Leuze electronic

the sensor people

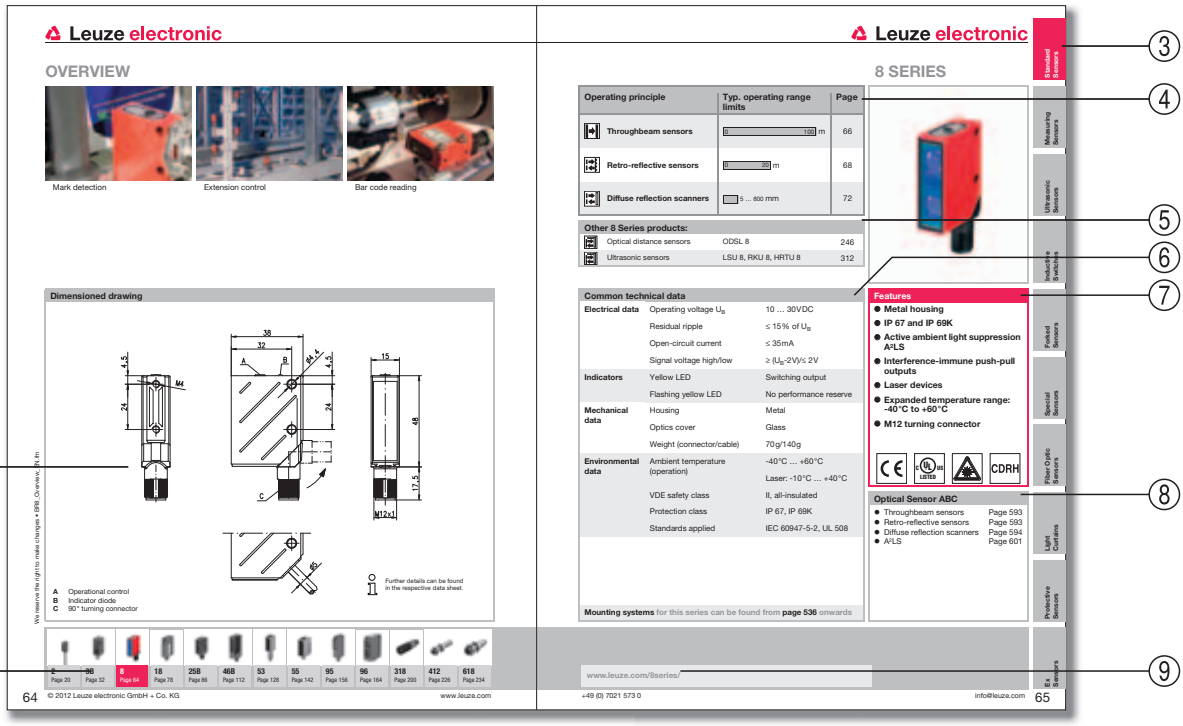
Catalog 2012

Optoelectronic Sensors
Inductive Switches

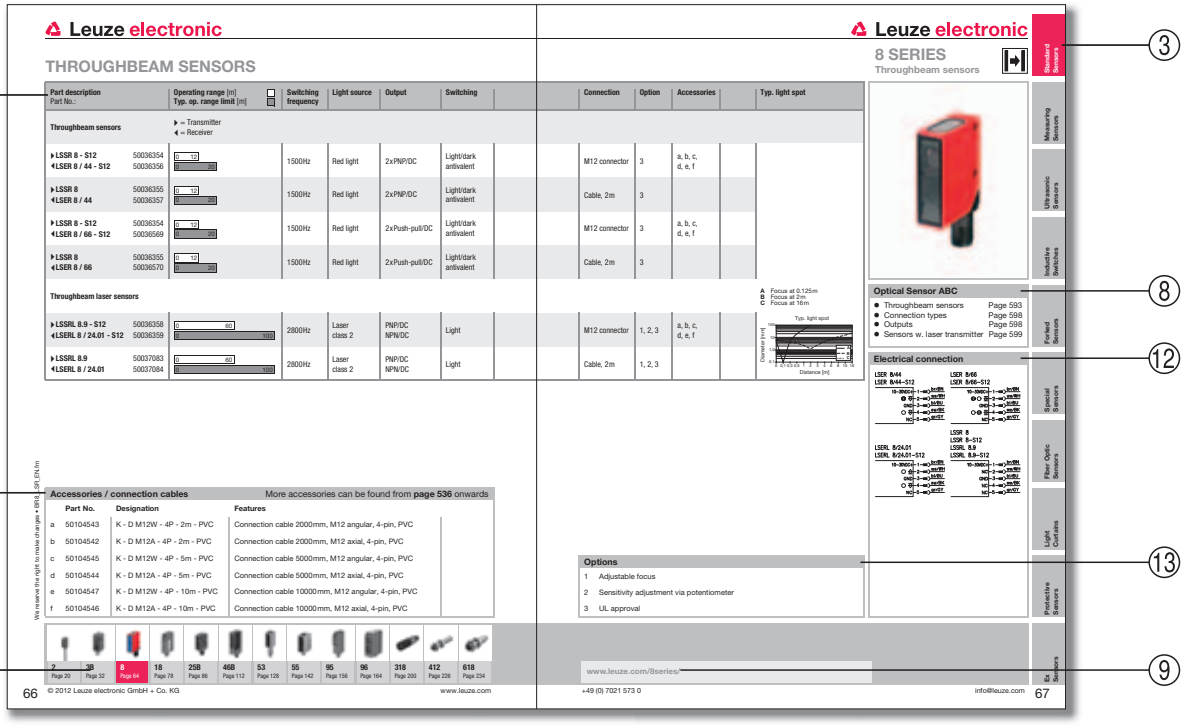
PRODUCT LINE

How to find the product you're looking for

The series/product group overview pages …



The product selection tables …



① Dimensioned drawing
② Current subchapter
③ Current chapter
④ Available function principles
⑤ Other products in this series/product group
⑥ Technical data
⑦ Special features
⑧ Reference to explanations in Optical Sensor ABCs
⑨ Web link
⑩ Product selection table with specific data
⑪ Table with connection accessories
⑫ Electrical connection diagrams
⑬ Product-specific options

COMPANY PORTRAIT

At Leuze electronic, we are "the sensor people": For almost 50 years we have been the specialists for innovative and practical solutions in the area of optical sensors for factory automation. Our systems are used in the automobile industry and in conveyor and storage technology as well as in printing machines and in packing material and analysis technologies.

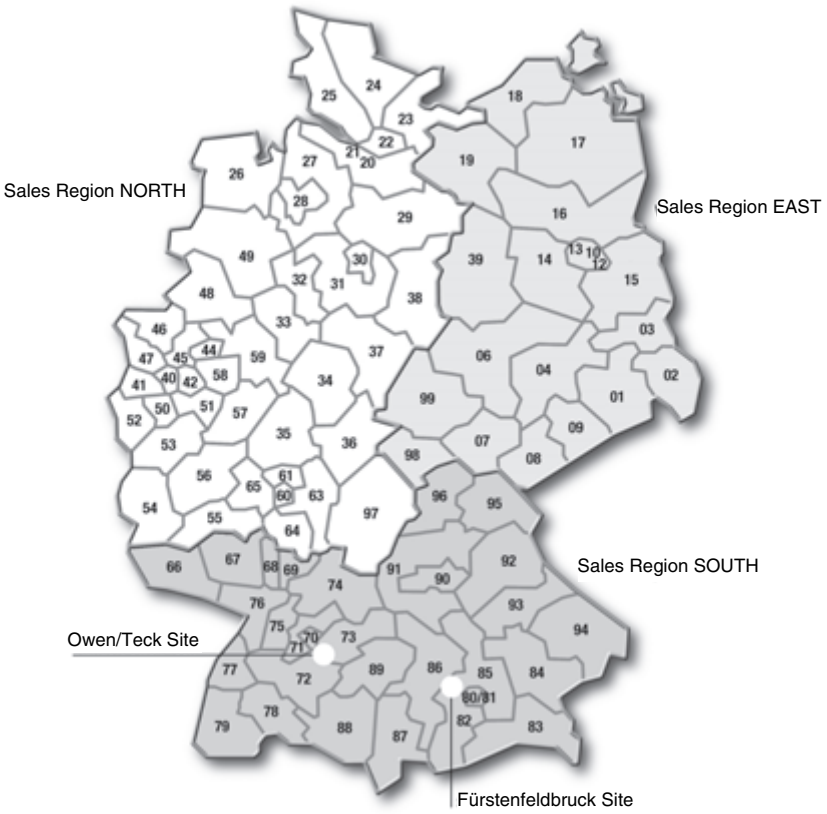
Our dedicated employees are characterised, above all, by their customer focus. There's one thing Leuze electronic customers can count on – on us.

The range of products extends from optical electronic sensors, inductive switches and identification and data transmission systems to image processing systems and optical electronic solutions for workplace safety.

On the basis of extensive research and development work and the large application know-how possessed by our engineers, we are constantly further developing our systems. All with the goal of being able to offer our customers increasingly efficient and higher performance solutions at an optimal price / performance ratio.

We are the right partner for both standard applications as well as for custom, high-end solutions, and with an extensive sales and service network we can always be reached quickly.

GERMAN SALES



With a staff of qualified field representatives and our capable Customer Support Center, we are able to provide you with service around the clock. Our dedication to qualified service and focus on the customer have always been among our distinguishing characteristics.

Customer Support Center Sales / Germany		
Sales Region North	Tel.	+49 7021 / 573-306
Sales Region South	Tel.	+49 7021 / 573-307
Sales Region East	Tel.	+49 7021 / 573-308
	Tel.	+49 35027 / 629-106

Technical Hotline		
Optical Sensors Division	Tel.	+49 7021 / 573-217
Logistics Division	Tel.	+49 7021 / 573-123
Workplace Safety Division	Tel.	+49 8141 / 5350-111

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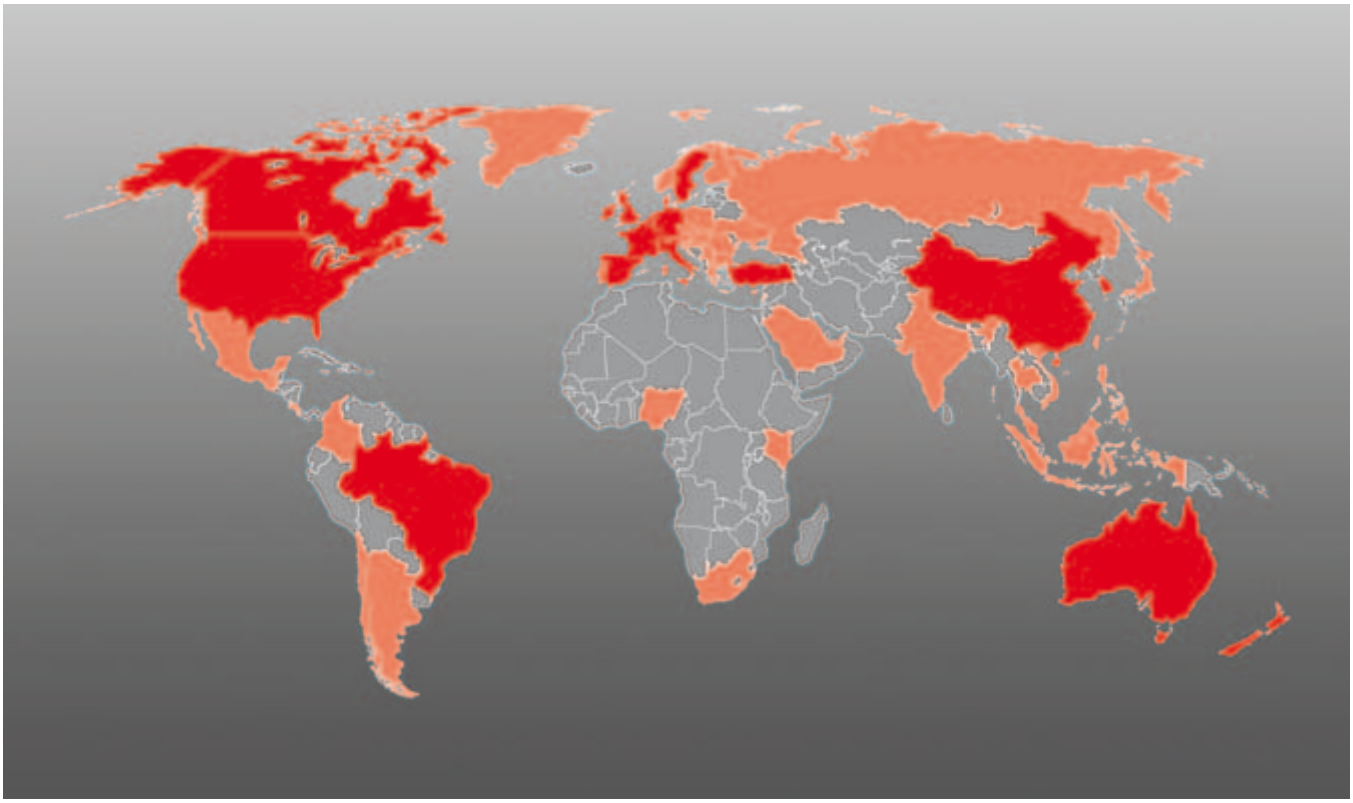
GLOBAL SALES



Through our constantly growing number of subsidiaries and sales partners around the world, we can guarantee you a uniform level of qualified advice, fast delivery times and reliable support during mounting and commissioning of your systems at nearly every location on earth.

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INDIA	SLOVENIA
INDONESIA	SOUTH AFRICA
ISRAEL	TAIWAN
JAPAN	THAILAND
KENYA	UKRAINE
LEBANON	UNITED ARAB EMIRATES
MACEDONIA	VIETNAM
MALAYSIA	

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SERIES SELECTION TABLE

Series	Dimensions in mm (WxHxD)	Housing material: Plastic	Housing material: Metal	Operating principle	Typ. op. range limit	Light source: Infrared light	Light source: Red light	Light source: Laser
2	8 x 23 x 12	●		Throughbeam sensor	0 … 2m		●	
				Retro-reflective sensor	0.05 … 3.1m		●	
				Diff. refl. scanner with backgr. suppr.	15 / 30 / 50mm		●	
3B	11 x 32 x 17	●		Throughbeam sensor	0 … 10m		●	
				Retro-reflective sensor	0 … 6m		●	●
				Diffuse reflection scanner	0 … 750mm		●	
				Diff. refl. scanner with backgr. suppr.	5 … 400mm		●	
53	14 x 54 x 20		●	Throughbeam sensor	0 … 10m		●	
				Retro-reflective sensor	0 … 5m		●	●
				Diff. refl. scanner with backgr. suppr.	5 … 400mm		●	
55	14 x 36 x 25		●	Throughbeam sensor	0 … 10m		●	
				Retro-reflective sensor	0.02 … 6m		●	●
				Diff. refl. scanner with backgr. suppr.	5 … 400mm		●	
25B	15 x 39 x 29	●		Throughbeam sensor	0 … 24m		●	
				Retro-reflective sensor	0.05 … 15m		●	●
				Diffuse reflection scanner	5 … 800mm		●	
				Diff. refl. scanner with backgr. suppr.	0 … 1000mm	●	●	
18	15 x 50 x 33		●					
				Retro-reflective sensor	0 … 5m		●	
8	15 x 48 x 38		●	Throughbeam sensor	0 … 100m		●	●
				Retro-reflective sensor	0 … 22m		●	●
				Diffuse reflection scanner	5 … 800mm		●	
				Diff. refl. scanner with backgr. suppr.	5 … 400mm		●	●
95	17 x 66 x 35		●	Throughbeam sensor	0 … 20m	●	●	
				Retro-reflective sensor	0 … 9m		●	
				Diffuse reflection scanner	10 … 900mm	●	●	
				Diff. refl. scanner with backgr. suppr.	20 … 500mm	●	●	
46B	18 x 75 x 43	●		Throughbeam sensor	0 … 60m		●	
				Retro-reflective sensor	0.05 … 18m		●	
				Diffuse reflection scanner	30 … 1100mm		●	
				Diff. refl. scanner with backgr. suppr.	0 … 2500mm	●	●	●
96	30 x 90 x 70	●	●	Throughbeam sensor	0 … 150m	●	●	
				Retro-reflective sensor	0 … 28m	●	●	
				Diffuse reflection scanner	20 … 1200mm	●	●	
				Diff. refl. scanner with backgr. suppr.	10…6500/25000mm	●	●	●
412	M12 x 55		●	Throughbeam sensor	0 … 8m		●	
				Retro-reflective sensor	0.05 … 1.6m		●	
				Diffuse reflection scanner	0 … 400mm		●	
318	M18 x 50	●	●	Throughbeam sensor	0 … 120m	●		●
				Retro-reflective sensor	0.02 … 15m	●	●	●
				Diffuse reflection scanner	0 … 700mm	●		●
				Diff. refl. scanner with backgr. suppr.	1 … 140mm		●	
618	M18 x 60		●	Throughbeam sensor	0 … 12m	●		
				Retro-reflective sensor	0 … 7m		●	
				Diffuse reflection scanner	0 … 300mm	●		

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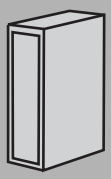
STANDARD SENSORS

Max. switching frequency	Response time	Special object features			Resistance in industrial environment			Page
		Shiny surface (metallic, foil coated object)	Transparent medium (glass, PET, foil)	Small part	High insensitivity towards soiling / performance reserve	Temperatures < -35 °C	Protection class	
385 Hz	1.3 ms			●			IP 67	
700 Hz	0.72 ms			●			IP 67	
								20
700 Hz	0.72 ms	●		●			IP 67	
1000 Hz	0.5 ms				●		IP 67	
1000 Hz	0.5 ms	●	●	●	●		IP 67	
1000 Hz	0.5 ms						IP 67	32
1000 Hz	0.5 ms	●		●			IP 67	
1000 Hz	0.5 ms				●		IP 67, IP 69K	
2000 Hz	0.25 ms		●	●	●		IP 67, IP 69K	
								128
1000 Hz	0.5 ms	●					IP 67, IP 69K	
1000 Hz	0.5 ms				●		IP 67, IP 69K	
2000 Hz	0.25 ms		●	●	●		IP 67, IP 69K	
								142
1000 Hz	0.5 ms	●		●			IP 67, IP 69K	
500 Hz	1 ms				●		IP 67, IP 66	
2000 Hz	0.25 ms	●	●	●	●		IP 67, IP 66	
500 Hz	1 ms						IP 67, IP 66	86
1000 Hz	0.5 ms	●		●	●		IP 67, IP 66	
1500 Hz	0.33 ms		●	●			IP 67, IP 69K	
								78
2800 Hz	0.18 ms			●		● [1]	IP 67, IP 69K	1) Not valid for laser sensors
2800 Hz	0.18 ms		●	●		● [1]	IP 67, IP 69K	
1500 Hz	0.33 ms					● [1]	IP 67, IP 69K	64
2000 Hz	0.25 ms	●		●		● [1]	IP 67, IP 69K	
1000 Hz	0.5 ms						IP 67, IP 69K	
1000 Hz	0.5 ms		●	●			IP 67, IP 69K	
1000 Hz	0.5 ms						IP 67, IP 69K	156
1000 Hz	0.5 ms	●					IP 67, IP 69K	
500 Hz	1 ms				●	●	IP 67, IP 69K	
500 Hz	1 ms	●			●	●	IP 67, IP 69K	
500 Hz	1 ms					●	IP 67, IP 69K	112
1000 Hz	0.5 ms	●		●	●	●	IP 67, IP 69K	
500 Hz	1 ms				●	●	IP 67, IP 69K [2]	2) IP 69K only for sensors with metal housing
1000 Hz	0.5 ms		●		●	●	IP 67, IP 69K [2]	
1000 Hz	0.5 ms					●	IP 67, IP 69K [2]	164
300 Hz	1.67 ms	●			●	●	IP 67, IP 69K [2]	
500 Hz	1 ms						IP 67	
700 Hz	0.7 ms						IP 67	
700 Hz	0.7 ms						IP 67	226
5000 Hz	0.1 ms			●		●	IP 67	
5000 Hz	0.1 ms			●		●	IP 67	
5000 Hz	0.1 ms			●			IP 67	200
1000 Hz	0.5 ms						IP 67	
500 Hz	1 ms						IP 67	
500 Hz	1 ms						IP 67	
500 Hz	1 ms						IP 67	234

SELECTION TABLE - ACC. TO OPERATING PRINCIPLE

 Series	Dimensions in mm (WxHxD)	Housing material: Plastic	Housing material: Metal	Typ. op. range limit [m]: 10	25	50	100	150
2	8 x 23 x 12	●		0 2				
3B	11 x 32 x 17	●		08.5				
53	14 x 54 x 20		●	0 10				
55	14 x 36 x 25		●	0 10				
25B	15 x 39 x 29	●		0	24			
18	15 x 50 x 33							
8	15 x 48 x 38		●	0			100	

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THROUGHBEAM SENSORS

	Light source			Switching output/ Operating voltage						Connection						
	Infrared light	Red light	Laser	PNP/DC	NPN/DC	Push-pull/DC	Relay/AC	Relay/DC	Relay/AC-DC	M8 connector	M12 connector	Terminals	Cable	Cable + M8 connector	Cable + M12 connector	Page
		●		●	●								●	●	●	20
		●		●						●			●	●		32
		●				●				●						128
		●				●				●					●	142
		●		●		●				●	●		●	●	●	86
		●	●	●	●	●					●		●			64

SELECTION TABLE - ACC. TO OPERATING PRINCIPLE

Series	Dimensions in mm (Ø x L)	Housing material: Plastic	Housing material: Metal	Typ. op. range limit [m]
				10 / 25 / 50 / 100 / 150
95	17 x 66 x 35		●	0 – 20
46B	18 x 75 x 43	●		0 – 60
96	30 x 90 x 70	●	●	0 – 150
412	M12 x 55		●	0 – 8
318	M18 x 50	●	●	0 – 120
618	M18 x 60		●	0 – 12

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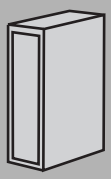
THROUGHBEAM SENSORS

	Light source			Switching output/ Operating voltage						Connection						
	Infrared light	Red light	Laser	PNP/DC	NPN/DC	Push-pull/DC	Relay/AC	Relay/DC	Relay/AC-DC	M8 connector	M12 connector	Terminals	Cable	Cable + M8 connector	Cable + M12 connector	Page
	●	●		●							●					156
		●				●					●		●		●	112
	●	●		●	●				●		●	●				164
		●		●							●		●			226
	●	●	●	●	●						●		●			200
	●			●							●					234

