, 2, 3, 4
VDE safety class [4]	II, all-insulated
Protection class	IP 67, IP 69K [5]
Laser class	2 (acc. to EN 60825-1)
Standards applied	IEC 60947-5-2

1) With reflective tape approx. 400 x 100mm²
2) Scanning range: recommended range with performance reserve, may be extended to 5000mm each via configuration
3) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs, 4=interference blanking
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

Tables

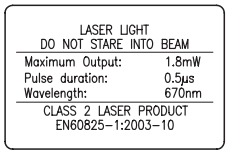
Switching points	no reflection	object detected
LED yellow Q1	on	off
LED yellow Q2	on	off

Remarks

- With the set scanning range, a tolerance of the upper scanning range limit is possible depending on the reflection properties of the reflective tape.
- Resolution 50mm.
- Switching points can be set as required within the adjustment range.
- Detection under inclination up to approx. 45°.
- Scanning range/reflectivity:

Object/ diffuse reflection	
Reflective tape (standard)	0.1 … 2.5m/5m (parameterisable range adjustment)

- Laser warning notice:



Order guide

Selection table / **Equipment ↓**		**Order code →** HRT 96M/P-336W.21-5000-426 Part No. 501 02286					
Housing	metal	●					
Light source	red light (laser)	●					
Connection	M12 connector	●					
Outputs	2 switching points	●					
	dark switching	●					
	analogue output 1 … 5V	●					
	switching points settable via teach buttons	●					

Notices on Teaching

- Teach Q1 first, followed by Q2. For this purpose: scanning range Q_2 ≤ scanning range Q_1.
- Apply the scanning range for the two switching points by pressing the respective teach button.

HRT 96 — Laser light scanner with background suppression

80 … 2500 mm

10 - 30 V DC

- Laser scanner with large detection range for universal application
- Phase measurement makes use possible under extreme environmental conditions (brightness, light)
- The switching points can be set/taught independently of each other
- Analogue output, combined with switching outputs
- Switching behaviour independent of the direction of movement
- Clearly visible light spot for exact alignment
- Optimised for positioning tasks and reliable object detection (e.g. compartment occupancy monitoring)

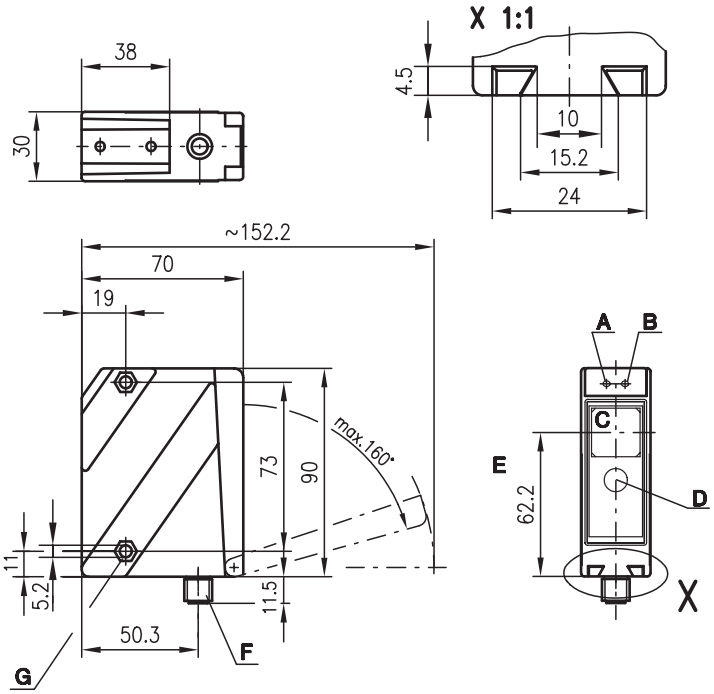
IEC 60947... IEC 60947... IP 69K IP 67

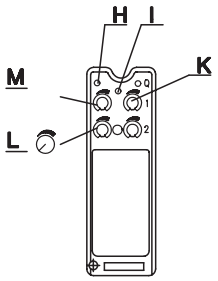
Accessories:

(available separately • see page 76)

- Mounting systems (BT 96, BT 96.1, UMS 96, BT 450.1-96)
- M12 connectors (KD …)
- Ready-made cables (K-D …)