SELECTION TABLE - ACC. TO OPERATING PRINCIPLE

 Series	Dimensions in mm (WxHxD)	Housing material: Plastic	Housing material: Metal	Typ. op. range limit [m]: 2	5	16	20	30
2	8 x 23 x 12	●		0.05 – 4				
3B	11 x 32 x 17	●		0.02 – 6				
53	14 x 54 x 20		●	0 – 5				
55	14 x 36 x 25		●	0.02 – 6				
25B	15 x 39 x 29	●		0 – 15				
18	15 x 50 x 33		●	0 – 5				
8	15 x 48 x 38		●	0 – 22				

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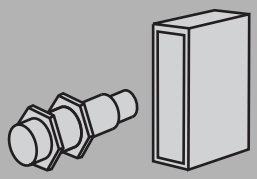
RETRO-REFLECTIVE SENSORS

	Light source			Switching output/ Operating voltage						Connection						
	Infrared light	Red light	Laser	PNP/DC	NPN/DC	Push-pull/DC	Relay/AC	Relay/DC	Relay/AC-DC	M8 connector	M12 connector	Terminals	Cable	Cable + M8 connector	Cable + M12 connector	Page
		●		●	●								●	●	●	20
	●	●	●	●	●	●				●			●	●	●	32
		●	●			●				●				●		128
		●	●			●				●					●	142
		●	●	●		●				●	●		●	●	●	86
		●		●	●					●	●		●			78
		●	●	●	●	●					●		●			64

SELECTION TABLE - ACC. TO OPERATING PRINCIPLE

 Series	Dimensions in mm (Ø x L)	Housing material: Plastic	Housing material: Metal	Typ. op. range limit [m]: 2	5	16	21	30
95	17 x 66 x 35		●	0 – 9				
46B	18 x 75 x 43	●		0.05 – 18				
96	30 x 90 x 70	●	●	0 – 28				
412	M12 x 55		●	0 – 1.6				
318	M18 x 50	●	●	0.02 – 15				
618	M18 x 60		●	0 – 7				

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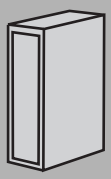
RETRO-REFLECTIVE SENSORS

	Light source			Switching output/ Operating voltage						Connection						
	Infrared light	Red light	Laser	PNP/DC	NPN/DC	Push-pull/DC	Relay/AC	Relay/DC	Relay/AC-DC	M8 connector	M12 connector	Terminals	Cable	Cable + M8 connector	Cable + M12 connector	Page
		●		●	●						●					156
		●		●		●		●			●		●		●	112
	●	●		●	●				●		●	●				164
		●		●							●		●			226
	●	●	●	●	●						●		●			200
		●		●							●					234

SELECTION TABLE - ACC. TO OPERATING PRINCIPLE

 Series	Dimensions in mm (WxHxD)	Housing material: Plastic	Housing material: Metal	Typ. scan range limit [mm]: 500	1000	2500	5500
2	8 x 23 x 12	●		15 / 30 / 50			
3B	11 x 32 x 17	●		10 – 750			
53	14 x 54 x 20		●	5 – 400			
55	14 x 36 x 25		●	5 – 400			
25B	15 x 39 x 29	●		0 – 1000			
18	15 x 50 x 33						
8	15 x 48 x 38		●	5 – 800			

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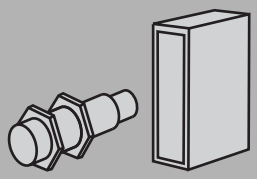
DIFFUSE REFLECTION SCANNERS

	Light source			Switching output/ Operating voltage						Connection						
	Infrared light	Red light	Laser	PNP/DC	NPN/DC	Push-pull/DC	Relay/AC	Relay/DC	Relay/AC-DC	M8 connector	M12 connector	Terminals	Cable	Cable + M8 connector	Cable + M12 connector	Page
		●		●	●								●	●	●	20
		●		●	●	●				●			●	●	●	32
		●				●				●				●		128
		●				●				●					●	142
	●	●		●	●	●				●	●		●	●	●	86
		●	●	●	●	●					●		●			64

SELECTION TABLE - ACC. TO OPERATING PRINCIPLE

 Series	Dimensions in mm (Ø x L)	Housing material: Plastic	Housing material: Metal	Typ. scan range limit [mm]: 500	1000	2500	6500
95	17 x 66 x 35		●	0 900			
46B	18 x 75 x 43	●		10 2500			
96	30 x 90 x 70	●	●	20 6500/25000			
412	M12 x 55		●	0 400			
318	M18 x 50	●	●	0 700			
618	M18 x 60		●	0 300			

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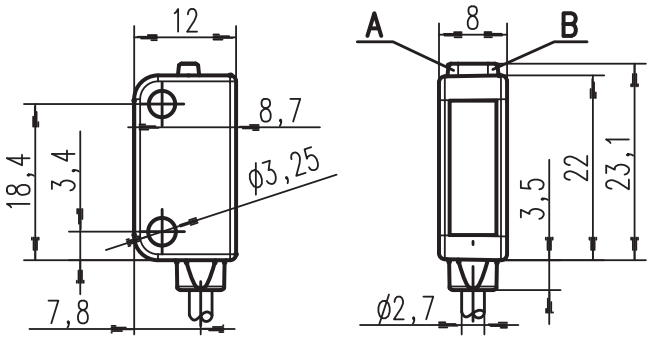
DIFFUSE REFLECTION SCANNERS

Light source			Switching output/ Operating voltage						Connection						
Infrared light	Red light	Laser	PNP/DC	NPN/DC	Push-pull/DC	Relay/AC	Relay/DC	Relay/AC-DC	M8 connector	M12 connector	Terminals	Cable	Cable + M8 connector	Cable + M12 connector	Page
●	●		●	●						●					156
●	●	●	●		●		●			●		●		●	112
●	●	●	●	●	●			●		●	●				164
	●		●							●		●			226
●	●	●	●	●	●					●		●			200
●			●							●					234

OVERVIEW

Dimensioned drawing



A Yellow indicator diode
B Green indicator diode

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2 SERIES

Operating principle	Typ. operating range limits	Page
Throughbeam sensors	0 … 2 m	22
Retro-reflective sensors	0.05 … 4 m	24
Diffuse reflection scanners	15 / 30 / 50 mm permanent	26

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple	≤ 10 % of U_B
	Open-circuit current	≤ 20 mA
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Green LED	Ready to operate
	Flashing green LED	Overload - output
	Yellow LED	Switching output
	Flashing yellow LED	No performance reserve
Mechanical data	Housing	Plastic (TPE)
	Optics cover	Plastic (PC)
	Weight (connector/cable)	20 g/50 g
Environmental data	Ambient temperature (operation)	-20 °C … +55 °C
	VDE safety class	III
	Protection class	IP 67
	Standards applied	IEC 60947-5-2

Mounting systems for this series can be found from **page 536** onwards

Features

- **Miniature sensors with visible red light**
- **Homogeneous, highly visible light spot by means of pin-point LED**
- **Universal connection options**
- **Temperature-stable plastic housing with inlaid metal attachment sleeves for secure mounting**

Optical Sensor ABC

- Throughbeam sensors Page 593
- Retro-reflective sensors Page 593
- Diffuse reflection scanners Page 594

THROUGHBEAM SENSORS

Part description Part No.:		Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Throughbeam sensors		▶ = Transmitter ◀ = Receiver				
▶ LSSR 2 **◀ LSER 2/42**	50112127 50112130	0 1.6 0 2	385 Hz	Red light	1 x PNP 1 x NPN	Light
▶ LSSR 2.8, 150 - S8.3 **◀ LSER 2/4, 150 - S8.3**	50116172 50116173	0 1.6 0 2	385 Hz	Red light	1 x PNP	Light
▶ LSSR 2, 150 - S8 **◀ LSER 2/42, 150 - S8**	50112128 50112131	0 1.6 0 2	385 Hz	Red light	1 x PNP 1 x NPN	Light
▶ LSSR 2, 150 - S12 **◀ LSER 2/42, 150 - S12**	50112129 50112132	0 1.6 0 2	385 Hz	Red light	1 x PNP 1 x NPN	Light
▶ LSSR 2 **◀ LSER 2/42D**	50112127 50112133	0 1.6 0 2	385 Hz	Red light	1 x PNP 1 x NPN	Dark
▶ LSSR 2, 150 - S8 **◀ LSER 2/42D, 150 - S8**	50112128 50112134	0 1.6 0 2	385 Hz	Red light	1 x PNP 1 x NPN	Dark
▶ LSSR 2, 150 - S12 **◀ LSER 2/42D, 150 - S12**	50112129 50112135	0 1.6 0 2	385 Hz	Red light	1 x PNP 1 x NPN	Dark

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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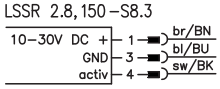
	Connection	Option	Accessories		Typ. light spot
	Cable, 2 m	1			
	Cable, 0.15 m, with M8 connector		a, b		
	Cable, 0.15 m, with M8 connector	1	c, d		
	Cable, 0.15 m, with M12 connector	1	e, f		
	Cable, 2 m	1			
	Cable, 0.15 m, with M8 connector	1	c, d		
	Cable, 0.15 m, with M12 connector	1	e, f		

Optical Sensor ABC

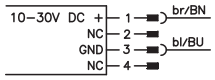
- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

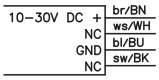
LSSR 2.8, 150 – S8.3



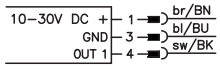
LSSR 2, 150 – S8
LSSR 2, 150 – S12



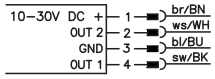
LSSR 2



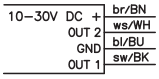
LSER 2/4, 150 – S8.3



LSER 2/42..., 150 – S8
LSER 2/42..., 150 – S12



LSER 2/42...



Options

1 UL Recognized Component Mark

RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors with polarization filter					
PRK 2 / 42 50112136	0.05 – 3.5 0.05 – 4	700 Hz	Red light	1 x PNP 1 x NPN	Light
PRK 2 / 42, 150 - S8 50112137	0.05 – 3.5 0.05 – 4	700 Hz	Red light	1 x PNP 1 x NPN	Light
PRK 2 / 42, 150 - S12 50112138	0.05 – 3.5 0.05 – 4	700 Hz	Red light	1 x PNP 1 x NPN	Light
PRK 2 / 42D 50112139	0.05 – 3.5 0.05 – 4	700 Hz	Red light	1 x PNP 1 x NPN	Dark
PRK 2 / 42D, 150 - S8 50112140	0.05 – 3.5 0.05 – 4	700 Hz	Red light	1 x PNP 1 x NPN	Dark
PRK 2 / 42D, 150 - S12 50112141	0.05 – 3.5 0.05 – 4	700 Hz	Red light	1 x PNP 1 x NPN	Dark

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 582

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000 mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000 mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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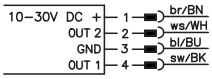
	Connection	Option	Accessories		Typ. performance reserve
	Cable, 2 m	1			
	Cable, 0.15 m, with M8 connector	1	a, b, c, d		
	Cable, 0.15 m, with M12 connector	1	e, f		
	Cable, 2 m	1			
	Cable, 0.15 m, with M8 connector	1	a, b, c, d		
	Cable, 0.15 m, with M12 connector	1	e, f		

Optical Sensor ABC

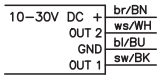
- Retro-reflective sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

PRK 2/42..., 150 – S8
PRK 2/42..., 150 – S12



PRK 2/42...



Options

1 UL Recognized Component Mark

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [1] [mm] ☐ Typ. scan range limit [mm] ☐	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRTR 2 / 42 - 50F 50112121	4 … 46 1 … 60	700 Hz	Red light	1 x PNP 1 x NPN	Light
HRTR 2 / 42 - 50F, 150 - S8 50112122	4 … 46 1 … 60	700 Hz	Red light	1 x PNP 1 x NPN	Light
HRTR 2 / 42 - 50F, 150 - S12 50112123	4 … 46 1 … 60	700 Hz	Red light	1 x PNP 1 x NPN	Light

1) Measured against a white object with 90 % diffuse reflection

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000 mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000 mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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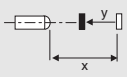
	Connection	Option	Accessories		Typ. b/w behavior
					A white 90 % **B** gray 18 % **C** black 6 % 
	Cable, 2 m	1, 2, 3			
	Cable, 0.15 m, with M8 connector	1, 2, 3	a, b, c, d		
	Cable, 0.15 m, with M12 connector	1, 2, 3	e, f		

Optical Sensor ABC

- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
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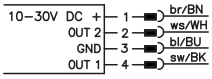
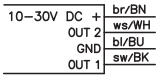
Electrical connection

HRTR 2/42..., 150 –S8
HRTR 2/42..., 150 –S12



HRTR 2/42...



Options

1 Scanning range permanently set to 50 mm

2 Laser-like, focussed light spot: Ø 0.5 mm @ 16 mm, Ø 6.5 mm @ 50 mm

3 UL Recognized Component Mark

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [1] [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRTR 2 / 42 - 30F 50112115	5 28 1 35	700 Hz	Red light	1 x PNP 1 x NPN	Light
HRTR 2 / 42 - 30F, 150 - S8 50112116	5 28 1 35	700 Hz	Red light	1 x PNP 1 x NPN	Light
HRTR 2 / 42 - 30F, 150 - S12 50112117	5 28 1 35	700 Hz	Red light	1 x PNP 1 x NPN	Light

1) Measured against a white object with 90 % diffuse reflection

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000 mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000 mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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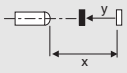
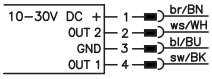
	Connection	Option	Accessories		Typ. b/w behavior
					A white 90 % **B** gray 18 % **C** black 6 % 
	Cable, 2 m	1, 2, 3			
	Cable, 0.15 m, with M8 connector	1, 2, 3	a, b, c, d		
	Cable, 0.15 m, with M12 connector	1, 2, 3	e, f		

Optical Sensor ABC

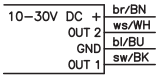
- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

HRTR 2/42..., 150 –S8
HRTR 2/42..., 150 –S12



HRTR 2/42...



Options

1 Scanning range permanently set to 30 mm

2 Laser-like, focussed light spot: Ø 0.5 mm @ 16 mm, Ø 3 mm @ 30 mm

3 UL Recognized Component Mark

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [1] [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRTR 2 / 42 - 15F 50112109	4 14 1 18	700 Hz	Red light	1 x PNP 1 x NPN	Light
HRTR 2 / 42 - 15F, 150 - S8 50112110	4 14 1 18	700 Hz	Red light	1 x PNP 1 x NPN	Light
HRTR 2 / 42 - 15F, 150 - S12 50112111	4 14 1 18	700 Hz	Red light	1 x PNP 1 x NPN	Light
HRTR 2 / 42D - 15F 50112112	4 14 1 18	700 Hz	Red light	1 x PNP 1 x NPN	Dark
HRTR 2 / 42D - 15F, 150 - S8 50112113	4 14 1 18	700 Hz	Red light	1 x PNP 1 x NPN	Dark
HRTR 2 / 42D - 15F, 150 - S12 50112114	4 14 1 18	700 Hz	Red light	1 x PNP 1 x NPN	Dark

1) Measured against a white object with 90 % diffuse reflection

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000 mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000 mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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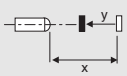
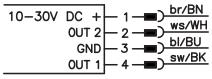
	Connection	Option	Accessories		Typ. b/w behavior
					A white 90 % B gray 18 % C black 6 % 
	Cable, 2 m	1, 2, 3			
	Cable, 0.15 m, with M8 connector	1, 2, 3	a, b, c, d		
	Cable, 0.15 m, with M12 connector	1, 2, 3	e, f		
	Cable, 2 m	1, 2, 3			
	Cable, 0.15 m, with M8 connector	1, 2, 3	a, b, c, d		
	Cable, 0.15 m, with M12 connector	1, 2. 3	e, f		

Optical Sensor ABC

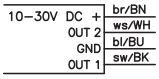
- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

HRTR 2/42..., 150 –S8
HRTR 2/42..., 150 –S12



HRTR 2/42...



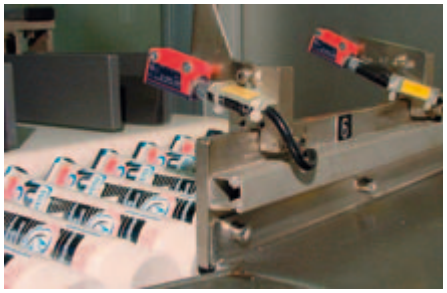
Options

1 Scanning range permanently set to 15 mm

2 Laser-like, focussed light spot: Ø 0.4 mm @ 10 mm, Ø 1.5 mm @ 15 mm

3 UL Recognized Component Mark

OVERVIEW

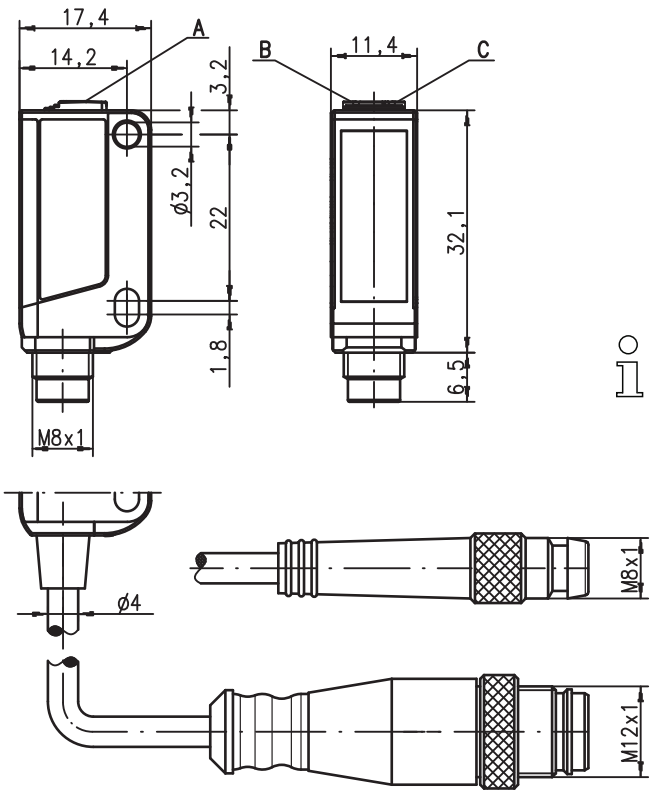


Product measurement

Circuit board detection

Container detection

Dimensioned drawing



Further details can be found in the respective data sheet.

A Green indicator diode
B Yellow indicator diode
C Operational control

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3B SERIES

Operating principle	Typ. operating range limits	Page
Throughbeam sensors	0 … 10 m	34
Retro-reflective sensors	0 … 7 m	36
Diffuse reflection scanners	0 … 750 mm	46

Other 3B Series products:

Contrast scanners	KRT… 3B	438

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple	≤ 15 % of U_B
	Open-circuit current	≤ 25 mA
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Yellow LED	Switching output
	Flashing yellow LED	No performance reserve
Mechanical data	Housing	Plastic
	Optics cover	Plastic (PMMA)
	Weight (connector/cable)	10 g/40 g
Environmental data	Ambient temperature (operation)	-25(-30) °C … +55 °C
		Laser: -10 °C … +55 °C
	VDE safety class	II, all-insulated (cable)
		III (metal connector)
	Protection class	IP 67
	Standards applied	IEC 60947-5-2, UL 508

Mounting systems for this series can be found from **page 536** onwards

Features

- **Active ambient light suppression A²LS**
- **Application-specific, special solutions available: e.g. diffuse reflection scanner with elongated light spot**
- **Highest functional reliability**
- **Laser with autocollimation principle**
- **M8 metal connector**

Optical Sensor ABC

- Throughbeam sensors Page 593
- Retro-reflective sensors Page 593
- Diffuse reflection scanners Page 594
- A²LS Page 601

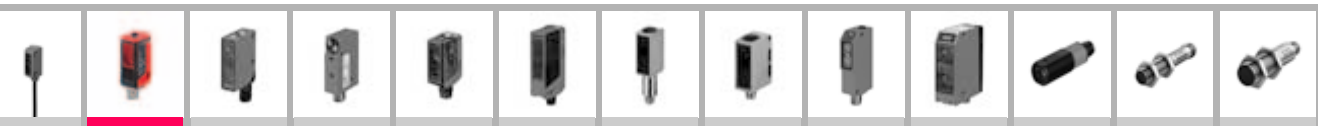
THROUGHBEAM SENSORS

Part description Part No.:		Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Throughbeam sensors		▶ = Transmitter ◀ = Receiver				
▶ **LSSR 3B.8 - S8** ◀ **ILSER 3B/4 - S8**	50108509 50108517	0.05 8.5 0.05 10	1000 Hz	Red light	1 x PNP/DC	Light
▶ **LSSR 3B.8, 5000** ◀ **LSER 3B/44.1, 5000**	50108511 50111732	0.05 8.5 0.05 10	1000 Hz	Red light	2 x PNP/DC	Light/dark antivalent
▶ **LSSR 3B.8, 200 - S8** ◀ **ILSER 3B/4, 200 - S8**	50108512 50108518	0.05 8.5 0.05 10	1000 Hz	Red light	1 x PNP/DC	Light
▶ **LSSR 3B - S8** ◀ **LSER 3B/66 - S8**	50108508 50108514	0.05 8.5 0.05 10	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
▶ **LSSR 3B.8 - S8** ◀ **LSER 3B/66 - S8**	50108509 50108514	0.05 8.5 0.05 10	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
▶ **LSSR 3B - S8** ◀ **LSER 3B/66.1 - S8**	50108508 50108515	0.05 8.5 0.05 10	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
▶ **LSSR 3B.8** ◀ **LSER 3B/66**	50108510 50108516	0.05 8.5 0.05 10	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
▶ **LSSR 3B.8, 5000** ◀ **LSER 3B/66, 5000**	50108511 50108519	0.05 8.5 0.05 10	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
▶ **LSSR 3B, 200 - S12** ◀ **LSER 3B/66, 200 - S12**	50111440 50111442	0.05 8.5 0.05 10	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
▶ **LSSR 3B.8, 200 - S12** ◀ **LSER 3B/66, 200 - S12**	50111441 50111442	0.05 8.5 0.05 10	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000 mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000 mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC


2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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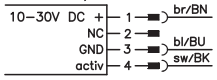
	Connection	Option	Accessories		Typ. light spot
	M8 connector	2, 3, 4	a, b, c, d		
	Cable, 5 m	1, 2, 4			
	Cable, 0.2 m, with M8 connector	2, 3, 4	a, b, c, d		
	M8 connector	4	a, b, c, d		
	M8 connector	2, 4	a, b, c, d		
	M8 connector	1, 4	a, b, c, d		
	Cable, 2 m	2, 4			
	Cable, 5 m	2, 4			
	Cable, 0.2 m, with M12 connector	4	e, f		
	Cable, 0.2 m, with M12 connector	2, 4	e, f		

Optical Sensor ABC

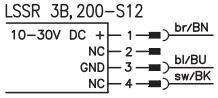
- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

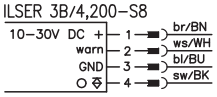
LSSR 3B.8–S8
LSSR 3B.8,200–S8
LSSR 3B.8,200–S12



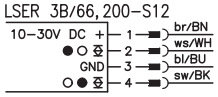
LSSR 3B–S8
LSSR 3B, 200–S12



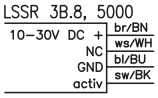
ILSER 3B/4–S8
ILSER 3B/4,200–S8



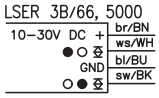
LSER 3B/66–S8
LSER 3B/66.1–S8
LSER 3B/66, 200–S12



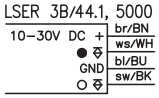
LSSR 3B.8
LSSR 3B.8, 5000



LSER 3B/66
LSER 3B/66, 5000



LSER 3B/44.1, 5000



Options

1	Sensitivity adjustment via multiturn potentiometer
2	Transmitter with activation input
3	Receiver with warning output
4	UL approval (class 2 acc. to NEC)

RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors					
RKR 3B / 44D.01 50106511	0.02 4 0.02 5	1500 Hz	Red light	2 x PNP/DC	Dark/light antivalent
RKR 3B / 22D.01 50106512	0.02 4 0.02 5	1500 Hz	Red light	2 x NPN/DC	Dark/light antivalent
RKR 3B / 22D.01, 200 - S8 50113267	0.02 4 0.02 5	1500 Hz	Red light	2 x NPN/DC	Dark/light antivalent
RKR 3B / 66.11 50109023	0.02 6.5 0.02 7	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
RKR 3B / 6.42 - S8 50104703	0 1.5 0 1.8	1000 Hz	Red light	1 x Push-pull/DC	Light/dark configurable
RKR 3B / 6.42 50104702	0 1.5 0 1.8	1000 Hz	Red light	1 x Push-pull/DC	Light/dark configurable
RKR 3B / 6D.42 50107914	0 1.5 0 1.8	1000 Hz	Red light	1 x Push-pull/DC	Light/dark configurable
RKR 3B / 6.42, 200 - S8 50104704	0 1.5 0 1.8	1000 Hz	Red light	1 x Push-pull/DC	Light/dark configurable
RKR 3B / 6.42, 200 - S12 50105763	0 1.5 0 1.8	1000 Hz	Red light	1 x Push-pull/DC	Light/dark configurable
RK 3B / 66.1 50106852	0.02 4.5 0.02 5.5	1000 Hz	Infrared light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000 mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000 mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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	Connection	Option	Accessories		Typ. performance reserve
	Cable, 2 m	4, 6			
	Cable, 2 m	4, 6			
	Cable, 0.2 m, with M8 connector	4, 6	a, b, c, d		
	Cable, 2 m	4, 6			
	M8 connector	2, 3, 5, 6	a, b, c, d		
	Cable, 2 m	2, 3, 5, 6			
	Cable, 2 m	2, 3, 5, 6			
	Cable, 0.2 m, with M8 connector	2, 3, 5, 6	a, b, c, d		
	Cable, 0.2 m, with M12 connector	2, 3, 5, 6	e, f		
	Cable, 2 m	4, 6			

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 582

Options

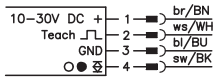
1	Sensitivity adjustment via multiturn potentiometer
2	Teach-in via teach button or teach input
3	Especially for transparent foils ≤ 20 µm
4	Shiny objects
5	Autocollimation principle
6	UL approval (class 2 acc. to NEC)

Optical Sensor ABC

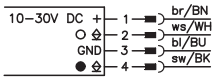
- Retro-reflective sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

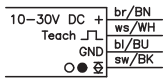
RKR 3B/6.42–S8
RKR 3B/6.42,200–S8
RKR 3B/6.42,200–S12



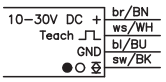
RKR 3B/22D.01,200–S8



RKR 3B/6.42



RKR 3B/6D.42



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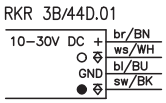
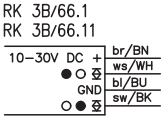
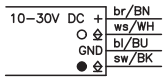


RK 3B/66.1
RK 3B/66.11



RKR 3B/22D.01



RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors with polarization filter					
PRK 3B / 6.7 - S8 50104698	0.02 5 0.02 6	1000 Hz	Red light	1 x Push-pull/DC	Light
PRK 3B / 6D.7 - S8 50106865	0.02 5 0.02 6	1000 Hz	Red light	1 x Push-pull/DC	Dark
PRK 3B / 6.7 50104697	0.02 5 0.02 6	1000 Hz	Red light	1 x Push-pull/DC	Light
PRK 3B / 6 - S8.3 50109581	0.02 5 0.02 6	1000 Hz	Red light	1 x Push-pull/DC	Light
PRK 3B / 66 - S8 50104694	0.02 5 0.02 6	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 3B / 66 50104693	0.02 5 0.02 6	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 3B / 66, 200 - S8 50104695	0.02 5 0.02 6	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 3B / 66, 200 - S12 50104696	0.02 5 0.02 6	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 3B / 66.1 - S8 50106078	0.02 5 0.02 6	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 582

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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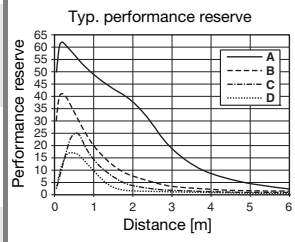
Connection	Option	Accessories		Typ. performance reserve
M8 connector	2, 3, 4	a, b		
M8 connector	2, 3, 4	a, b		
Cable, 2 m	2, 4			
M8 connector	3, 4	a, b		
M8 connector	4	c, d		
Cable, 2 m	4			
Cable, 0.2 m, with M8 connector	4	c, d		
Cable, 0.2 m, with M12 connector	4	e, f		
M8 connector	1, 4	c, d		



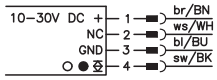
A TK 100x100
B TKS 40x60
C TKS 20x40
D Tape 4: 50x50

Optical Sensor ABC

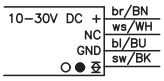
- Retro-reflective sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

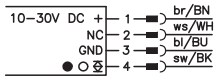
PRK 3B/6.7–S8



PRK 3B/6.7



PRK 3B/6D.7–S8



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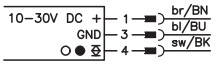

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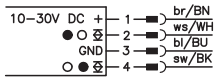
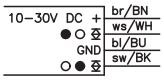
PRK 3B/66.1–S8
PRK 3B/66,200–S8
PRK 3B/66,200–S12



PRK 3B/66



Options

1 Sensitivity adjustment via multiturn potentiometer

2 Economy version (plastic connector, 1 LED, without metal sleeve in housing)

3 Direct connection to AS-interface I/O coupling modules

4 UL approval (class 2 acc. to NEC)

RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors with polarization filter					
PRK 3B / 4D.22, 200 - S8 50110775	0 4 0 5	1000 Hz	Red light	1 x PNP/DC	Dark/light configurable
PRK 3B / 6.2 - S8.3 50109385	0 4 0 5	1000 Hz	Red light	1 x Push-pull/DC	Light/dark configurable
PRK 3B / 6.2, 200 - S8.3 50114099	0 4 0 5	1000 Hz	Red light	1 x Push-pull/DC	Light/dark configurable
PRK 3B / 6.22 - S8 50104700	0 4 0 5	1000 Hz	Red light	1 x Push-pull/DC	Light/dark configurable
PRK 3B / 6D.22 - S8 50106418	0 4 0 5	1000 Hz	Red light	1 x Push-pull/DC	Dark/light configurable
PRK 3B / 6.22 50104699	0 4 0 5	1000 Hz	Red light	1 x Push-pull/DC	Light/dark configurable
PRK 3B / 6.22, 200 - S8 50104701	0 4 0 5	1000 Hz	Red light	1 x Push-pull/DC	Light/dark configurable
PRK 3B / 6.22, 200 - S12 50105762	0 4 0 5	1000 Hz	Red light	1 x Push-pull/DC	Light/dark configurable
PRK 3B / 6D.46 50108026	0 4 0 5	1000 Hz	Red light	1 x Push-pull/DC	Dark/light antivalent

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 582

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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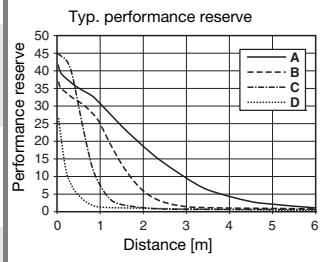
	Connection	Option	Accessories		Typ. performance reserve
	Cable, 0.2 m, with M8 connector	2, 5, 6	c, d		
	M8 connector	1, 5, 6	a, b		
	Cable, 0.2 m, with M8 connector	1, 5, 6	a, b		
	M8 connector	2, 5, 6	c, d		
	M8 connector	2, 5, 6	c, d		
	Cable, 2 m	2, 5, 6			
	Cable, 0.2 m, with M8 connector	2, 5, 6	c, d		
	Cable, 0.2 m, with M12 connector	2, 5, 6	e, f		
	Cable, 2 m	2, 3, 4, 5, 6,			



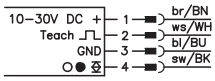
A TK 100x100
B TKS 40x60
C TKS 20x40
D Tape 4: 50x50

Optical Sensor ABC

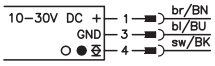
- Retro-reflective sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

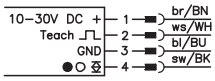
PRK 3B/6.22–S8
PRK 3B/6.22,200–S8
PRK 3B/6.22,200–S12



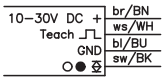
PRK 3B/6.2–S8.3
PRK 3B/6.2,200–S8.3



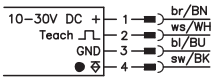
PRK 3B/6D.22–S8



PRK 3B/6.22
PRK 3B/6D.46



PRK 3B/4D.22,200–S8



Options

1	Teach-in via teach button
2	Teach-in via teach button (lockable) or teach input
3	Transparent media (e.g. bottles)
4	AutoTeach - cyclical, automatic teach event
5	Autocollimation principle
6	UL approval (class 2 acc. to NEC)

RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors with polarization filter					
PRK 3B / 6.42 - S8 50112473	0 3 0 3.6	1000 Hz	Red light	1 x Push-pull/DC	Light/dark configurable
PRK 3B / 6.42 50113327	0 3 0 3.6	1000 Hz	Red light	1 x Push-pull/DC	Light/dark configurable
PRK 3B / 6.42, 5000 50114873	0 3 0 3.6	1000 Hz	Red light	1 x Push-pull/DC	Light/dark configurable
PRK 3B / 6.42, 200 - S8 50113325	0 3 0 3.6	1000 Hz	Red light	1 x Push-pull/DC	Light/dark configurable
PRK 3B / 6.42, 200 - S12 50113326	0 3 0 3.6	1000 Hz	Red light	1 x Push-pull/DC	Light/dark configurable
PRK 3B / 6D.42 - S8 50112474	0 3 0 3.6	1000 Hz	Red light	1 x Push-pull/DC	Dark/light configurable
PRK 3B / 6D.42, 200 - S12 50113324	0 3 0 3.6	1000 Hz	Red light	1 x Push-pull/DC	Dark/light antivalent

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 582

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000 mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000 mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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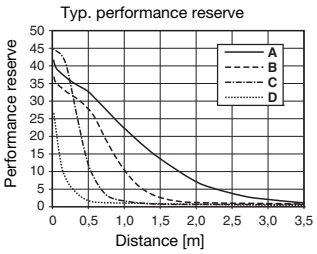
	Connection	Option	Accessories		Typ. performance reserve
	M8 connector	1, 2, 3, 4	a, b, c, d		
	Cable, 5 m	1, 2, 3, 4			
	Cable, 2 m	1, 2, 3, 4			
	Cable, 0.2 m, with M8 connector	1, 2, 3, 4	a, b, c, d		
	Cable, 0.2 m, with M12 connector	1, 2, 3, 4	e, f		
	M8 connector	1, 2, 3, 4	a, b, c, d		
	Cable, 0.2 m, with M12 connector	1, 2, 3, 4	e, f		



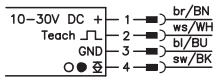
A TK 100x100
B TKS 40x60
C TKS 20x40
D Tape 4: 50x50

Optical Sensor ABC

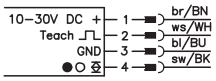
- Retro-reflective sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

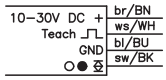
PRK 3B/6.42-S8
PRK 3B/6.42,200-S8
PRK 3B/6.42,200-S12



PRK 3B/6D.42-S8
PRK 3B/6D.42,200-S12



PRK 3B/6.42
PRK 3B/6.42, 5000



Options

1 Teach-in via teach button (lockable) or teach input

2 Highly transparent bottles (PET and glass)

3 Autocollimation principle

4 UL approval (class 2 acc. to NEC)

RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective laser sensors with polarization filter					
PRKL 3B / 6.2 - S8.3 50109484	0 2 0 3	2000 Hz	Red light laser class 1	Push-pull/DC	Light/dark configurable
PRKL 3B / 6D.22 - S8 50106475	0 2 0 3	2000 Hz	Red light laser class 1	Push-pull/DC	Dark/light configurable
PRKL 3B / 6.22 - S8 50104706	0 2 0 3	2000 Hz	Red light laser class 1	Push-pull/DC	Light/dark configurable
PRKL 3B / 6.22 50104705	0 2 0 3	2000 Hz	Red light laser class 1	Push-pull/DC	Light/dark configurable
PRKL 3B / 6.2, 200 - S8.3 50114872	0 2 0 3	2000 Hz	Red light laser class 1	Push-pull/DC	Light/dark configurable
PRKL 3B / 6.22, 200 - S8 50104707	0 2 0 3	2000 Hz	Red light laser class 1	Push-pull/DC	Light/dark configurable
PRKL 3B / 6.22, 200 - S12 50105764	0 2 0 3	2000 Hz	Red light laser class 1	Push-pull/DC	Light/dark configurable

1) The specified values apply in combination with reflectors MTKS 50 x 50, additional reflectors with range specifications can be found on page 582

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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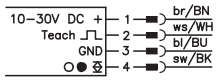
	Connection	Option	Accessories		Typ. performance reserve
	M8 connector	1, 3, 4	a, b		
	M8 connector	2, 3, 4	c, d		
	M8 connector	2, 3, 4	c, d		
	Cable, 2 m	2, 3, 4			
	Cable, 0.2 m, with M8 connector	2, 3, 4	a, b		
	Cable, 0.2 m, with M8 connector	2, 3, 4	c, d		
	Cable, 0.2 m, with M12 connector	2, 3, 4	e, f		

Optical Sensor ABC

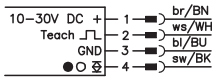
- Retro-reflective sensors with polarization filter Page 593
- Connection types/Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection

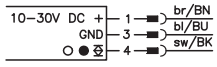
PRKL 3B/6.22-S8
PRKL 3B/6.22,200-S8
PRKL 3B/6.22,200-S12



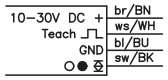
PRKL 3B/6D.22-S8



PRKL 3B/6.2-S8.3
PRKL 3B/6.2,200-S8.3



PRKL 3B/6.22



Options

1	Teach-in via teach button
2	Teach-in via teach button (lockable) or teach input
3	Autocollimation principle
4	UL approval (class 2 acc. to NEC)

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Energetic diffuse reflection scanners					
RTR 3B / 2.7 - S8 50109065	0 700 0 750	1000 Hz	Red light	1 x NPN/DC	Light
RTR 3B / 2.7 50109251	0 700 0 750	1000 Hz	Red light	1 x NPN/DC	Light
RTR 3B / 6.7 - S8 50109061	0 700 0 750	1000 Hz	Red light	1 x Push-pull/DC	Light
RTR 3B / 6.7 50109250	0 700 0 750	1000 Hz	Red light	1 x Push-pull/DC	Light
RTR 3B / 66 - S8 50108505	0 700 0 750	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
RTR 3B / 66 50108506	0 700 0 750	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000 mm, M8 angular, 4-pin, PVC
d	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000 mm, M8 axial, 4-pin, PVC
e	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
f	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC

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3B SERIES

Diffuse reflection scanners

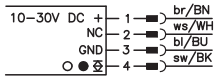
	Connection	Option	Accessories		Typ. b/w behavior
	M8 connector	1, 2, 3, 4	a, b		
	Cable, 2 m	1, 2, 4			
	M8 connector	1, 2, 3, 4	a, b		
	Cable, 2 m	1, 2, 4			
	M8 connector	1, 4	c, d, e, f		
	Cable, 2 m	1, 4			

Optical Sensor ABC

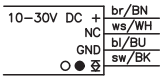
- Diffuse reflection scanners Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

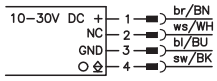
RTR 3B/6.7–S8



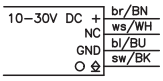
RTR 3B/6.7



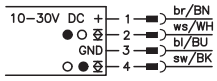
RTR 3B/2.7–S8



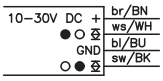
RTR 3B/2.7



RTR 3B/66–S8



RTR 3B/66



Options

1	Sensitivity adjustment
2	Economy version (plastic connector, 1 LED, without metal sleeve in housing)
3	Direct connection to AS-interface I/O coupling modules
4	UL approval (class 2 acc. to NEC)

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection light scanners with fading					
RTFR 3B / 2.7 50108502	10 420 5 450	1000 Hz	Red light	1 x NPN/DC	Light
RTFR 3B / 6.7 - S8 50108497	10 420 5 450	1000 Hz	Red light	1 x Push-pull/DC	Light
RTFR 3B / 6D.7 - S8 50108500	10 420 5 450	1000 Hz	Red light	1 x Push-pull/DC	Dark
RTFR 3B / 6.7 50108501	10 420 5 450	1000 Hz	Red light	1 x Push-pull/DC	Light
RTFR 3B / 6 - S8.3 50108498	10 420 5 450	1000 Hz	Red light	1 x Push-pull/DC	Light
RTFR 3B / 6D - S8.3 50108499	10 420 5 450	1000 Hz	Red light	1 x Push-pull/DC	Dark
RTFR 3B / 66 - S8 50108495	10 420 5 450	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
RTFR 3B / 66 50108496	10 420 5 450	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
RTFR 3B / 66, 200 - S8 50108504	10 420 5 450	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000 mm, M8 angular, 4-pin, PVC
d	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000 mm, M8 axial, 4-pin, PVC
e	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
f	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC

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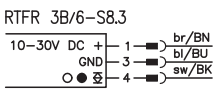
	Connection	Option	Accessories		Typ. b/w behavior
	Cable, 2 m	1, 2, 4			< 50 %
	M8 connector	1, 2, 3, 4			< 50 %
	M8 connector	1, 2, 3, 4			< 50 %
	Cable, 2 m	1, 2, 4			< 50 %
	M8 connector	1, 4	a, b		< 50 %
	M8 connector	1, 4	a, b		< 50 %
	M8 connector	1, 4	c, d, e, f		< 50 %
	Cable, 2 m	1, 4			< 50 %
	Cable, 0.2 m, with M8 connector	1, 4	c, d, e, f		< 50 %

Optical Sensor ABC

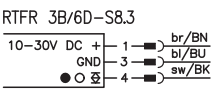
- Diffuse reflection scanners Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

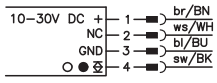
RTFR 3B/6-S8.3



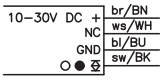
RTFR 3B/6D-S8.3



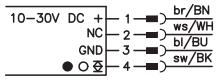
RTFR 3B/6.7-S8



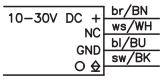
RTFR 3B/6.7



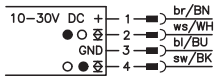
RTFR 3B/6D.7-S8



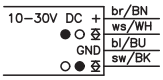
RTFR 3B/2.7



RTFR 3B/66-S8
RTFR 3B/66,200-S8



RTFR 3B/66



Options

1 Sensitivity adjustment

2 Economy version (plastic connector, 1 LED, without metal sleeve in housing)

3 Direct connection to AS-interface I/O coupling modules

4 UL approval (class 2 acc. to NEC)

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [1] [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRTR 3B / 4, 200 - S8.3 50107232	5 200 5 400	1000 Hz	Red light	1 x PNP/DC	Light
HRTR 3B / 44 - S8 50107233	5 200 5 400	1000 Hz	Red light	2 x PNP/DC	Light/dark antivalent
HRTR 3B / 44 50107235	5 200 5 400	1000 Hz	Red light	2 x PNP/DC	Light/dark antivalent
HRTR 3B / 44, 5000 50109753	5 200 5 400	1000 Hz	Red light	2 x PNP/DC	Light/dark antivalent
HRTR 3B / 44, 200 - S12 50107236	5 200 5 400	1000 Hz	Red light	2 x PNP/DC	Light/dark antivalent
HRTR 3B / 2.7 50107918	5 200 5 400	1000 Hz	Red light	1 x NPN/DC	Light
HRTR 3B / 22 - S8 50107239	5 200 5 400	1000 Hz	Red light	2 x NPN/DC	Light/dark antivalent
HRTR 3B / 22 50107238	5 200 5 400	1000 Hz	Red light	2 x NPN/DC	Light/dark antivalent
HRTR 3B / 6.7 - S8 50107241	5 200 5 400	1000 Hz	Red light	1 x Push-pull/DC	Light
HRTR 3B / 6.7 50107240	5 200 5 400	1000 Hz	Red light	1 x Push-pull/DC	Light