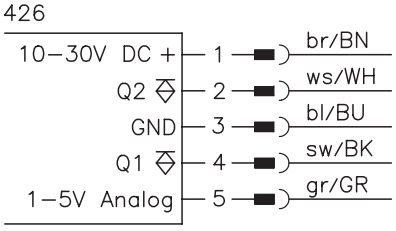
Dimensioned drawing





A Indicator diode green
B Indicator diode yellow
C Receiver
D Transmitter
E Optical axis
F Device plug M12x1
G Countersinking for SK nut M5, 4.2 deep
H Indicator diode red
I Indicator diode yellow
K Scanning range adjustment Q_2
L Scanning range adjustment Q_3
M Scanning range adjustment Q_1

Electrical connection



Specifications

Optical data

Typ. scanning range limit (white 90%) [1]	2500mm
Scanning range [2]	80 … 2200mm
Adjustment range	300 … 2200mm
Light source	laser (red light)
Wavelength	660nm
Laser warning notice	see remarks

Timing

Switching frequency	40Hz
Response time	12.5ms
Delay before start-up	≤ 200ms

Electrical data

Operating voltage U_B	10 … 30VDC (incl. residual ripple)
Residual ripple	≤ 15% of U_B
Bias current	≤ 40mA
Switching output	PNP transistor
Function characteristics	light or dark switching (adjustable)
Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Output current	max. 100mA

Indicators

Sensor front	
LED green	ready
LED yellow	reflection (Q_1)
Sensor back	see table

Mechanical data	**Metal housing**
Housing	diecast zinc
Optics cover	glass
Weight	380g
Connection type	M12 connector, 5-pin

Environmental data

Ambient temp. (operation/storage)	0°C … +40°C/-30°C … +70°C
Protective circuit [3]	1, 2, 3, 4
VDE safety class [4]	II, all-insulated
Protection class	IP 67, IP 69K [5]
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) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs, 4=interference blanking
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

Tables

Switching points	no reflection	object detected
LED yellow Q 1	off	on
LED green Q 2	off	on
LED red Q 3	off	on

Typ. operating ranges

1	100	2000	2500
2	100	1800	1900
3	100	1500	1600

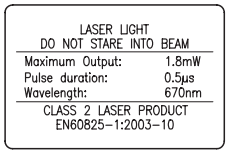
1	white 90%
2	grey 18%
3	black 6%

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

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.
- Resolution (at 90%): 50mm
- Light spot diameter
  8mm at distance of 5m
  5mm at distance of 1m
- Switching points can be set as required within the adjustment range.
- Scanning range/reflectivity:

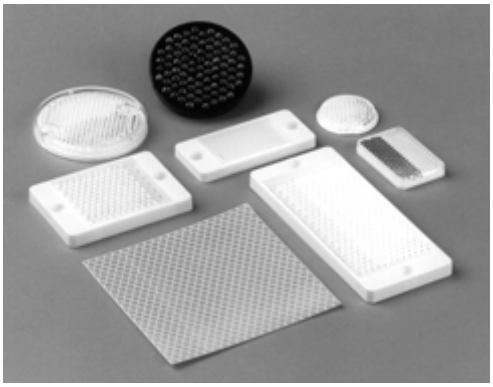
Object/ diffuse reflection	
6 … 90%	0.1 … 2.2m (standard)



Order guide

Selection table **Order code →** **Equipment ↓**		**HRT 96M/P-3360-2500-426** Part No. 501 04825						
Housing	metal	●						
Light source	red light/laser	●						
Connection	M12 connector	●						
Outputs	3 switching points 2.5m							
	2 switching points and analogue output	●						
	dark switching							
	light switching	●						
	switching points adjustable/ teachable	●						

Reflectors



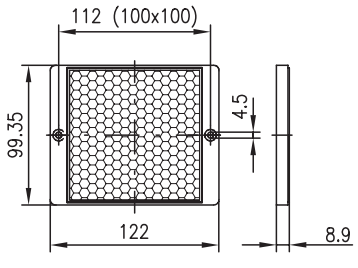
- Reflectors and reflective tapes are ideally suited for Leuze retro-reflective photoelectric sensors. The performance data refer to the use of Leuze reflectors and reflective tapes. The range of retro-reflective photoelectric sensors depends on the type and size of the reflector.
- Adhesive and screw 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:

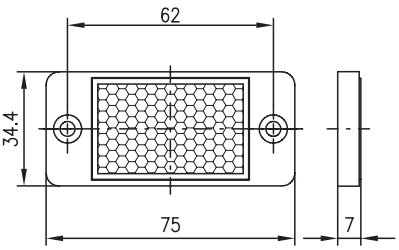
Designation	Part No.
TKS 100x100	500 22816
TKS 40x60	500 40820
TKS 30x50	500 23525
TKS 20x40	500 81283
MTKS 20x20	500 40895
MTKS 20x30	500 40894
MTKS 50x50	500 36188
Reflective tape No. 4	500 38062

Dimensioned drawings

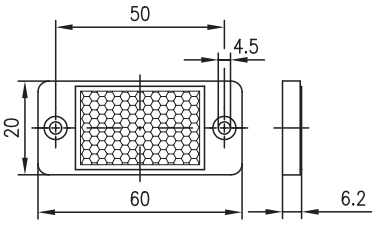
TKS 100 x 100



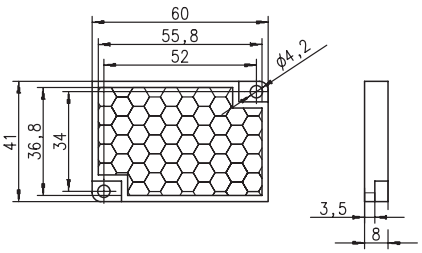
TKS 30 x 50



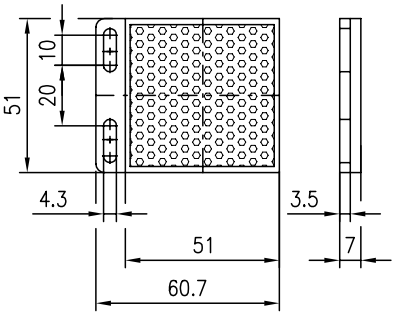
TKS 20 x 40



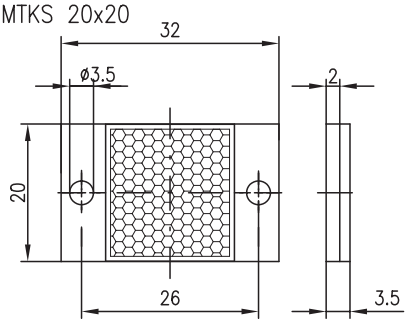
TKS 40 x 60



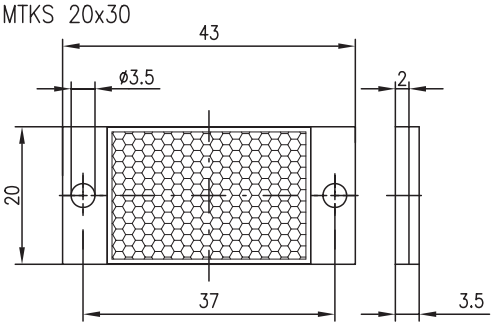
MTKS 50x50



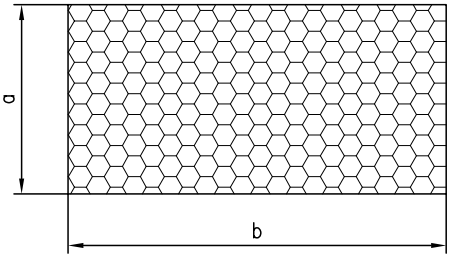
MTKS 20x20



MTKS 20x30



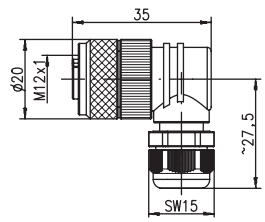
Reflective tape No. 4, length on request