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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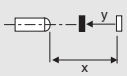
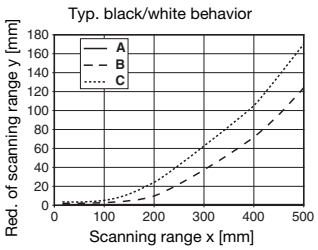
	Connection	Option	Accessories		Typ. b/w behavior
					A white 90 % B gray 18 % C black 6 % 
	M8 connector	1, 4	a, b		
	M8 connector	1, 4	c, d		
	Cable, 2 m	1, 4			
	Cable, 5 m	1, 4			
	Cable, 0.2 m, with M12 connector	1, 4	e, f		
	Cable, 2 m	1, 2, 3, 4			
	M8 connector	1, 4	c, d		
	Cable, 2 m	1, 4			
	M8 connector	1, 2, 3, 4	a, b		
	Cable, 2 m	1, 2, 3, 4			



1) Typical scanning range with a black/white error < 10 %

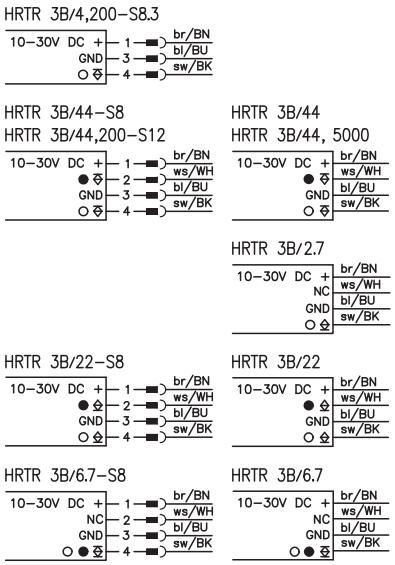
Options

1	Scanning range adjustment via multiturn potentiometer
2	Economy version (plastic connector, 1 LED, without metal sleeve in housing)
3	Direct connection to AS-interface I/O coupling modules
4	UL approval (class 2 acc. to NEC)

Optical Sensor ABC

- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection



DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [1] [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRTR 3B / 6D.7 50107922	5 200 5 400	1000 Hz	Red light	1 x Push-pull/DC	Dark
HRTR 3B / 6 - S8.3 50108408	5 200 5 400	1000 Hz	Red light	1 x Push-pull/DC	Light
HRTR 3B / 66 - S8 50107229	5 200 5 400	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 3B / 66 50107228	5 200 5 400	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 3B / 66, 200 - S8 50107230	5 200 5 400	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 3B / 66, 200 - S12 50107298	5 200 5 400	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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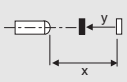
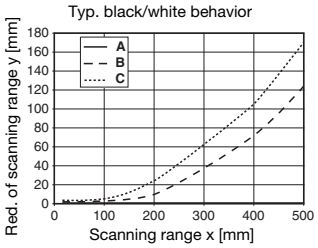
Connection	Option	Accessories		Typ. b/w behavior
				A white 90 % B gray 18 % C black 6 % 
Cable, 2 m	1, 2, 3, 4			
M8 connector	1, 4	a, b		
M8 connector	1, 4	c, d		
Cable, 2 m	1, 4			
Cable, 0.2 m, with M8 connector	1, 4	c, d		
Cable, 0.2 m, with M12 connector	1, 4	e, f		



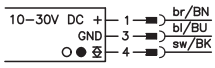
1) Typical scanning range with a black/white error < 10 %

Optical Sensor ABC

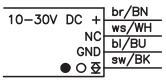
- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

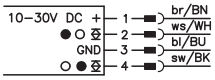
HRTR 3B/6-S8.3



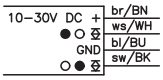
HRTR 3B/6D.7



HRTR 3B/66-S8
HRTR 3B/66,200-S8
HRTR 3B/66,200-S12



HRTR 3B/66



Options

1	Scanning range adjustment via multiturn potentiometer
2	Economy version (plastic connector, 1 LED, without metal sleeve in housing)
3	Direct connection to AS-interface I/O coupling modules
4	UL approval (class 2 acc. to NEC)

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [1] [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRTR 3B / 6 - S - S8.3 50108407	5 100 5 200	1000 Hz	Red light	1 x Push-pull/DC	Light
HRTR 3B / 6 - S, 200 - S8.3 50109051	5 100 5 200	1000 Hz	Red light	1 x Push-pull/DC	Light
HRTR 3B / 66 - S - S8 50107243	5 100 5 200	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 3B / 66 - S 50107242	5 100 5 200	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 3B / 66 - S, 5000 50110809	5 100 5 200	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 3B / 66 - S, 200 - S8 50107244	5 100 5 200	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 3B / 66 - S, 200 - S12 50107245	5 100 5 200	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 3B / 44 - L - S8 50111443	5 50 5 100	150 Hz	Red light	2 x PNP/DC	Light/dark antivalent
HRTR 3B / 44 - L, 200 - S8 50113317	5 50 5 100	150 Hz	Red light	2 x PNP/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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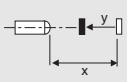
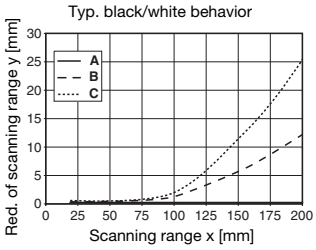
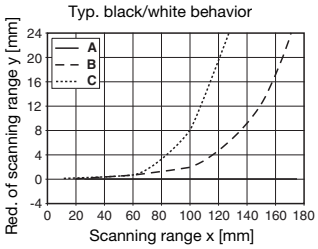
Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % B gray 18 % C black 6 % 
M8 connector	1, 2, 4	a, b	
Cable, 0.2 m, with M8 connector	1, 2, 4	a, b	
M8 connector	1, 2, 4	c, d	
Cable, 2 m	1, 2, 4		
Cable, 5 m	1, 2, 4		
Cable, 0.2 m, with M8 connector	1, 2, 4	c, d	
Cable, 0.2 m, with M12 connector	1, 2, 4	e, f	
M8 connector	1, 3, 4	c, d	
Cable, 0.2 m, with M8 connector	1, 3, 4	c, d	

1) Typical scanning range with a black/white error < 10 %

Options

1 Scanning range adjustment via multiturn potentiometer

2 Small, homogenous light spot for detecting small parts

3 Broad rectangular light spot 3 x 33 mm² (at a distance of 50 mm) guarantees the reliable detection of objects with openings, grid structures, holes, grooves and of objects with changeable position as well as transparent foils/bottles

4 UL approval (class 2 acc. to NEC)

Optical Sensor ABC

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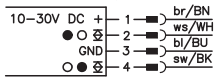
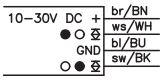
- Connection types Page 598
- Outputs Page 598

Electrical connection

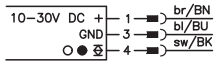
HRTR 3B/66-S-S8
HRTR 3B/66-S,200-S8
HRTR 3B/66-S,200-S12



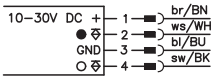
HRTR 3B/66-S
HRTR 3B/66-S, 5000



HRTR 3B/6-S-S8.3
HRTR 3B/6-S,200-S8.3



HRTR 3B/44-L-S8
HRTR 3B/44-L,200-S8



DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [1] [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRTR 3B / 4 - XL - S8 50107299	5 60 5 100	1000 Hz	Red light	1 x PNP/DC	Light
HRTR 3B / 44 - XL - S8 50107250	5 60 5 100	1000 Hz	Red light	2 x PNP/DC	Light/dark antivalent
HRTR 3B / 44 - XL, 200 - S12 50107251	5 60 5 100	1000 Hz	Red light	2 x PNP/DC	Light/dark antivalent
HRTR 3B / 6 - XL - S8.3 50109485	5 60 5 100	1000 Hz	Red light	1 x Push-pull/DC	Light
HRTR 3B / 6D - XL - S8.3 50111444	5 60 5 100	1000 Hz	Red light	1 x Push-pull/DC	Dark
HRTR 3B / 66 - XL - S8 50107247	5 60 5 100	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 3B / 66 - XL 50107246	5 60 5 100	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 3B / 66 - XL, 200 - S8 50107248	5 60 5 100	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 3B / 66 - XL, 200 - S12 50107249	5 60 5 100	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

1) Typical scanning range with a black/white error < 10 %

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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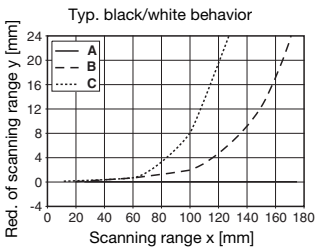
Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % B gray 18 % C black 6 %
M8 connector	1, 2, 3, 4	c, d	
M8 connector	1, 3, 4	c, d	
Cable, 0.2 m, with M12 connector	1, 3, 4	e, f	
M8 connector	1, 3, 4	a, b	
M8 connector	1, 3, 4	a, b	
M8 connector	1, 3, 4	c, d	
Cable, 2 m	1, 3, 4		
Cable, 0.2 m, with M8 connector	1, 3, 4	c, d	
Cable, 0.2 m, with M12 connector	1, 3, 4	e, f	



Optical Sensor ABC

- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
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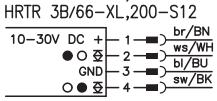
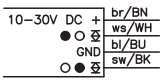
Electrical connection

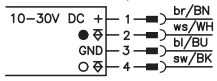
HRTR 3B/66-XL-S8
HRTR 3B/66-XL,200-S8
HRTR 3B/66-XL,200-S12



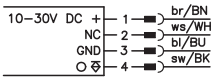
HRTR 3B/66-XL



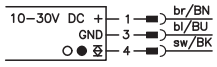
HRTR 3B/44-XL-S8
HRTR 3B/44-XL,200-S12



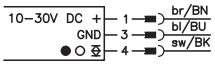
HRTR 3B/4-XL-S8



HRTR 3B/6-XL-S8.3



HRTR 3B/6D-XL-S8.3



Options

1 Scanning range adjustment via multiturn potentiometer

2 Direct connection to AS-interface I/O coupling modules

3 Broad rectangular light spot 3 x 40 mm² (at a distance of 50 mm) guarantees the reliable detection of objects with openings, grid structures, holes, grooves and of objects with changeable position as well as transparent foils/bottles

4 UL approval (class 2 acc. to NEC)

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [1] [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRTR 3B / 66 - V - S8 50114769	15 200 15 200	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 3B / 66 - V 50114766	15 200 15 200	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 3B / 66 - V, 200 - S8 50114767	15 200 15 200	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 3B / 66 - V, 200 - S12 50114768	15 200 15 200	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104524	K - D M8W - 4P - 2m - PVC	Connection cable 2000 mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000 mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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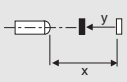
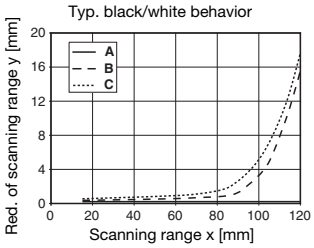
Connection	Option	Accessories		Typ. b/w behavior
				A white 90 % B gray 18 % C black 6 % 
M8 connector	1, 2, 3	a, b, c, d		
Cable, 2 m	1, 2, 3			
Cable, 0.2 m, with M8 connector	1, 2, 3	a, b, c, d		
Cable, 0.2 m, with M12 connector	1, 2, 3	e, f		

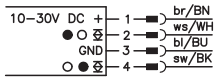
1) Typical scanning range with a black/white error < 10 %

Optical Sensor ABC

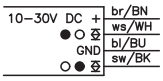
- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

HRTR 3B/66-V-S8
HRTR 3B/66-V,200-S8
HRTR 3B/66-V,200-S12



HRTR 3B/66-V



Options

1 Scanning range adjustment via multiturn potentiometer

2 V-optics for detection of very shiny, polished surfaces and transparent objects in a range of 30 … 70

3 UL approval (class 2 acc. to NEC)

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [1] [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching	
Diffuse reflection scanners with background suppression						
HRT 3B / 44 50110659	5 250 5 600	1000 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent	

1) Typical scanning range with a black/white error < 10 %

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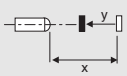
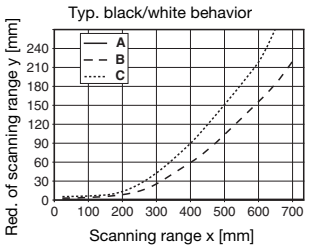
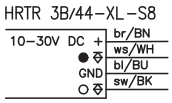
	Connection	Option	Accessories		Typ. b/w behavior
					A white 90 % **B** gray 18 % **C** black 6 % 
	Cable, 2 m	1, 2			

Optical Sensor ABC

- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1 Scanning range adjustment via multiturn potentiometer

2 UL approval (class 2 acc. to NEC)

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [1] [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection laser scanners with background suppression					
HRTL 3B / 66 - C2 - S8 50114582	15 250 5 500	2000 Hz	Red light laser class 2	2 x Push-pull/DC	Light/dark antivalent
HRTL 3B / 66 - C2 50114763	15 250 5 500	2000 Hz	Red light laser class 2	2 x Push-pull/DC	Light/dark antivalent
HRTL 3B / 66 - C2, 200 - S8 50114764	15 250 5 500	2000 Hz	Red light laser class 2	2 x Push-pull/DC	Light/dark antivalent
HRTL 3B / 66 - C2, 200 - S12 50114765	15 250 5 500	2000 Hz	Red light laser class 2	2 x Push-pull/DC	Light/dark antivalent
HRTL 3B / 66 - S8 50114581	15 170 10 400	2000 Hz	Red light laser class 1	2 x Push-pull/DC	Light/dark antivalent
HRTL 3B / 66 50114760	15 170 10 400	2000 Hz	Red light laser class 1	2 x Push-pull/DC	Light/dark antivalent
HRTL 3B / 66, 200 - S8 50114761	15 170 10 400	2000 Hz	Red light laser class 1	2 x Push-pull/DC	Light/dark antivalent
HRTL 3B / 66, 200 - S12 50114762	15 170 10 400	2000 Hz	Red light laser class 1	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000 mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000 mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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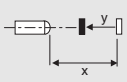
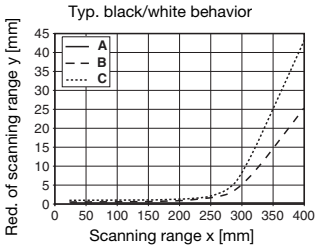
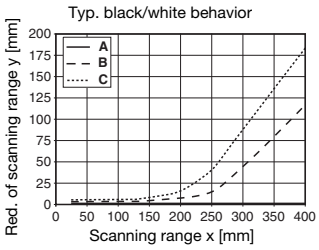
Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % B gray 18 % C black 6 % 
M8 connector	1, 2, 3	a, b, c, d	
Cable, 2 m	1, 2, 3		
Cable, 0.2 m, with M8 connector	1, 2, 3	a, b, c, d	
Cable, 0.2 m, with M12 connector	1, 2, 3	e, f	
M8 connector	1, 2, 3	a, b, c, d	
Cable, 2 m	1, 2, 3		
Cable, 0.2 m, with M8 connector	1, 2, 3	a, b, c, d	
Cable, 0.2 m, with M12 connector	1, 2, 3	e, f	

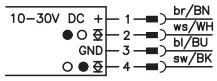
1) Typical scanning range with a black/white error < 10 %

Optical Sensor ABC

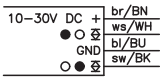
- Diffuse reflection scanners with background suppr. Page 594
- Connection types/Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection

HRTL 3B/66...-S8
HRTL 3B/66...,200-S8
HRTL 3B/66...,200-S12



HRTR 3B/66...



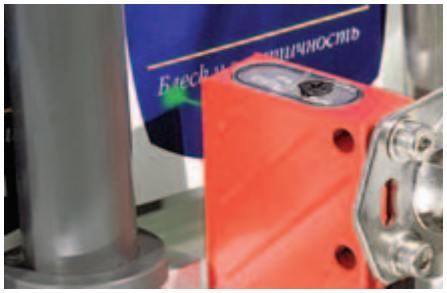
Options

1 Scanning range adjustment via multiturn potentiometer

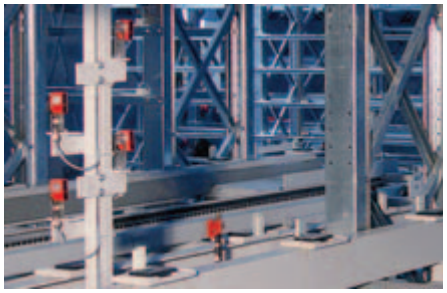
2 Collimated light beam propagation with small beam diameter of 1 mm

3 UL approval (class 2 acc. to NEC)

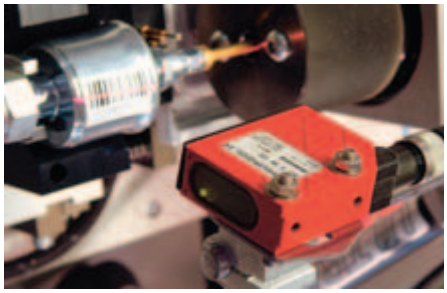
OVERVIEW



Mark detection

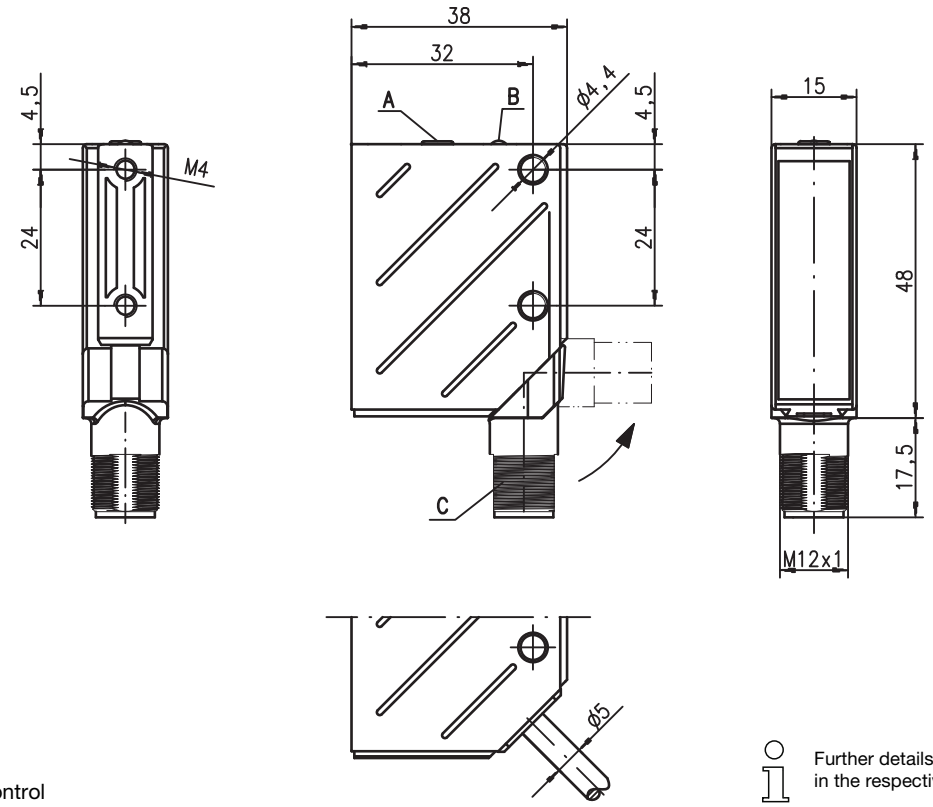


Extension control



Bar code reading

Dimensioned drawing



A Operational control
B Indicator diode
C 90° turning connector

Further details can be found in the respective data sheet.