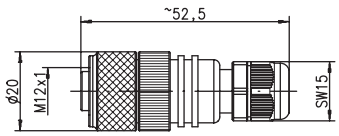
a	b
25 50	100... 22500

Dimensioned drawings

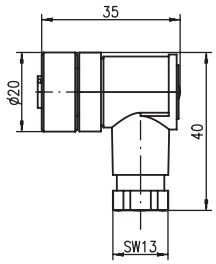
KD 095-4



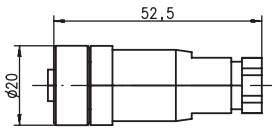
KD 095-4A



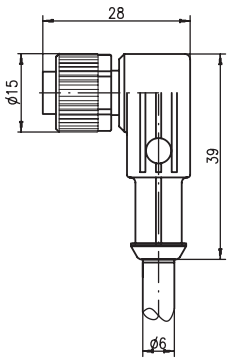
KD 095-5



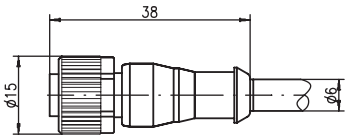
KD 095-5A



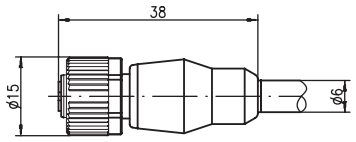
K-D M12W-4P-…
K-D M12W-5P-…
K-D M12W-4P-…-DP-…



K-D M12A-4P-…
K-D M12A-5P-…



K-D M12A-4P-…-DP-…



Connectors, cables

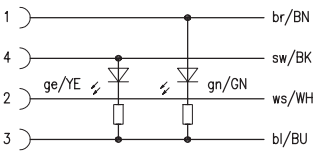
For devices with M12 connectors, there are connectors with ready-made cables in various lengths and connectors with screw connection available.

Protection class (DIN 40050)
plugged and screwed: IP 67

Important:
With throughbeam photoelectric sensors, a connector is required both for the transmitter and the receiver.

Remarks

LED circuit diagram
(K-D M12…-4P-…-DP-…):



Connectors, cables

Selection table

M12 connector, user-configurable		
		
Connection	**Without cable, 4-pin**	
Screw terminals	**KD 095-4** Part No. 500 31324	**KD 095-4A** Part No. 500 31323
	Without cable, 5-pin	
Screw terminals	**KD 095-5** Part No. 500 20502	**KD 095-5A** Part No. 500 20501

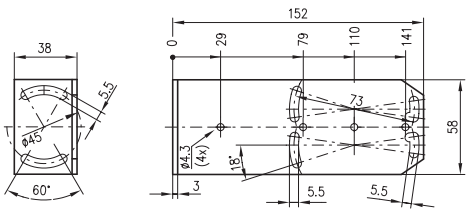
M12 connection cable with connector, single-sided		
		
Length	**PVC cable sheath, 4-pin**	
2m	**K-D M12W-4P-2m-PVC** Part No. 501 04543	**K-D M12A-4P-2m-PVC** Part No. 501 04542
5m	**K-D M12W-4P-5m-PVC** Part No. 501 04545	**K-D M12A-4P-5m-PVC** Part No. 501 04544
10m	**K-D M12W-4P-10m-PVC** Part No. 501 04547	**K-D M12A-4P-10m-PVC** Part No. 501 04546
20m	–	**K-D M12A-4P-20m-PVC** Part No. 501 04753
Length	**PUR cable sheath, 4-pin**	
2m	**K-D M12W-4P-2m-PUR** Part No. 501 04562	**K-D M12A-4P-2m-PUR** Part No. 501 04561
5m	**K-D M12W-4P-5m-PUR** Part No. 501 04564	**K-D M12A-4P-5m-PUR** Part No. 501 04563
10m	**K-D M12W-4P-10m-PUR** Part No. 501 04566	**K-D M12A-4P-10m-PUR** Part No. 501 04565

M12 connection cable with connector, single-sided, with 2 integrated LEDs in transparent connector		
		
Length	**PUR cable sheath, 4-pin**	
2m	**K-D M12W-4P-2m-DP-PUR** Part No. 501 04549	**K-D M12A-4P-2m-DP-PUR** Part No. 501 04548
5m	**K-D M12W-4P-5m-DP-PUR** Part No. 501 04551	**K-D M12A-4P-5m-DP-PUR** Part No. 501 04550
10m	**K-D M12W-4P-10m-DP-PUR** Part No. 501 04553	**K-D M12A-4P-10m-DP-PUR** Part No. 501 04552

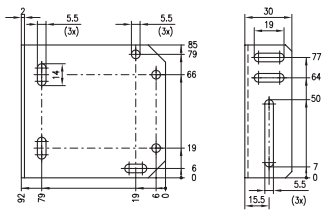
M12 connection cable with connector, single-sided		
		