2	3B	8	18	25B	46B	53	55	95	96	318	412	618
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8 SERIES

Operating principle	Typ. operating range limits	Page
Throughbeam sensors	0 … 100 m	66
Retro-reflective sensors	0 … 20 m	68
Diffuse reflection scanners	5 … 800 mm	72

Other 8 Series products:

Optical distance sensors	ODSL 8	246
Ultrasonic sensors	LSU 8, RKU 8, HRTU 8	312

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple	≤ 15 % of U_B
	Open-circuit current	≤ 35 mA
	Signal voltage high/low	≥ (U_B-2 V)/≤ 2 V
Indicators	Yellow LED	Switching output
	Flashing yellow LED	No performance reserve
Mechanical data	Housing	Metal
	Optics cover	Glass
	Weight (connector/cable)	70 g/140 g
Environmental data	Ambient temperature (operation)	-40 °C … +60 °C Laser: -10 °C … +40 °C
	VDE safety class	II, all-insulated
	Protection class	IP 67, IP 69K
	Standards applied	IEC 60947-5-2, UL 508

Mounting systems for this series can be found from **page 536** onwards

Features

- **Metal housing**
- **IP 67 and IP 69K**
- **Active ambient light suppression A²LS**
- **Interference-immune push-pull outputs**
- **Laser devices**
- **Expanded temperature range: -40 °C to +60 °C**
- **M12 turning connector**

Optical Sensor ABC

- Throughbeam sensors Page 593
- Retro-reflective sensors Page 593
- Diffuse reflection scanners Page 594
- A²LS Page 601

THROUGHBEAM SENSORS

Part description Part No.:		Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Throughbeam sensors		▶ = Transmitter ◀ = Receiver				
▶ LSSR 8 - S12 **◀ LSER 8 / 44 - S12**	50036354 50036356	0 12 0 20	1500 Hz	Red light	2 x PNP/DC	Light/dark antivalent
▶ LSSR 8 **◀ LSER 8 / 44**	50036355 50036357	0 12 0 20	1500 Hz	Red light	2 x PNP/DC	Light/dark antivalent
▶ LSSR 8 - S12 **◀ LSER 8 / 66 - S12**	50036354 50036569	0 12 0 20	1500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
▶ LSSR 8 **◀ LSER 8 / 66**	50036355 50036570	0 12 0 20	1500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
Throughbeam laser sensors						
▶ LSSRL 8.9 - S12 **◀ LSERL 8 / 24.01 - S12**	50036358 50036359	0 60 0 100	2800 Hz	Laser class 2	PNP/DC NPN/DC	Light
▶ LSSRL 8.9 **◀ LSERL 8 / 24.01**	50037083 50037084	0 60 0 100	2800 Hz	Laser class 2	PNP/DC NPN/DC	Light

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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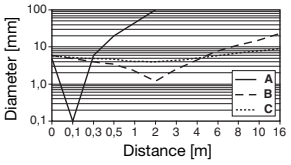
	Connection	Option	Accessories		Typ. light spot
	M12 connector	3	a, b, c, d, e, f		
	Cable, 2 m	3			
	M12 connector	3	a, b, c, d, e, f		
	Cable, 2 m	3			
	M12 connector	1, 2, 3	a, b, c, d, e, f		
	Cable, 2 m	1, 2, 3			

A Focus at 0.125 m
B Focus at 2 m
C Focus at 16 m

Typ. light spot



Options

1 Adjustable focus

2 Sensitivity adjustment via potentiometer

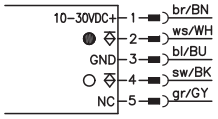
3 UL approval

Optical Sensor ABC

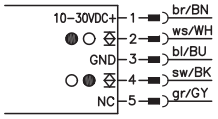
- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection

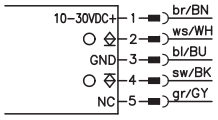
LSER 8/44
LSER 8/44–S12



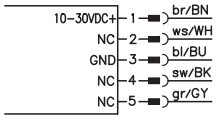
LSER 8/66
LSER 8/66–S12



LSERL 8/24.01
LSERL 8/24.01–S12



LSSR 8
LSSR 8–S12
LSSRL 8.9
LSSRL 8.9–S12



RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors with polarization filter					
PRK 8 / 44 - S12 50036360	0.1 6.4 0.05 8	1500 Hz	Red light	2 x PNP/DC	Light/dark antivalent
PRK 8 / 44 50036361	0.1 6.4 0.05 8	1500 Hz	Red light	2 x PNP/DC	Light/dark antivalent
PRK 8 / 66 - S12 50036362	0.1 6.4 0.05 8	1500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 8 / 66 50036363	0.1 6.4 0.05 8	1500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 8 / 66.11 - S12 50037133	0 5 0 7	1500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 8 / 66.41 - S12 50037134	0 2 0 2.4	1500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 8 / 66.42 - S12 50037135	0 2 0 2.4	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 582

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
f	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC

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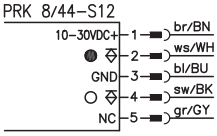
	Connection	Option	Accessories		Typ. light spot
	M12 connector	6	a, b, c, d		
	Cable, 2 m	6			
	M12 connector	6	a, b, c, d		
	Cable, 2 m	6			
	M12 connector	1, 3, 6	a, b, c, d		
	M12 connector	1, 3, 4, 6	e, f		
	M12 connector	2, 3, 4, 5, 6	e, f		

Optical Sensor ABC

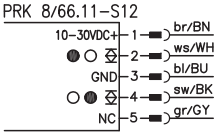
- Retro-reflective sensors with polarization filter Page 593
- Connection types/Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection

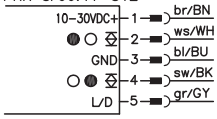
PRK 8/44
PRK 8/44-S12



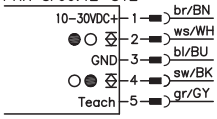
PRK 8/66
PRK 8/66-S12
PRK 8/66.11-S12



PRK 8/66.41-S12



PRK 8/66.42-S12



Options

1	Sensitivity adjustment via potentiometer
2	Sensitivity adjustment via teach-in
3	Autocollimation principle
4	Transparent media (foil < 20 µm and bottles)
5	Tracking function
6	UL approval

RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective laser sensors with polarization filter					
PRKL 8 / 24.91 - S12 50036364	0 – 19 0 – 22	2800 Hz	Red light laser class 2	PNP/DC NPN/DC	Light Dark
PRKL 8 / 24.91 50036365	0 – 19 0 – 22	2800 Hz	Red light laser class 2	PNP/DC NPN/DC	Light Dark
PRKL 8 / 24.99 - S12 50115689	0 – 12 0 – 14	2800 Hz	Red light laser class 1	PNP/DC NPN/DC	Light Dark

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 582

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000 mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000 mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC
e	50104560	K - D M12W - 5P - 10m - PVC	Connection cable 10000 mm, M12 angular, 5-pin, PVC
f	50104559	K - D M12A - 5P - 10m - PVC	Connection cable 10000 mm, M12 axial, 5-pin, PVC

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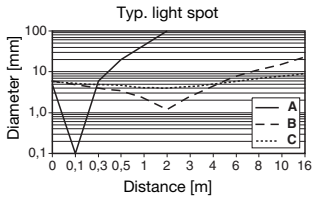
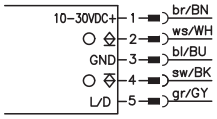
	Connection	Option	Accessories		Typ. light spot
					A Focus at 0.144m **B** Focus at 2m **C** Focus at 16m
	M12 connector	1, 2, 3, 4	a, b, c, d, e, f		
	Cable, 2m	1, 2, 3, 4			
	M12 connector	1, 2, 3, 4	a, b, c, d, e, f		

Optical Sensor ABC

- Retro-reflective sensors with polarization filter Page 593
- Connection types/Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection

PRKL 8/24.91
PRKL 8/24.91–S12
PRKL 8/24.99–S12



Options

1 Sensitivity adjustment via potentiometer

2 Autocollimation principle

3 Adjustable focus

4 UL approval

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Energetic diffuse reflection scanners					
RTR 8 / 44 - 800 - S12 50036366	10 600 5 800	1500 Hz	Red light	2 x PNP/DC	Light/dark antivalent
RTR 8 / 44 - 800 50036367	10 600 5 800	1500 Hz	Red light	2 x PNP/DC	Light/dark antivalent
RTR 8 / 66 - 800 - S12 50036368	10 600 5 800	1500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
RTR 8 / 66 - 800 50036369	10 600 5 800	1500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
Diffuse reflection scanners with foreground suppression					
VRTR 8 / 44 - 250 - S12 50036372	0 250 0 250	1000 Hz	Red light	2 x PNP/DC	Light/dark antivalent
VRTR 8 / 66 - 250 - S12 50036374	0 250 0 250	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
VRTR 8 / 66 - 250 50036375	0 250 0 250	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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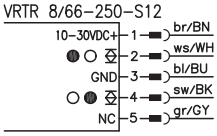
	Connection	Option	Accessories		Typ. b/w behavior
	M12 connector	1, 3	a, b, c, d, e, f		
	Cable, 2 m	1, 3			
	M12 connector	1, 3	a, b, c, d, e, f		
	Cable, 2 m	1, 3			
	M12 connector	2, 3	a, b, c, d, e, f		
	M12 connector	2, 3	a, b, c, d, e, f		
	Cable, 2 m	2, 3			

Optical Sensor ABC

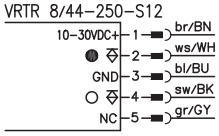
- Diffuse reflection scanners Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

RTR 8/66-800
RTR 8/66-800-S12
VRTR 8/66-250
VRTR 8/66-250-S12



RTR 8/44-800
RTR 8/44-800-S12
VRTR 8/44-250-S12



Options

1 Scanning range adjustment via potentiometer

2 Scanning range adjustment via multiturn potentiometer

3 UL approval

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRTR 8 / 44 - 350 - S12 50036350	7 350 5 400	1000 Hz	Red light	2 x PNP/DC	Light/dark antivalent
HRTR 8 / 44 - 350 50036351	7 350 5 400	1000 Hz	Red light	2 x PNP/DC	Light/dark antivalent
HRTR 8 / 66 - 350 - S12 50036352	7 350 5 400	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 8 / 66 - 350 50036353	7 350 5 400	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 8 / 66 - 350, 5000 50108224	7 350 5 400	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRT 8 / 66.6 - 350 - S12 50039650	7 350 5 400	1000 Hz	Infrared light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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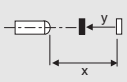
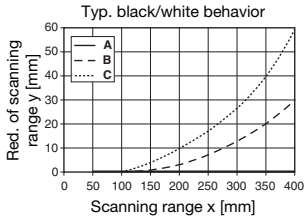
8 SERIES

Diffuse reflection scanners

Connection	Option	Accessories		Typ. b/w behavior
				A white 90 % B gray 18 % C black 6 % 
M12 connector	1, 2	a, b, c, d, e, f		
Cable, 2 m	1, 2			
M12 connector	1, 2	a, b, c, d, e, f		
Cable, 2 m	1, 2			
Cable, 5 m	1, 2			
M12 connector	1, 2	a, b, c, d, e, f		

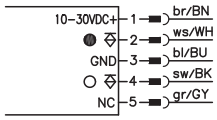


Optical Sensor ABC

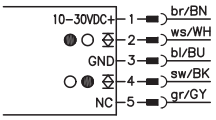
- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

HRTR 8/44–350
HRTR 8/44–350–S12



HRTR 8/66–350
HRTR 8/66–350,5000
HRTR 8/66–350–S12
HRT 8/66.6–350–S12



Options

1 Scanning range adjustment via multiturn potentiometer

2 UL approval

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source Light spot [1]	Output	Switching
Diffuse reflection laser scanners with background suppression					
HRTL 8 / 24 - 350 - S12 50036370	7 350 5 400	2000 Hz	Red light laser class 2 Ø 1.0 mm	PNP/DC NPN/DC	Light
HRTL 8 / 24 - 350 50036371	7 350 5 400	2000 Hz	Red light laser class 2 Ø 1.0 mm	PNP/DC NPN/DC	Light
HRTL 8 / 66 - 350 - S12 50102705	7 350 5 400	2000 Hz	Red light laser class 2 Ø 1.0 mm	2 x Push-pull/DC	Light/dark antivalent
HRTL 8 / 66 - 350, 5000 50103709	7 350 5 400	2000 Hz	Red light laser class 2 Ø 1.0 mm	2 x Push-pull/DC	Light/dark antivalent
HRTL 8 / 24 - 150 - S12 50038482	10 150 10 250	2000 Hz	Red light laser class 2 Ø 0.75 mm	PNP/DC NPN/DC	Light
HRTL 8 / 24 - 150 50038483	10 150 10 250	2000 Hz	Red light laser class 2 Ø 0.75 mm	PNP/DC NPN/DC	Light
HRTL 8 / 66 - 150 - S12 50102704	10 150 10 250	2000 Hz	Red light laser class 2 Ø 0.75 mm	2 x Push-pull/DC	Light/dark antivalent
HRTL 8 / 66.09 - 150 - S12 50115688	25 150 25 250	2000 Hz	Red light laser class 1 Ø 0.75 mm	2 x Push-pull/DC	Light/dark antivalent

1) At the specified scanning range

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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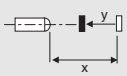
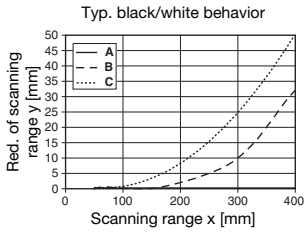
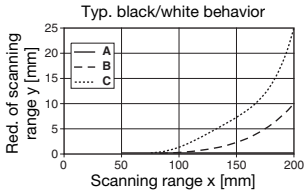
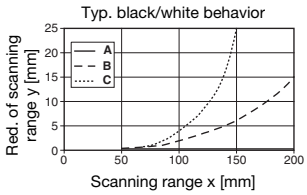
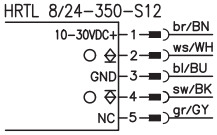
Connection	Option	Accessories		Typ. b/w behavior
				A white 90 % **B** gray 18 % **C** black 6 % 
M12 connector	1, 2	a, b, c, d, e, f		
Cable, 2 m	1, 2			
M12 connector	1, 2	a, b, c, d, e, f		
Cable, 5 m	1, 2			
M12 connector	1, 2	a, b, c, d, e, f		
Cable, 2 m	1, 2			
M12 connector	1, 2	a, b, c, d, e, f		
M12 connector	1, 2	a, b, c, d, e, f		

Optical Sensor ABC

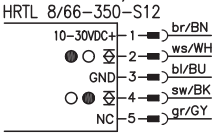
- Diffuse reflection scanners with background suppr. Page 594
- Connection types/Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection

HRTL 8/24–150
HRTL 8/24–150–S12
HRTL 8/24–350
HRTL 8/24–350–S12



HRTL 8/66–150–S12
HRTL 8/66.09–150–S12
HRTL 8/66–350, 5000
HRTL 8/66–350–S12

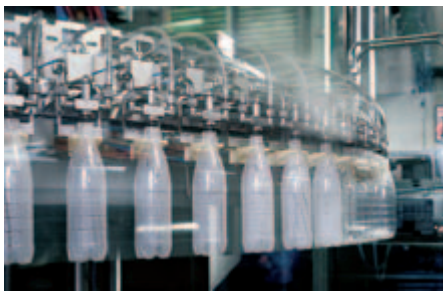


Options

1 Scanning range adjustment via multiturn potentiometer

2 UL approval

OVERVIEW

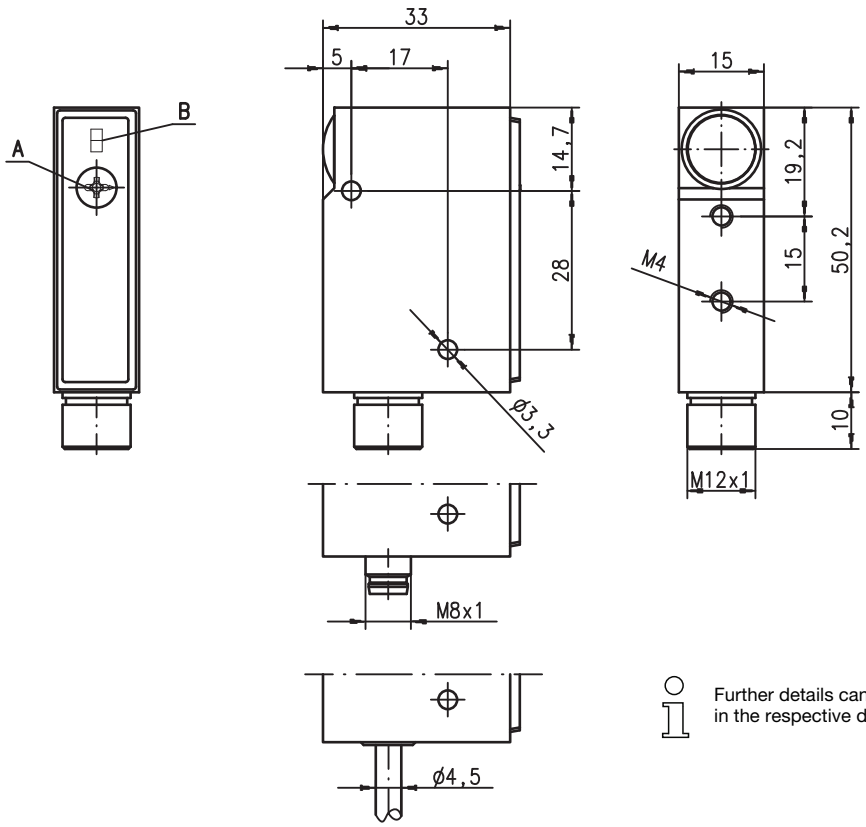


Bottle cleaning

Suspended bottle transport

Bottle inspection

Dimensioned drawing



Further details can be found in the respective data sheet.

A Sensitivity adjustment
B Indicator diode

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18 SERIES

Operating principle	Typ. operating range limits	Page
Retro-reflective sensors	0 … 5 m	80

Other 18 Series products:

Ultrasonic sensors	LSU 18	316
AS-interface sensors	IPRK 18	532

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple	≤ 15 % of U_B
	Open-circuit current	≤ 35 mA
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Yellow LED	Switching output
Mechanical data	Housing	Diecast zinc
	Optics cover	Glass
	Weight (connector/cable)	90 g/150 g
Environmental data	Ambient temperature (operation)	-25 °C … +55 °C
	VDE safety class	III
	Protection class	IP 67, IP 69K
	Standards applied	IEC 60947-5-2, UL 508

Mounting systems for this series can be found from **page 540** onwards

Features

- **Stainless steel and metal housing**
- **Glass optics**
- **IP 67 and IP 69K**
- **Detection of PET, foil, and glass**

Optical Sensor ABC

- Retro-reflective sensors Page 593
- Retro-reflective sensor with polarization filter Page 593
- A²LS Page 601

RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors					
RKR 18 / 2 DL.2 50115268	0 – 6 0 – 7	1500 Hz	Red light	NPN/DC	Light/dark reversible
RKR 18 / 4 L 50102731	0 – 4 0 – 5	1000 Hz	Red light	PNP/DC	Light/dark reversible
RKR 18 / 4, 6000 50102730	0 – 4 0 – 5	1000 Hz	Red light	PNP/DC	Light/dark reversible
RK 18 / 4 DL.45 50081364	0 – 2.4 0 – 3	1500 Hz	Red light	PNP/DC	Light/dark reversible

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 583

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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18 SERIES

Retro-reflective sensors

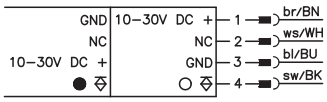
	Connection	Option	Accessories		Typ. light spot
	M12 connector	1, 3, 4, 5	a, b, c, d, e, f		
	M12 connector	4, 6	a, b, c, d, e, f		
	Cable, 6 m	4, 6			
	M12 connector	1, 2, 3, 4, 6	a, b, c, d, e, f		

Optical Sensor ABC

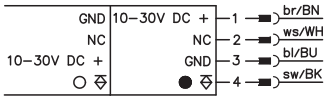
- Retro-reflective sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

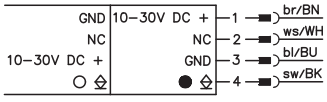
RKR 18/4, 6000
RKR 18/4 L



RK 18/4 DL.45



RKR 18/2 DL.2



Options

1	Sensitivity adjustment via multiturn potentiometer
2	Transparent media (foil < 20 µm and bottles)
3	Green LED for precise adjustment of the operating point
4	Autocollimation principle
5	Target mark detection (e. g. reflective tapes)
6	UL approval

RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors with polarization filter					
PRK 18 / 4 L 50081254	0 – 4 [1] 0 – 5 [1]	1000 Hz	Red light	PNP/DC	Light/dark reversible
PRK 18 / 4, 6000 50033244	0 – 4 [1] 0 – 5 [1]	1000 Hz	Red light	PNP/DC	Light/dark reversible
PRK 18 / 44 L.43 50115193	0 – 3 [1] 0 – 4 [1]	1000 Hz	Red light	2 x PNP/DC	Light/dark antivalent
IPRK 18 / 4 DL.41 50033552	0 – 3 [1] 0 – 4 [1]	1000 Hz	Red light	PNP/DC	Light/dark reversible
PRK 18 / 24 DL.42 50033554	0 – 3 [1] 0 – 4 [1]	1000 Hz	Red light	PNP/DC NPN/DC	Dark
PRK 18 / 24 DL.46 50032798	0 – 3 [1] 0 – 4 [1]	1000 Hz	Red light	PNP/DC NPN/DC	Light/dark reversible

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 583

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
f	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC

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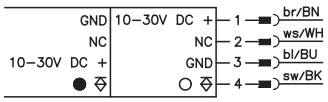
	Connection	Option	Accessories		Typ. light spot
	M12 connector	4, 9	a, b, c, d		
	Cable, 6 m	4, 9			
	M12 connector	2, 3, 5, 6, 7	e, f		
	M12 connector	2, 3, 5, 7, 8, 9	e, f		
	M12 connector	2, 3, 5, 6, 7, 9	e, f		
	M12 connector	2, 3, 5, 7, 9	e, f		

Optical Sensor ABC

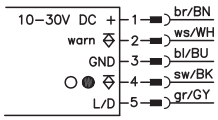
- Retro-reflective sensors with polarization filter — Page 593
- Connection types — Page 598
- Outputs — Page 598

Electrical connection

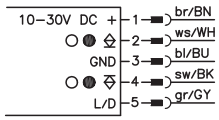
PRK 18/4, 6000
PRK 18/4 L



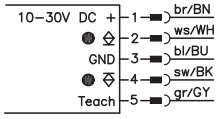
IPRK 18/4 DL.41



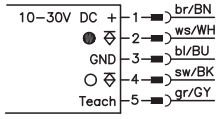
PRK 18/24 DL.46



PRK 18/24 DL.42



PRK 18/44 L.43



Options

1 Extensive configuration of input and outputs via IO-Link
2 Transparent media (foil < 20 µm and bottles)
3 LEDs for the operating mode/setting the operating point
4 Autocollimation principle
5 Teach-in via step switch
6 Teach-in via control cable
7 Dirt/cleaning compensation (step/peak tracking)
8 Warning output
9 UL approval

RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors with polarization filter					
PRK 18 / 4 L.4 50104415	0 2.4 [1] 0 3 [1]	1500 Hz	Red light	PNP/DC	Light/dark reversible
PRK 18 / 4 DL.4 50080153	0 2.4 [1] 0 3 [1]	1500 Hz	Red light	PNP/DC	Dark/light reversible
PRK 18 / 2 DL.4 50081153	0 2.4 [1] 0 3 [1]	1500 Hz	Red light	NPN/DC	Dark/light reversible
IPRK 18 / V L.03 50106974	0 1 [2] 0 1.2 [2]	–	Red light	Analog/mA, 1 x PNP/DC	–

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 583
2) The specified values apply in combination with reflectors MTKS 50 x 50, additional reflectors with range specifications can be found on page 583

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
f	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC

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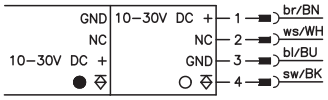
	Connection	Option	Accessories		Typ. light spot
	M12 connector	1, 2, 3, 4, 7	a, b, c, d		
	M12 connector	1, 2, 3, 4, 7	a, b, c, d		
	M12 connector	1, 2, 3, 4, 7	a, b, c, d		
	M12 connector	3, 5, 6, 7	e, f		

Optical Sensor ABC

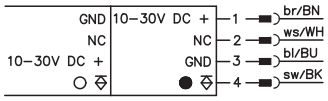
- Retro-reflective sensors with polarization filter — Page 593
- Connection types — Page 598
- Outputs — Page 598

Electrical connection

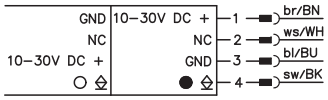
PRK 18/4 L.4



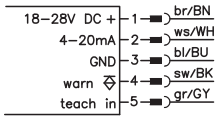
PRK 18/4 DL.4



PRK 18/2 DL.4



IPRK 18/V L.03



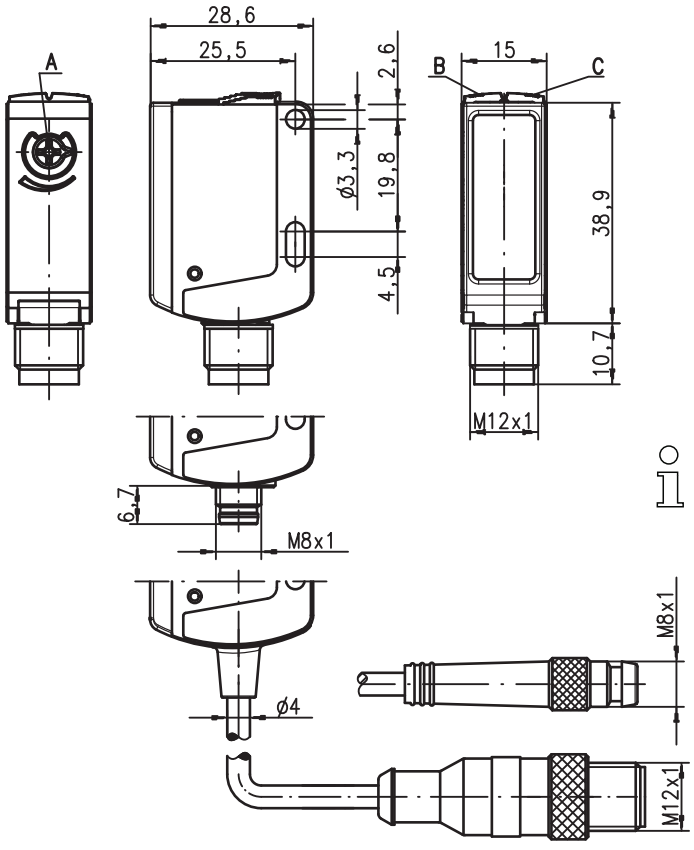
Options

1	Sensitivity adjustment via multiturn potentiometer
2	Transparent media (foil < 20µm and bottles)
3	LEDs for the operating mode/setting the operating point
4	Autocollimation principle
5	Teach-in via control cable
6	Warning output
7	UL approval

OVERVIEW

Object detection in distribution systems

Dimensioned drawing



Further details can be found in the respective data sheet.

A Operational control
B Green indicator diode
C Yellow indicator diode

2	3B	8	18	25B	46B	53	55	95	96	318	412	618
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25B SERIES

Operating principle	Typ. operating range limits	Page
Throughbeam sensors	0 … 24 m	88
Retro-reflective sensors	0 … 15 m	90
Diffuse reflection scanners	0 … 1000 mm	98

Other 25B Series products:

Protective sensors	SLSR 25B	510

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple	≤ 15 % of U_B
	Open-circuit current	≤ 35 mA
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Yellow LED	Switching output
	Flashing yellow LED	No performance reserve
Mechanical data	Housing	Plastic
	Optics cover	Plastic
	Weight (connector/cable)	15 g/55 g
Environmental data	Ambient temperature (operation)	-30 °C … +60 °C
	VDE safety class	II, all-insulated
	Protection class	IP 67, IP 66
	Standards applied	IEC 60947-5-2, UL 508

Mounting systems for this series can be found from **page 541** onwards

Features

- **IP 67 and IP 66**
- **Active ambient light suppression A²LS**

New retro-reflective sensor PRK 25B:

- **Highest performance reserve**
- **Reliable function with shrink-wrapped objects or containers**
- **Very bright light spot, indicator diodes visible from all sides**

Optical Sensor ABC

- Throughbeam sensors Page 593
- Retro-reflective sensors Page 593
- Diffuse reflection scanners Page 594
- A²LS Page 601

THROUGHBEAM SENSORS

Part description Part No.:		Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Throughbeam sensors		▶ = Transmitter ◀ = Receiver				
▶ **LSSR 25B.8 - S12** ◀ **ILSER 25B / 4 - S12**	50108478 50108487	0 20 0 24	500 Hz	Red light	1 x PNP/DC	Light
▶ **LSSR 25B - S12** ◀ **ILSER 25B / 4 - S12**	50108477 50108487	0 20 0 24	500 Hz	Red light	1 x PNP/DC	Light
▶ **LSSR 25B, 200 - S8.1** ◀ **LSER 25B / 4, 200 - S8.1**	50110872 50110873	0 20 0 24	500 Hz	Red light	1 x PNP/DC	Light
▶ **LSSR 25B, 200 - S12** ◀ **LSER 25B/4, 200 - S12**	50110922 50110923	0 20 0 24	500 Hz	Red light	1 x PNP/DC	Light
▶ **LSSR 25B.8** ◀ **LSER 25B / 66**	50108480 50108486	0 20 0 24	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
▶ **LSSR 25B.8 - S12** ◀ **LSER 25B / 66 - S12**	50108478 50108483	0 20 0 24	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
▶ **LSSR 25B - S12** ◀ **LSER 25B / 66 - S12**	50108477 50108483	0 20 0 24	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
▶ **LSSR 25B.8 - S8** ◀ **LSER 25B / 66 - S8**	50108479 50108485	0 20 0 24	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
▶ **LSSR 25B - S12** ◀ **LSER 25B / 66.1 - S12**	50108477 50108484	0 20 0 24	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
b	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
c	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
d	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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25B SERIES

Throughbeam sensors

	Connection	Option	Accessories		Typ. light spot
	M12 connector	2, 3, 5	c, d, e, f		
	M12 connector	3, 5	c, d, e, f		
	Cable, 0.2m, with M8 connector [1)]	4, 5	a, b		
	Cable, 0.2m, with M12 connector	4, 5	c, d, e, f		
	Cable, 2m	2, 5			
	M12 connector	2, 5	c, d, e, f		
	M12 connector	5	c, d, e, f		
	M8 connector	2, 5	a, b		
	M12 connector	1, 5	c, d, e, f		

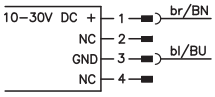
1) Acc. to IEC 61076-2-101, NM construction with snap locking

Optical Sensor ABC

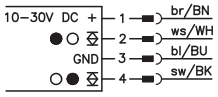
- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

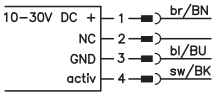
LSSR 25B –S12
LSSR 25B, 200–S8.1
LSSR 25B, 200–S12



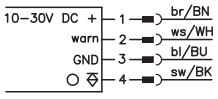
LSER 25B/66–S8
LSER 25B/66–S12
LSER 25B/66.1–S12



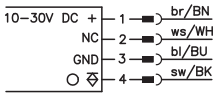
LSSR 25B.8–S8
LSSR 25B.8–S12



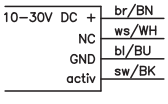
ILSER 25B/4–S12



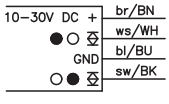
LSER 25B/4, 200–S8.1
LSER 25B/4, 200–S12



LSSR 25B.8



LSER 25B/66



Options

1	Sensitivity adjustment via potentiometer
2	Transmitter with activation input
3	Receiver with warning output
4	Direct connection to AS-interface I/O coupling modules
5	UL approval (class 2 acc. to NEC)

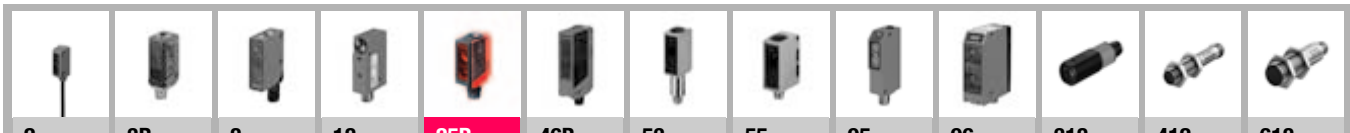
RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors with polarization filter					
PRK 25B / 4.8 - S12 50104227	0.08 8 0.05 10	500 Hz	Red light	PNP/DC	Light
IPRK 25B / 4 - S12 50104228	0.08 8 0.05 10	500 Hz	Red light	PNP/DC	Light
PRK 25B / 4, 200 - S8.1 50113771	0.08 8 0.05 10	500 Hz	Red light	PNP/DC	Light
IPRK 25B / 4, 200 - S12 50104229	0.08 8 0.05 10	500 Hz	Red light	PNP/DC	Light
PRK 25B / 44 - S12 50109432	0.08 8 0.05 10	500 Hz	Red light	2 x PNP/DC	Light/dark antivalent
PRK 25B / 66 - S8 50104224	0.08 8 0.05 10	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 25B / 66 - S12 50104223	0.08 8 0.05 10	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 25B / 66.1 - S12 50104230	0.08 8 0.05 10	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 25B / 66 50104225	0.08 8 0.05 10	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 25B / 66, 100 - S8 50105739	0.08 8 0.05 10	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 25B / 66, 200 - S12 50104226	0.08 8 0.05 10	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
b	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC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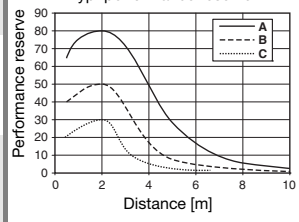
	Connection	Option	Accessories		Typ. performance reserve
	M12 connector	2, 5	c, d		
	M12 connector	3, 5	c, d		
	Cable, 0.2 m, with M8 connector 2)	3, 4, 5	a, b		
	Cable, 0.2 m, with M12 connector	3, 5	c, d		
	M12 connector	5	c, d		
	M8 connector	5	a, b		
	M12 connector	5	c, d		
	M12 connector	1, 5	c, d		
	Cable, 2 m	5			
	Cable, 0.1 m, with M8 connector	5	a, b		
	Cable, 0.2 m, with M12 connector	5	c, d		

Typ. performance reserve



A TK(S) 100x100
B TK(S) 40x60
C TK(S) 20x40

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 583

2) Acc. to IEC 61076-2-101, NM construction with snap locking

Options

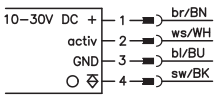
1	Sensitivity adjustment via potentiometer
2	Activation input
3	Warning output
4	Direct connection to AS-interface I/O coupling modules
5	UL approval (class 2 acc. to NEC)

Optical Sensor ABC

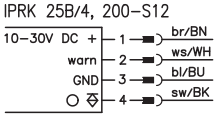
- Retro-reflective sensors with polarization filter — Page 593
- Connection types — Page 598
- Outputs — Page 598

Electrical connection

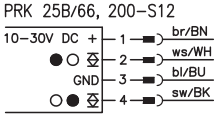
PRK 25B/4.8–S12



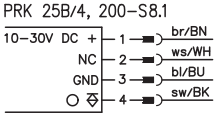
IPRK 25B/4–S12
IPRK 25B/4, 200–S12



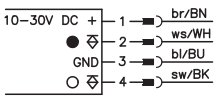
PRK 25B/66–S8
PRK 25B/66–S12
PRK 25B/66.1–S12
PRK 25B/66, 100–S8
PRK 25B/66, 200–S12



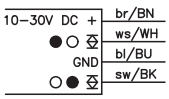
PRK 25B/4, 200–S8.1



PRK 25B/44–S12



PRK 25B/66



RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors with polarization filter					
PRK 25B / 4.38 - S12 50104247	0.12 6 0.07 8	500 Hz	Red light	PNP/DC	Light
IPRK 25B / 4.3 - S12 50104246	0.12 6 0.07 8	500 Hz	Red light	PNP/DC	Light
PRK 25B / 4.3, 200 - S8.1 50110874	0.12 6 0.07 8	500 Hz	Red light	PNP/DC	Light
PRK 25B / 4.3, 200 - S12 50110924	0.12 6 0.07 8	500 Hz	Red light	PNP/DC	Light
IPRK 25B / 4.3, 200 - S12 50108111	0.12 6 0.07 8	500 Hz	Red light	PNP/DC	Light
PRK 25B / 4D.3 - S8 50104241	0.12 6 0.07 8	500 Hz	Red light	PNP/DC	Dark
PRK 25B / 4D.3 - S12 50104242	0.12 6 0.07 8	500 Hz	Red light	PNP/DC	Dark
PRK 25B / 4D.3, 200 - S12 50108549	0.12 6 0.07 8	500 Hz	Red light	PNP/DC	Dark

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 583
2) Acc. to IEC 61076-2-101, NM construction with snap locking

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
b	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
c	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
d	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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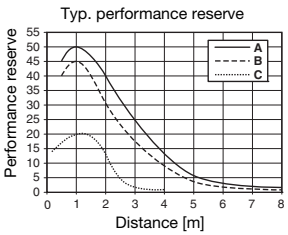
Connection	Option	Accessories	Typ. performance reserve
M12 connector	2, 3, 6	c, d, e, f	
M12 connector	2, 4, 6	c, d, e, f	
Cable, 0.2 m, with M8 connector [2)]	2, 5, 6	a, b	
Cable, 0.2 m, with M12 connector	2, 5, 6	c, d, e, f	
Cable, 0.2 m, with M12 connector	2, 4, 6	c, d, e, f	
M8 connector	2, 5, 6	a, b	
M12 connector	2, 5, 6	c, d, e, f	
Cable, 0.2 m, with M12 connector	2, 5, 6	c, d, e, f	



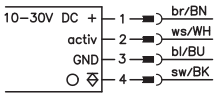
A TK(S) 100x100
B TK(S) 40x60
C TK(S) 20x40

Optical Sensor ABC

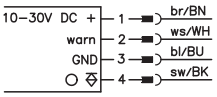
- Retro-reflective sensors with polarization filter Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

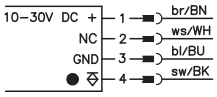
PRK 25B/4.38–S12



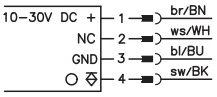
IPRK 25B/4.3–S12
IPRK 25B/4.3, 200–S12



PRK 25B/4D.3–S8
PRK 25B/4D.3–S12
PRK 25B/4D.3, 200–S12



PRK 25B/4.3, 200–S8.1
PRK 25B/4.3, 200–S12



Options

1	Sensitivity adjustment via potentiometer
2	Depolarizing media (e.g. foil packaging)
3	Activation input
4	Warning output
5	Direct connection to AS-interface I/O coupling modules
6	UL approval (class 2 acc. to NEC)

RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors with polarization filter					
PRK 25B / 66.3 - S8 50104237	0.12 6 0.07 8	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 25B / 66.31 - S8 50104244	0.12 6 0.07 8	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 25B / 66.3 - S12 50104236	0.12 6 0.07 8	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 25B / 66.31 - S12 50104243	0.12 6 0.07 8	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 25B / 66.3 50104238	0.12 6 0.07 8	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 25B / 66.31 50104245	0.12 6 0.07 8	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 25B / 66.3, 200 - S8 50104239	0.12 6 0.07 8	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 25B / 66.3, 200 - S12 50104240	0.12 6 0.07 8	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 25B / 66.30, 200 - S12 50106203	0.12 6 0.07 8	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 583

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
b	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
c	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
d	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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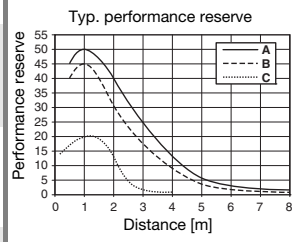
25B SERIES

Retro-reflective sensors

Connection	Option	Accessories		Typ. performance reserve
M8 connector	2, 4	a, b		
M8 connector	1, 2, 4	a, b		
M12 connector	2, 4	c, d, e, f		
M12 connector	1, 2, 4	c, d, e, f		
Cable, 2 m	2, 4			
Cable, 2 m	1, 2, 4			
Cable, 0.2 m, with M8 connector	2, 4	a, b		
Cable, 0.2 m, with M12 connector	2, 4	c, d, e, f		
Cable, 0.2 m, with M12 connector	2, 3, 4	c, d, e, f		



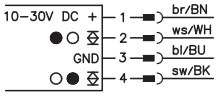
A TK(S) 100x100
B TK(S) 40x60
C TK(S) 20x40

Optical Sensor ABC

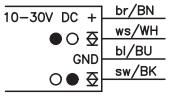
- Retro-reflective sensors with polarization filter Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

PRK 25B/66.3–S8
PRK 25B/66.3–S12
PRK 25B/66.31–S8
PRK 25B/66.31–S12
PRK 25B/66.3, 200–S8
PRK 25B/66.3, 200–S12
PRK 25B/66.30, 200–S12



PRK 25B/66.3
PRK 25B/66.31



Options

1	Sensitivity adjustment via potentiometer
2	Depolarizing media (e.g. foil packaging)
3	Connection plug, yellow, extruded
4	UL approval (class 2 acc. to NEC)

RETRO-REFLECTIVE SENSORS

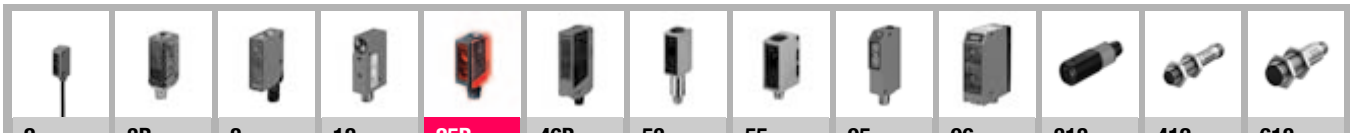
Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective laser sensors with polarization filter					
PRKL 25B / 4D.1 - S12 50104232	0.30 – 12 0.05 – 15	2000 Hz	Red light laser class 2	PNP/DC	Dark
PRKL 25B / 4.1, 200 - S12 50110921	0.30 – 12 0.05 – 15	2000 Hz	Red light laser class 2	PNP/DC	Light
PRKL 25B / 6.81 - S12 50104233	0.30 – 12 0.05 – 15	2000 Hz	Red light laser class 2	Push-pull/DC	PNP/light NPN/dark
PRKL 25B / 66.1 - S8 50104234	0.30 – 12 0.05 – 15	2000 Hz	Red light laser class 2	2 x Push-pull/DC	Light/dark antivalent
PRKL 25B / 66.1 - S12 50104231	0.30 – 12 0.05 – 15	2000 Hz	Red light laser class 2	2 x Push-pull/DC	Light/dark antivalent
PRKL 25B / 66.1 50104235	0.30 – 12 0.05 – 15	2000 Hz	Red light laser class 2	2 x Push-pull/DC	Light/dark antivalent

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 583

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
b	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
c	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
d	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
g	50108005	PRKL 25B - S12	Laser pointer as alignment aid (see electr. connection)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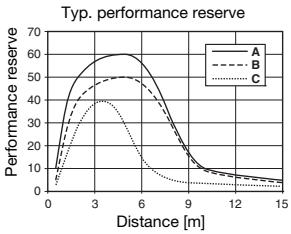
25B SERIES

Retro-reflective sensors

	Connection	Option	Accessories		Typ. performance reserve
	M12 connector	1, 3, 4	c, d, e, f, g		
	Cable, 0.2m, with M12 connector	1, 3, 4	c, d, e, f, g		
	M12 connector	1, 2, 4	c, d, e, f, g		
	M8 connector	1, 4	a, b, g		
	M12 connector	1, 4	c, d, e, f, g		
	Cable, 2m	1, 4	g		



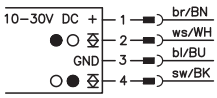
A TK(S) 100x100
B MTKS 50x50
C MTKS 20x20

Optical Sensor ABC

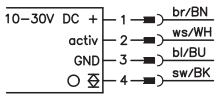
- Retro-reflective sensors with polarization filter Page 593
- Connection types/Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection

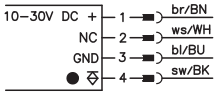
PRKL 25B/66.1–S8
PRKL 25B/66.1–S12



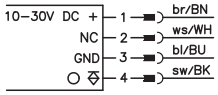
PRKL 25B/6.81–S12



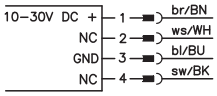
PRKL 25B/4D.1–S12



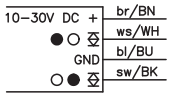
PRKL 25B/4.1, 200–S12



PRKL 25B –S12



PRKL 25B/66.1



Options

1 Sensitivity adjustment via potentiometer

2 Activation input

3 Direct connection to AS-interface I/O coupling modules

4 UL approval (class 2 acc. to NEC)

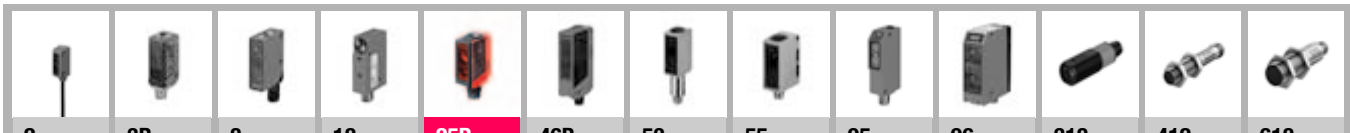
DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Energetic diffuse reflection scanners					
RTR 25B / 66 - S12 50108476	20 500 10 500	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
Diffuse reflection light scanners with fading					
RTFR 25B / 66 - S8 50108474	20 500 10 550	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
RTFR 25B / 66 - S12 50108472	20 500 10 550	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
RTFR 25B / 66 50108475	20 500 10 550	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
RTFR 25B / 66, 200 - S12 50108473	20 500 10 550	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
b	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
c	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
d	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC



2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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25B SERIES

Diffuse reflection scanners

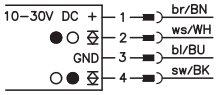
	Connection	Option	Accessories		Typ. b/w behavior
	M12 connector	1, 3	c, d, e, f		
	M8 connector	2, 3	a, b		< 50 %
	M12 connector	2, 3	c, d, e, f		< 50 %
	Cable, 2 m	2, 3			< 50 %
	Cable, 0.2 m, with M12 connector	2, 3	c, d, e, f		< 50 %

Optical Sensor ABC

- Diffuse reflection scanners with fading — Page 594
- Connection types — Page 598
- Outputs — Page 598

Electrical connection

RTR 25B/66 ...
RTFR 25B/66 ...