Length	**PVC cable sheath, 5-pin**	
2m	**K-D M12W-5P-2m-PVC** Part No. 501 04556	**K-D M12A-5P-2m-PVC** Part No. 501 04555
5m	**K-D M12W-5P-5m-PVC** Part No. 501 04558	**K-D M12A-5P-5m-PVC** Part No. 501 04557
10m	**K-D M12W-5P-10m-PVC** Part No. 501 04560	**K-D M12A-5P-10m-PVC** Part No. 501 04559
Length	**PUR cable sheath, 5-pin**	
2m	**K-D M12W-5P-2m-PUR** Part No. 501 04568	**K-D M12A-5P-2m-PUR** Part No. 501 04567
5m	**K-D M12W-5P-5m-PUR** Part No. 501 04762	**K-D M12A-5P-5m-PUR** Part No. 501 04569

Dimensioned drawings

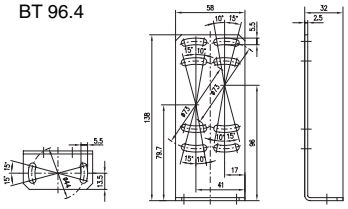
BT 96



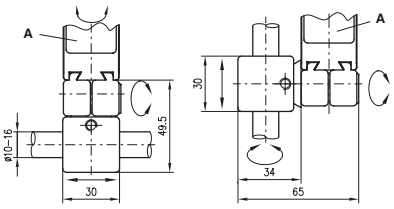
BT 96.1



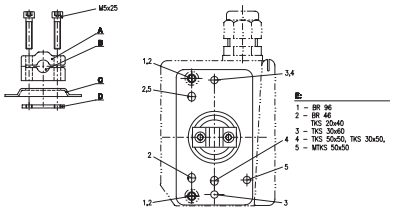
BT 96.4



UMS 96

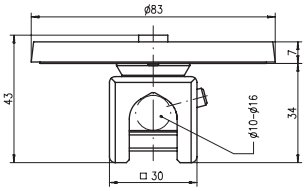


BT 450.1-96

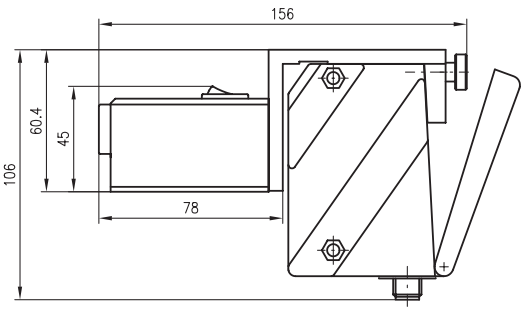


A Sensor

UMS 96-82



ARH 96



Mounting systems

Mounting brackets:

BT 96…

Designation	Part No.
BT 96	500 25570
BT 96.1	500 80614
BT 96.4	500 32319

Mounting systems:

UMS 96

BT 450.1-96

UMS 96-82

Designation	Part No.
UMS 96	500 26204
BT 450.1-96	500 82084
UMS 96-82	500 27191

Alignment aid:

ARH 96

Designation	Part No.
ARH 96	500 80502

Leuze electronic

Leuze electronic GmbH + Co. KG
P.O. Box 11 11, D-73277 Owen/Teck
Tel. +49(0)7021/573-0,
Fax +49(0)7021/573-199
E-mail: info@leuze.de, www.leuze.de

A qualified partner in the field of...

...detection

- Standard sensors in cubic design
- Cylindrical sensors
- Measuring sensors
- Forked photoelectric sensors
- Contrast, colour, luminescence scanners
- Fibre optic amplifiers
- Double sheet monitoring/splice detection
- Accessories

...identification

- Bar code readers
- Data matrix code readers
- Hand-held readers
- RF identification systems
- Bar code positioning systems
- Optical data transmission systems
- Laser distance measuring devices
- Industrial machine vision

...protection

- Safety light curtains
- Multiple light beam safety devices
- Safety laser scanners
- Safety interlocks
- Safety relays and interfaces
- Sensor accessories and signal devices
- Measuring light curtains
- Service for all aspects of machine safety

For quick, simple sales and service information go to...

...www.leuze.de

GB 191/01 – 03/06 Part No. 501 04 216