Options

1 Scanning range adjustment via multiturn potentiometer

2 Scanning range adjustment via potentiometer

3 UL approval (class 2 acc. to NEC)

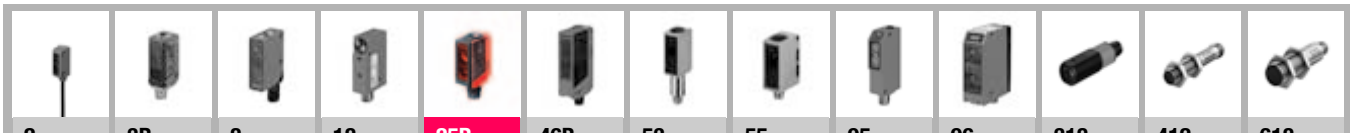
DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRTR 25B / 4D - S12 50115138	0 350 0 1000	250 Hz	Red light	1 x PNP/DC	Dark
HRTR 25B / 4D, 200 - S8 50115136	0 350 0 1000	250 Hz	Red light	1 x PNP/DC	Dark
HRTR 25B / 4D, 200 - S8.1 50115135	0 350 0 1000	250 Hz	Red light	1 x PNP/DC	Dark
HRTR 25B / 4D, 200 - S12 50115137	0 350 0 1000	250 Hz	Red light	1 x PNP/DC	Dark
HRTR 25B / 44 - S8 50115146	0 350 0 1000	250 Hz	Red light	2 x PNP/DC	Light/dark antivalent
HRTR 25B / 44 - S12 50115147	0 350 0 1000	250 Hz	Red light	2 x PNP/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
b	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
c	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
d	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC



2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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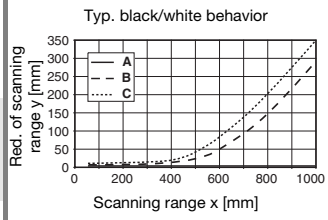
Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % B gray 18 % C black 6 %
M12 connector	1, 2, 3	c, d, e, f	
Cable, 0.2 m, with M8 connector	1, 2, 3	a, b	
Cable, 0.2 m, with M8 connector 1)	1, 2, 3	a, b	
Cable, 0.2 m, with M12 connector	1, 2, 3	c, d, e, f	
M8 connector	1, 3	a, b	
M12 connector	1, 3	c, d, e, f	

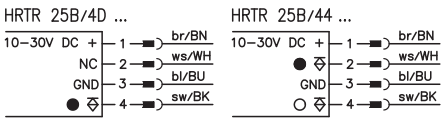


1) Acc. to IEC 61076-2-101, NM construction with snap locking

Optical Sensor ABC

- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1 Scanning range adjustment via multiturn potentiometer

2 Direct connection to AS-interface I/O coupling modules

3 UL approval

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRTR 25B / 6 - S12 50115144	0 350 0 1000	250 Hz	Red light	1 x Push-pull/DC	Light
HRTR 25B / 6.8 - S12 50115141	0 350 0 1000	250 Hz	Red light	1 x Push-pull/DC	Light
HRTR 25B / 6 50115140	0 350 0 1000	250 Hz	Red light	1 x Push-pull/DC	Light
HRTR 25B / 66 - S8 50115153	0 350 0 1000	250 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 25B / 66 - S12 50114491	0 350 0 1000	250 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 25B / 66 50115150	0 350 0 1000	250 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 25B / 66, 200 - S8 50115151	0 350 0 1000	250 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 25B / 66, 200 - S12 50115152	0 350 0 1000	250 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
b	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
c	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
d	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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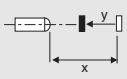
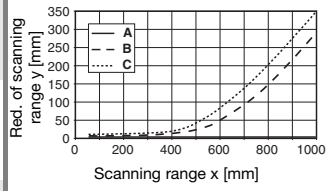
25B SERIES

Diffuse reflection scanners

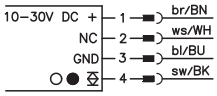
	Connection	Option	Accessories		Typ. b/w behavior
					A white 90 % **B** gray 18 % **C** black 6 % 
	M12 connector	1, 3, 4	c, d, e, f		
	M12 connector	1, 2, 4	c, d, e, f		
	Cable, 2 m	1, 4			
	M8 connector	1, 4	a, b		Typ. black/white behavior 
	M12 connector	1, 4	c, d, e, f		
	Cable, 2 m	1, 4			
	Cable, 0.2 m, with M8 connector	1, 4	a, b		
	Cable, 0.2 m, with M12 connector	1, 4	c, d, e, f		

Optical Sensor ABC

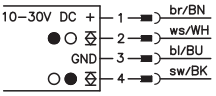
- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

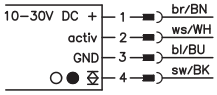
HRTR 25B/6 ...



HRTR 25B/66 ...



HRTR 25B/6.8 ...



Options

1	Scanning range adjustment via multiturn potentiometer
2	Activation input
3	Direct connection to AS-interface I/O coupling modules
4	UL approval

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRTR 25B / 44 - S - S12 50115149	0 300 0 600	1000 Hz	Red light	2 x PNP/DC	Light/dark antivalent
HRTR 25B / 44 - S 50115148	0 300 0 600	1000 Hz	Red light	2 x PNP/DC	Light/dark antivalent
HRTR 25B / 6 - S - S12 50115145	0 300 0 600	1000 Hz	Red light	1 x Push-pull/DC	Light
HRTR 25B / 6.8 - S - S12 50115142	0 300 0 600	1000 Hz	Red light	1 x Push-pull/DC	Light
HRTR 25B / 66 - S - S8 50115156	0 300 0 600	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 25B / 66 - S - S12 50114875	0 300 0 600	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 25B / 66 - S 50115154	0 300 0 600	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 25B / 66 - S, 200 - S12 50115155	0 300 0 600	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
b	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
c	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
d	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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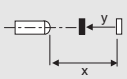
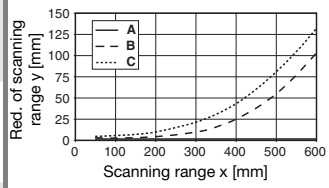
25B SERIES

Diffuse reflection scanners

Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % B gray 18 % C black 6 %
M12 connector	1, 2, 5	c, d, e, f	
Cable, 2 m	1, 2, 5		
M12 connector	1, 2, 4, 5	c, d, e, f	
M12 connector	1, 2, 3, 5	c, d, e, f	
M8 connector	1, 2, 5	a, b	
M12 connector	1, 2, 5	c, d, e, f	
Cable, 2 m	1, 2, 5		
Cable, 0.2 m, with M12 connector	1, 2, 5	c, d, e, f	



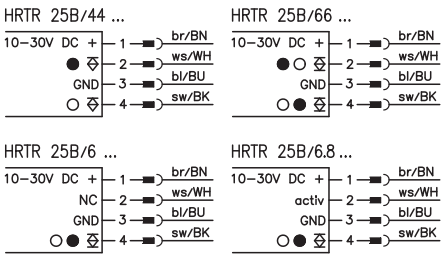
Typ. black/white behavior



Optical Sensor ABC

- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1 Scanning range adjustment via multiturn potentiometer

2 Focussed light spot for the reliable detection of objects with glossy and inconsistently structured surfaces

3 Activation input

4 Direct connection to AS-interface I/O coupling modules

5 UL approval

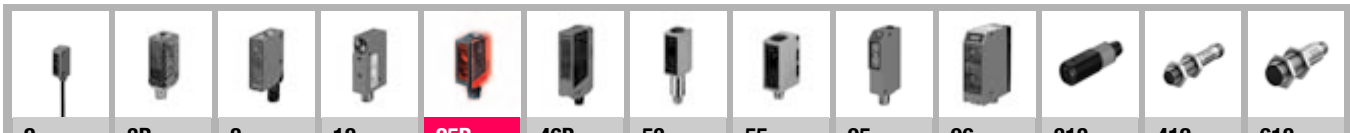
DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRTR 25B / 4D - XL - S12 50115139	0 350 0 600	250 Hz	Red light	1 x PNP/DC	Dark
HRTR 25B / 4D - XL, 200 - S12 50116808	0 350 0 600	250 Hz	Red light	1 x PNP/DC	Dark
HRTR 25B / 6.8 - XL - S12 50115143	0 350 0 600	250 Hz	Red light	1 x Push-pull/DC	Light
HRTR 25B / 66 - XL - S12 50114876	0 350 0 600	250 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 25B / 66 - XL 50116532	0 350 0 600	250 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 25B / 66 - XL, 200 - S8 50115157	0 350 0 600	250 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 25B / 66 - XL, 200 - S12 50115158	0 350 0 600	250 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
b	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
c	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
d	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC


2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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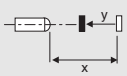
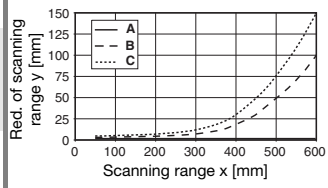
25B SERIES

Diffuse reflection scanners

Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % **B** gray 18 % **C** black 6 % 
M12 connector	1, 2, 4, 5	c, d, e, f	
Cable, 0.2 m, with M12 connector	1, 2, 4, 5	c, d, e, f	
M12 connector	1, 2, 3, 5	c, d, e, f	
M12 connector	1, 2, 5	c, d, e, f	
Cable, 2 m	1, 2, 5		
Cable, 0.2 m, with M8 connector	1, 2, 5	a, b	
Cable, 0.2 m, with M12 connector	1, 2, 5	c, d, e, f	

Typ. black/white behavior

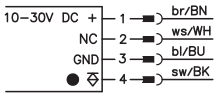


Optical Sensor ABC

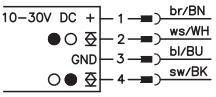
- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

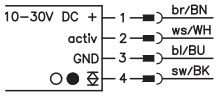
HRTR 25B/4D ...



HRTR 25B/66 ...



HRTR 25B/6.8 ...



Options

1 Scanning range adjustment via multiturn potentiometer

2 Large light spot for exact, reliable edge detection – positioning on glossy, broken (perforated) metallic surfaces e.g. slide bolts

3 Activation input

4 Direct connection to AS-interface I/O coupling modules

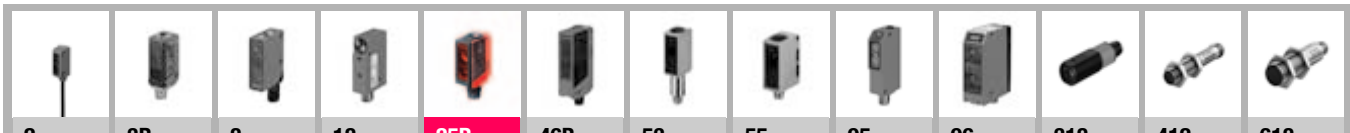
5 UL approval

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRT 25B / 4D - S8 50115121	0 500 0 1000	250 Hz	Infrared light	1 x PNP/DC	Dark
HRT 25B / 4D - S12 50115122	0 500 0 1000	250 Hz	Infrared light	1 x PNP/DC	Dark
HRT 25B / 44 - S8 50115129	0 500 0 1000	250 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
HRT 25B / 44 - S12 50115130	0 500 0 1000	250 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
b	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
c	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
d	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC


2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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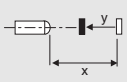
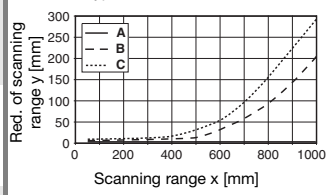
25B SERIES

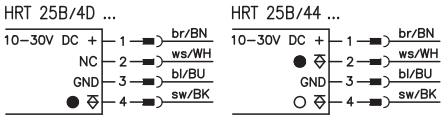
Diffuse reflection scanners

	Connection	Option	Accessories		Typ. b/w behavior
					A white 90 % **B** gray 18 % **C** black 6 % 
	M8 connector	1, 2, 3	a, b		Typ. black/white behavior 
	M12 connector	1, 2, 3	c, d, e, f		
	M8 connector	1, 3	a, b		
	M12 connector	1, 3	c, d, e, f		

Optical Sensor ABC

- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1 Scanning range adjustment via multiturn potentiometer

2 Direct connection to AS-interface I/O coupling modules

3 UL approval

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRT 25B / 6 - S8 50115127	0 500 0 1000	250 Hz	Infrared light	1 x Push-pull/DC	Light
HRT 25B / 6 - S12 50115128	0 500 0 1000	250 Hz	Infrared light	1 x Push-pull/DC	Light
HRT 25B / 6, 200 - S12 50115126	0 500 0 1000	250 Hz	Infrared light	1 x Push-pull/DC	Light
HRT 25B / 6.8 - S12 50115124	0 500 0 1000	250 Hz	Infrared light	1 x Push-pull/DC	Light
HRT 25B / 6.8, 200 - S12 50115123	0 500 0 1000	250 Hz	Infrared light	1 x Push-pull/DC	Light
HRT 25B / 66 - S8 50115134	0 500 0 1000	250 Hz	Infrared light	2 x Push-pull/DC	Light/dark antivalent
HRT 25B / 66 - S12 50114874	0 500 0 1000	250 Hz	Infrared light	2 x Push-pull/DC	Light/dark antivalent
HRT 25B / 66 50115131	0 500 0 1000	250 Hz	Infrared light	2 x Push-pull/DC	Light/dark antivalent
HRT 25B / 66, 200 - S8 50115132	0 500 0 1000	250 Hz	Infrared light	2 x Push-pull/DC	Light/dark antivalent
HRT 25B / 66, 200 - S12 50115133	0 500 0 1000	250 Hz	Infrared light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
b	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
c	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
d	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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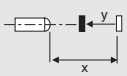
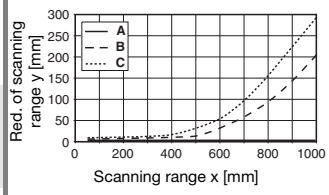
25B SERIES

Diffuse reflection scanners

Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % **B** gray 18 % **C** black 6 % 
M8 connector	1, 3, 4	a, b	
M12 connector	1, 3, 4	c, d, e, f	
Cable, 0.2 m, with M12 connector	1, 3, 4	c, d, e, f	
M12 connector	1, 2, 4	c, d, e, f	
Cable, 0.2 m, with M12 connector	1, 2, 4	c, d, e, f	
M8 connector	1, 4	a, b	
M12 connector	1, 4	c, d, e, f	
Cable, 2 m	1, 4		
Cable, 0.2 m, with M8 connector	1, 4	a, b	
Cable, 0.2 m, with M12 connector	1, 4	c, d, e, f	

Typ. black/white behavior

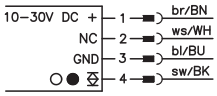


Optical Sensor ABC

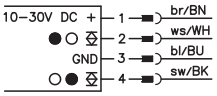
- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

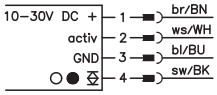
HRT 25B/6 ...



HRT 25B/66 ...



HRT 25B/6.8 ...



Options

1 Scanning range adjustment via multiturn potentiometer

2 Activation input

3 Direct connection to AS-interface I/O coupling modules

4 UL approval

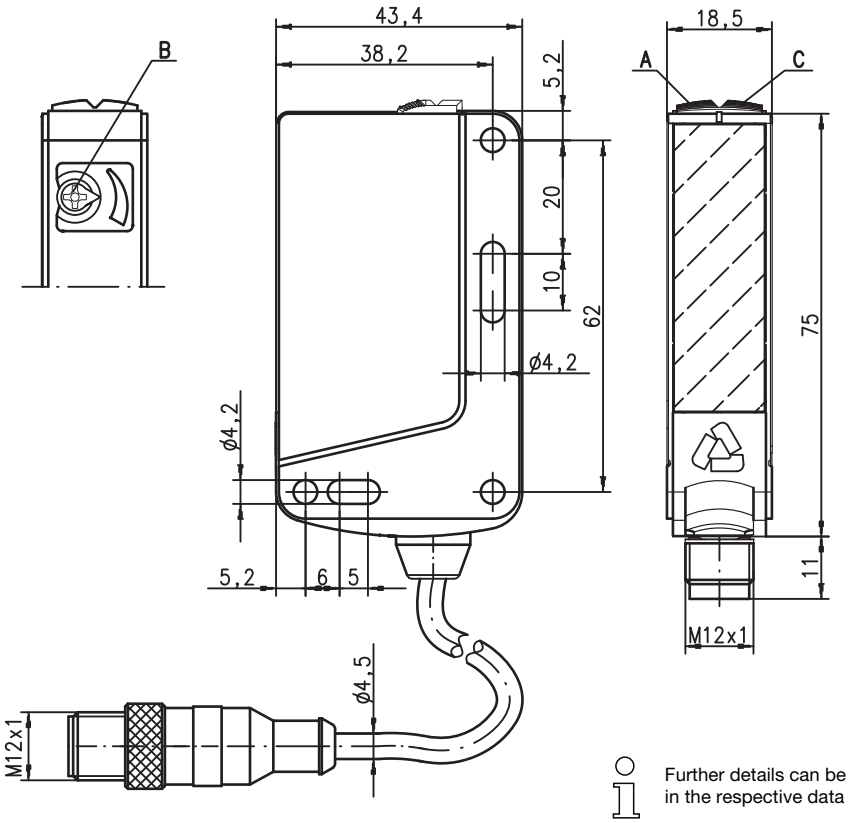
OVERVIEW

Material flow tracking

Container detection

Pallet detection

Dimensioned drawing



Further details can be found in the respective data sheet.

A Green indicator diode
B Scanning range adjustment
C Yellow indicator diode

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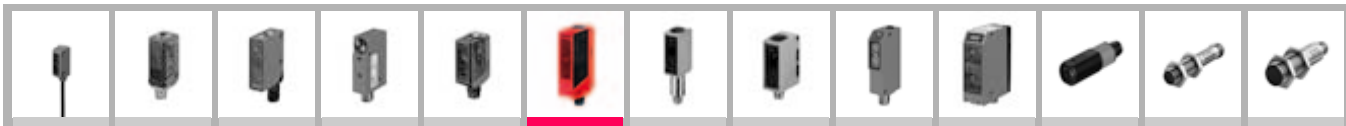

2	3B	8	18	25B	46B	53	55	95	96	318	412	618
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46B SERIES

Operating principle	Typ. operating range limits	Page
Throughbeam sensors	0 … 60 m	114
Retro-reflective sensors	0.05 … 18 m	116
Diffuse reflection scanners	10 … 2500 mm	120

Other 46B Series products:

Protective sensors	SLS 46B	510
Ex Sensors	PRK 46B … Ex n, HRT 46B … Ex n	524

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple	≤ 15 % of U_B
	Open-circuit current	≤ 30 mA
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Green LED	Ready to operate
	Yellow LED	Switching output
	Flashing yellow LED	No performance reserve
Mechanical data	Housing	Plastic
	Optics cover	Plastic
	Weight (connector/cable)	50 g/130 g
Environmental data	Ambient temperature (operation)	-40 °C … +60 °C Laser: -30 °C … +55 °C
	VDE safety class	II, all-insulated
	Protection class	IP 67, IP 69K
	Standards applied	IEC 60947-5-2, UL 508

Mounting systems for this series can be found from **page 542** onwards

Features

- **Active ambient light suppression A²LS**
- **Good operability from the optics side**
- **IP 67 and IP 69K**
- **Highest performance reserve**
- **Reliable function with shrink-wrapped pallets**
- **Very bright light spot, indicator diodes visible from all sides**

Optical Sensor ABC

- Throughbeam sensors Page 593
- Retro-reflective sensors Page 593
- Diffuse reflection scanners Page 594
- A²LS Page 601

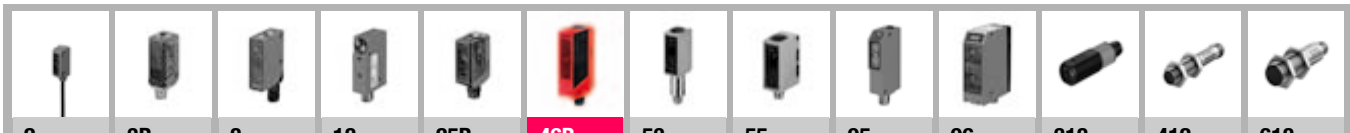
THROUGHBEAM SENSORS

Part description Part No.:		Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Throughbeam sensors		▶ = Transmitter ◀ = Receiver				
▶ LSSR 46B - S12 **◀ ILSER 46B/4 - S12**	50108526 50108536	0 50 0 60	500 Hz	Red light	PNP/DC	Light
▶ LSSR 46B **◀ LSER 46B/66**	50108529 50108535	0 50 0 60	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
▶ LSSR 46B, 200 - S12 **◀ LSER 46B/66, 200 - S12**	50108528 50108534	0 50 0 60	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
▶ LSSR 46B.8 - S12 **◀ ILSER 46B/4 - S12**	50108527 50108536	0 50 0 60	500 Hz	Red light	PNP/DC	Light
▶ LSSR 46B - S12 **◀ LSER 46B/66 - S12**	50108526 50108532	0 50 0 60	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
▶ LSSR 46B.8 - S12 **◀ LSER 46B/66 - S12**	50108527 50108532	0 50 0 60	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
▶ LSSR 46B - S12 **◀ LSER 46B/66.1 - S12**	50108526 50108533	0 50 0 60	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
▶ LSSR 46B - S - S12 **◀ LSER 46B/66 - S - S12**	50110929 50110930	0 40 0 44	100 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC



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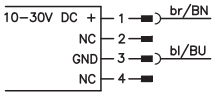
	Connection	Option	Accessories		Typ. light spot
	M12 connector	3, 4, 6	a, b, c, d, e, f		
	Cable, 2 m	4, 6			
	Cable, 0.2 m, with M12 connector	4, 6	a, b, c, d, e, f		
	M12 connector	2, 3, 4, 6	a, b, c, d, e, f		
	M12 connector	4, 6	a, b, c, d, e, f		
	M12 connector	2, 4, 6	a, b, c, d, e, f		
	M12 connector	1, 4, 6	a, b, c, d, e, f		
	M12 connector	4, 5, 6	a, b, c, d, e, f		

Optical Sensor ABC

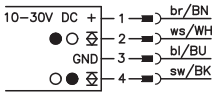
- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

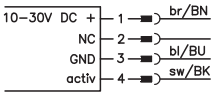
LSSR 46B–S12
LSSR 46B–S–S12
LSSR 46B, 200–S12



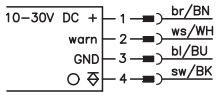
LSER 46B/66–S12
LSER 46B/66–S–S12
LSER 46B/66.1–S12
LSER 46B/66, 200–S12



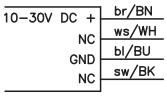
LSSR 46B.8–S12



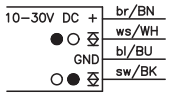
ILSER 46B/4–S12



LSSR 46B



LSER 46B/66



Options

1 Sensitivity adjustment via potentiometer

2 Transmitter with activation input

3 Receiver with warning output

4 Highly visible, additional LED assists with alignment

5 Narrow light beam for preventing reflections caused by shiny objects

6 UL approval (class 2 acc. to NEC)

RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors with polarization filter					
IPRK 46B / 4 - S12 50103074	0.05 – 15 0.05 – 18	500 Hz	Red light	PNP/DC	Light
PRK 46B / 44 - S12 50105986	0.05 – 15 0.05 – 18	500 Hz	Red light	2xPNP/DC	Light/dark
PRK 46B / 66 - S12 50103070	0.05 – 15 0.05 – 18	500 Hz	Red light	2xPush-pull/DC	Light/dark antivalent
PRK 46B / 66.01 - S12 50103082	0.05 – 15 0.05 – 18	500 Hz	Red light	2xPush-pull/DC	Light/dark antivalent
PRK 46B / 66 50107068	0.05 – 15 0.05 – 18	500 Hz	Red light	2xPush-pull/DC	Light/dark antivalent
PRK 46B / 66, 200 - S12 50103071	0.05 – 15 0.05 – 18	500 Hz	Red light	2xPush-pull/DC	Light/dark antivalent
PRK 46B / 66D - S12 50113009	0.05 – 15 0.05 – 18	500 Hz	Red light	2xPush-pull/DC	Dark/light antivalent
PRK 46B / 7D - S12 50103080	0.05 – 15 0.05 – 18	20 Hz	Red light	Relay/make-contact/DC	Dark

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 584

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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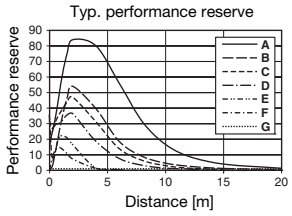
46B SERIES

Retro-reflective sensors

	Connection	Option	Accessories		Typ. performance reserve
	M12 connector	2, 4, 7	a, b, c, d, e, f		
	M12 connector	2, 7	a, b, c, d, e, f		
	M12 connector	2, 7	a, b, c, d, e, f		
	M12 connector	1, 2, 7	a, b, c, d, e, f		
	Cable, 2 m	2, 7			
	Cable, 0.2 m, with M12 connector	2, 7	a, b, c, d, e, f		
	M12 connector	2, 7	a, b, c, d, e, f		
	M12 connector	2, 7	a, b, c, d, e, f		

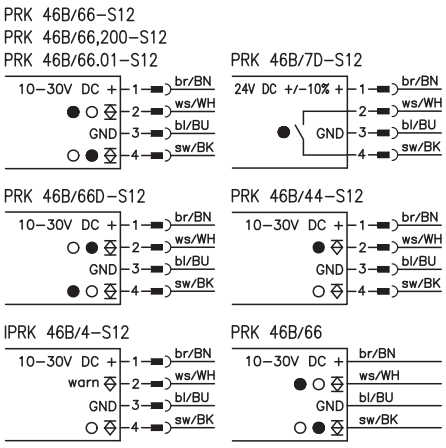


A TK 100x100
B TK 82.2
C TKS 50x50
D TKS 40x60
E TKS 20x40
F Tape 4 50x50
G Switching point

Optical Sensor ABC

- Retro-reflective sensors with polarization filter Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1	Sensitivity adjustment via potentiometer
2	Fast alignment through *brightVision*
3	Activation input
4	Warning output
5	Direct connection to AS-interface I/O coupling modules
6	Highest functional reliability for depolarizing media
7	UL approval (class 2 acc. to NEC)

RETRO-REFLECTIVE SENSORS

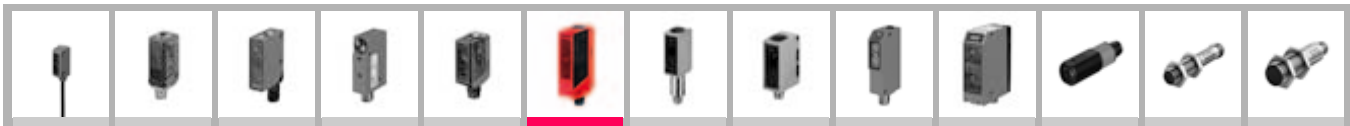
Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors with polarization filter					
PRK 46B / 4.82 - S12 50103084	0.1 8 0.1 10	500 Hz	Red light	PNP/DC	Light
IPRK 46B / 4.2 - S12 50103076	0.1 8 0.1 10	500 Hz	Red light	PNP/DC	Light
PRK 46B / 4D.2 - S12 50105987	0.1 8 0.1 10	500 Hz	Red light	PNP/DC	Dark
IPRK 46B / 4D.2 - S12 50111655	0.1 8 0.1 10	500 Hz	Red light	PNP/DC	Dark
PRK 46B / 44.2 - S12 50105106	0.1 8 0.1 10	500 Hz	Red light	2 x PNP/DC	Light/dark antivalent
PRK 46B / 6.2 - S12 50105156	0.1 8 0.1 10	500 Hz	Red light	Push-pull/DC	PNP/light NPN/dark
PRK 46B / 66.2 - S12 50103072	0.1 8 0.1 10	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
PRK 46B / 66.2, 200 - S12 50103073	0.1 8 0.1 10	500 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 584

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC


2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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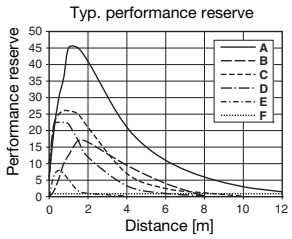
Connection	Option	Accessories		Typ. performance reserve
M12 connector	2, 3, 6, 7	a, b, c, d, e, f		
M12 connector	2, 4, 6, 7	a, b, c, d, e, f		
M12 connector	2, 5, 6, 7	a, b, c, d, e, f		
M12 connector	2, 4, 6, 7	a, b, c, d, e, f		
M12 connector	2, 6, 7	a, b, c, d, e, f		
M12 connector	2, 5, 6, 7	a, b, c, d, e, f		
M12 connector	2, 6, 7	a, b, c, d, e, f		
Cable, 0.2m, with M12 connector	2, 6, 7	a, b, c, d, e, f		

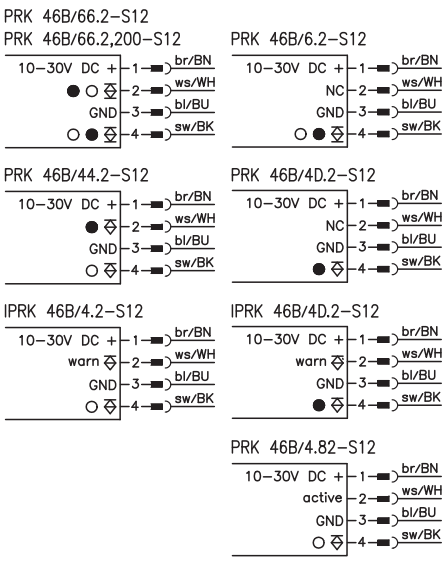


A TK 100x100
B TK 82.2
C TKS 50x50
D TKS 40x60
E Tape 4 50x50
F Switching point

Optical Sensor ABC

- Retro-reflective sensors with polarization filter Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1 Sensitivity adjustment via potentiometer
2 Fast alignment through *brightVision*
3 Activation input
4 Warning output
5 Direct connection to AS-interface I/O coupling modules
6 Highest functional reliability for depolarizing media,
e.g. with pallets that have been stretch-wrapped with foil
7 UL approval (class 2 acc. to NEC)

DIFFUSE REFLECTION SCANNERS

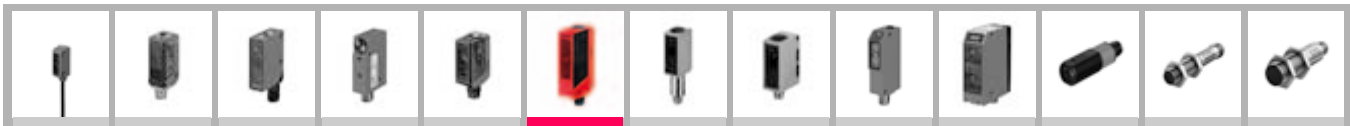
Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRTR 46B / 6.22 - S12 50114032	20 1000 [1)] 20 1800	200 Hz	Red light	1 x Push-pull/DC	Light/dark reversible
HRTR 46B / 6.22, 200 - S12 50114034	20 1000 [1)] 20 1800	200 Hz	Red light	1 x Push-pull/DC	Light/dark reversible
HRTR 46B / L4.23 - S12 50114037	20 1000 [1)] 20 1800	100 Hz	Red light	1 x PNP/DC, 1 x push-pull/DC	Light/dark reversible
HRTR 46B / 4 - S12 50106557	5 800 [1)] 5 1800	200 Hz	Red light	1 x PNP/DC	Light
HRTR 46B / 4D - S12 50106558	5 800 [1)] 5 1800	200 Hz	Red light	1 x PNP/DC	Dark
HRTR 46B / 4D, 200 - S12 50113432	5 800 [1)] 5 1800	200 Hz	Red light	1 x PNP/DC	Dark
HRTR 46B / 66 - S12 50106555	5 800 [1)] 5 1800	200 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 46B / 66, 200 - S12 50106556	5 800 [1)] 5 1800	200 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 46B / 66 - S - S12 50106559	5 500 [1)] 5 700	200 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

1) Typical scanning range with a black/white error < 10 %

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC


2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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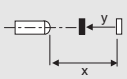
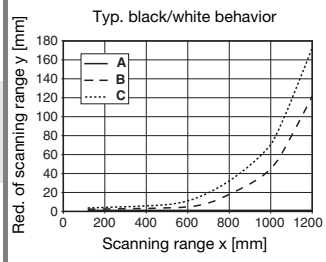
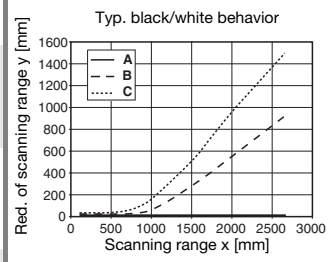
Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % B gray 18 % C black 6 % 
M12 connector	2, 7, 8	a, b, c, d, e, f	
Cable, 0.2 m, with M12 connector	2, 7, 8		
M12 connector	3, 4, 7, 8	a, b, c, d, e, f	
M12 connector	1, 6, 7, 8	a, b, c, d, e, f	
M12 connector	1, 6, 7, 8	a, b, c, d, e, f	
Cable, 0.2 m, with M12 connector	1, 6, 7, 8	a, b, c, d, e, f	
M12 connector	1, 7, 8	a, b, c, d, e, f	
Cable, 0.2 m, with M12 connector	1, 7, 8	a, b, c, d, e, f	
M12 connector	1, 5, 7, 8	a, b, c, d, e, f	

Options

1 Scanning range adjustment via multiturn potentiometer

2 Teach-in via teach button (lockable) or teach input

3 2 individually teachable switching outputs

4 IO-Link interface with comprehensive configuration and diagnostic options

5 Optimized, small light spot for reliable detection of objects with colored structure (focus at approx. 200 mm)

6 Direct connection to AS-interface I/O coupling modules

7 Fast alignment through *brightVision*

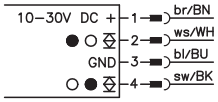
8 UL approval (class 2 acc. to NEC)

Optical Sensor ABC

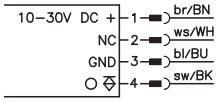
- Diffuse reflection scanners Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

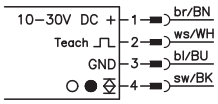
HRTR 46B/66–S12
HRTR 46B/66,200–S12
HRTR 46B/66–S–S12



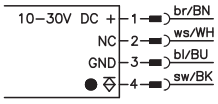
HRTR 46B/4–S12



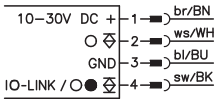
HRTR 46B/6.22–S12
HRTR 46B/6.22,200–S12



HRTR 46B/4D–S12
HRTR 46B/4D,200–S12



HRTR 46B/L4.23–S12



DIFFUSE REFLECTION SCANNERS

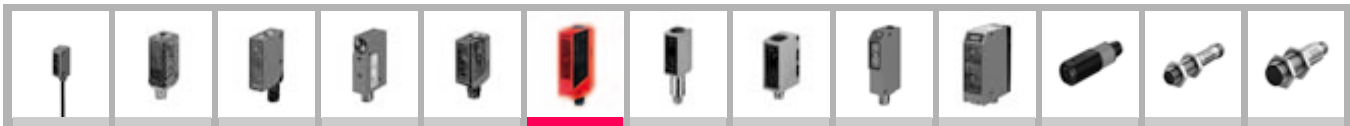
Part description Part No.:	Scanning range [1] [mm] □ Typ. scan range limit [mm] ■	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRT 46B / 4 - S12 50106549	0 1200 0 2500	200 Hz	Infrared light	PNP/DC	Light
IHRT 46B / 4 - S12 50106551	0 1200 0 2500	200 Hz	Infrared light	PNP/DC	Light
IHRT 46B / 4, 200 - S12 50106553	0 1200 0 2500	200 Hz	Infrared light	PNP/DC	Light
HRT 46B / 4D - S12 50106550	0 1200 0 2500	200 Hz	Infrared light	PNP/DC	Dark
IHRT 46B / 4D - S12 50106552	0 1200 0 2500	200 Hz	Infrared light	PNP/DC	Dark
HRT 46B / 4D, 200 - S12 50109551	0 1200 0 2500	200 Hz	Infrared light	PNP/DC	Dark
IHRT 46B / 4D, 200 - S12 50106554	0 1200 0 2500	200 Hz	Infrared light	PNP/DC	Dark
HRT 46B / 44 - S12 50106546	0 1200 0 2500	200 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
HRT 46B / 44 50114869	0 1200 0 2500	200 Hz	Infrared light	2xPNP/DC	Light/dark antivalent

1) Typical scanning range with a black/white error < 10 %

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC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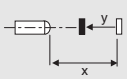
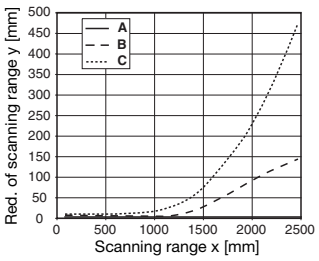
46B SERIES

Diffuse reflection scanners

	Connection	Option	Accessories		Typ. b/w behavior
					A white 90 % **B** gray 18 % **C** black 6 % 
	M12 connector	1, 3, 4, 5	a, b, c, d, e, f		
	M12 connector	1, 2, 4, 5	a, b, c, d, e, f		
	Cable, 0.2 m, with M12 connector	1, 2, 4, 5	a, b, c, d, e, f		
	M12 connector	1, 3, 4, 5	a, b, c, d, e, f		
	M12 connector	1, 2, 4, 5	a, b, c, d, e, f		
	M12 connector	1, 3, 4, 5	a, b, c, d, e, f		
	Cable, 0.2 m, with M12 connector	1, 2, 4, 5	a, b, c, d, e, f		
	M12 connector	1, 4, 5	a, b, c, d, e, f		
	Cable, 2 m	1, 4, 5			

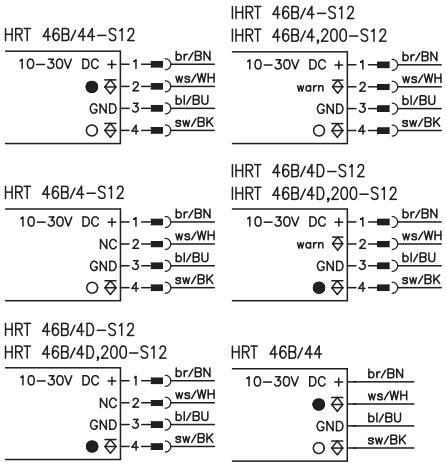
Typ. black/white behavior



Optical Sensor ABC

- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1	Scanning range adjustment via multiturn potentiometer
2	Warning output
3	Direct connection to AS-interface I/O coupling modules
4	Reliable detection of light, dark, inclined/sloped surfaces
5	UL approval (class 2 acc. to NEC)

DIFFUSE REFLECTION SCANNERS

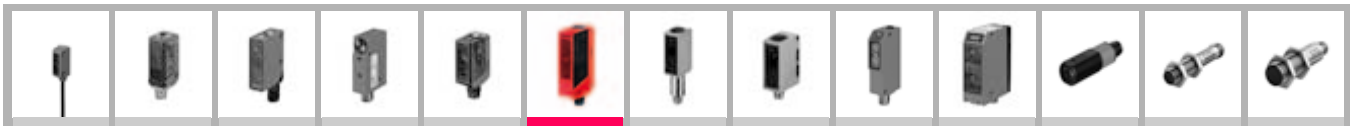
Part description Part No.:	Scanning range [1] [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRT 46B / 66 - S12 50106547	0 1200 0 2500	200 Hz	Infrared light	2 x Push-pull/DC	Light/dark antivalent
HRT 46B / 66 50112805	0 1200 0 2500	200 Hz	Infrared light	2 x Push-pull/DC	Light/dark antivalent
HRT 46B / 66, 200 - S12 50106548	0 1200 0 2500	200 Hz	Infrared light	2 x Push-pull/DC	Light/dark antivalent
HRT 46B / 7 - S12 50106562	0 1200 0 2500	20 Hz	Infrared light	Relay/make-contact/DC	Light

1) Typical scanning range with a black/white error < 10 %

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC


2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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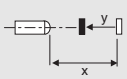
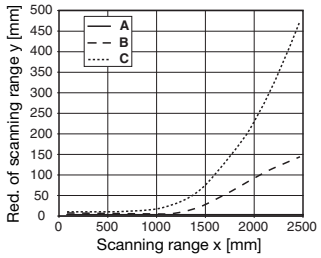
46B SERIES

Diffuse reflection scanners

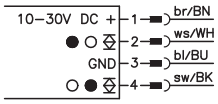
Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % **B** gray 18 % **C** black 6 % 
M12 connector	1, 2, 3	a, b, c, d, e, f	Typ. black/white behavior 
Cable, 2 m	1, 2, 3		
Cable, 0.2 m, with M12 connector	1, 2, 3	a, b, c, d, e, f	
M12 connector	1, 2, 3	a, b, c, d, e, f	

Optical Sensor ABC

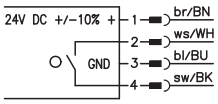
- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

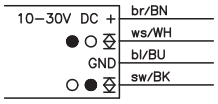
HRT 46B/66–S12
HRT 46B/66,200–S12



HRT 46B/7–S12



HRT 46B/66



Options

1 Scanning range adjustment via multiturn potentiometer

2 Reliable detection of light, dark, inclined/sloped surfaces

3 UL approval (class 2 acc. to NEC)

DIFFUSE REFLECTION SCANNERS

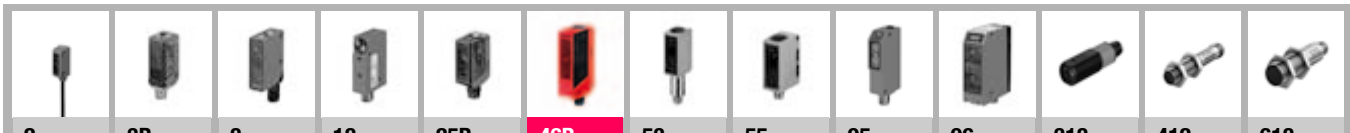
Part description Part No.:	Scanning range [1] [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRT 46B / 66.1 - S12 50111640	20 800 10 1200	200 Hz	Infrared light	2 x Push-pull/DC	Light/dark antivalent
Diffuse reflection laser scanners with background suppression					
HRTL 46B / 6.8 - S12 50110806	50 800 50 1200	1000 Hz	Red light laser class 2	1 x Push-pull/DC	Light
HRTL 46B / 66 - S12 50106560	50 800 50 1200	1000 Hz	Red light laser class 2	2 x Push-pull/DC	Light/dark antivalent
HRTL 46B / 66, 200 - S12 50106561	50 800 50 1200	1000 Hz	Red light laser class 2	2 x Push-pull/DC	Light/dark antivalent
HRTL 46B / 66.1 - S12 50113308	50 500 50 800	1000 Hz	Red light laser class 1	2 x Push-pull/DC	Light/dark antivalent

1) Typical scanning range with a black/white error < 10 %

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC


2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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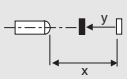
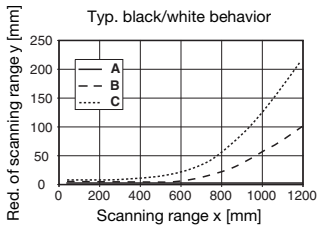
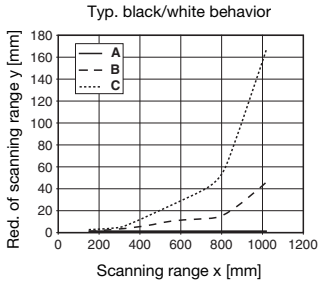
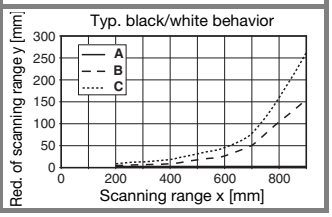
46B SERIES

Diffuse reflection scanners

Connection	Option	Accessories		Typ. b/w behavior
				A white 90 % **B** gray 18 % **C** black 6 % 
M12 connector	1, 2, 3, 7	a, b, c, d, e, f		
M12 connector	1, 4, 6, 7	a, b, c, d, e, f		
M12 connector	1, 4, 7	a, b, c, d, e, f		
Cable, 0.2 m, with M12 connector	1, 4, 7	a, b, c, d, e, f		
M12 connector	1, 4, 7	a, b, c, d, e, f		

Options

1 Scanning range adjustment via multiturn potentiometer

2 Reliable detection of objects between the rollers of a roller conveyor (smallest-possible gap: 6 mm)

3 Reliable detection of light, dark, inclined/sloped surfaces

4 Precise positioning and detection of small parts

5 Direct connection to AS-interface I/O coupling modules

6 Activation input

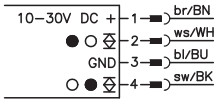
7 UL approval (class 2 acc. to NEC)

Optical Sensor ABC

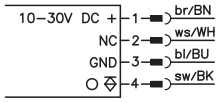
- Diffuse reflection scanners with background suppr. Page 594
- Connection types/Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection

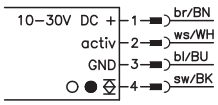
HRT 46B/66.1–S12
HRTL 46B/66–S12
HRTL 46B/66.1–S12
HRTL 46B/66,200–S12



HRT 46B/4.1–S12



HRTL 46B/6.8–S12



www.leuze.com/46series/

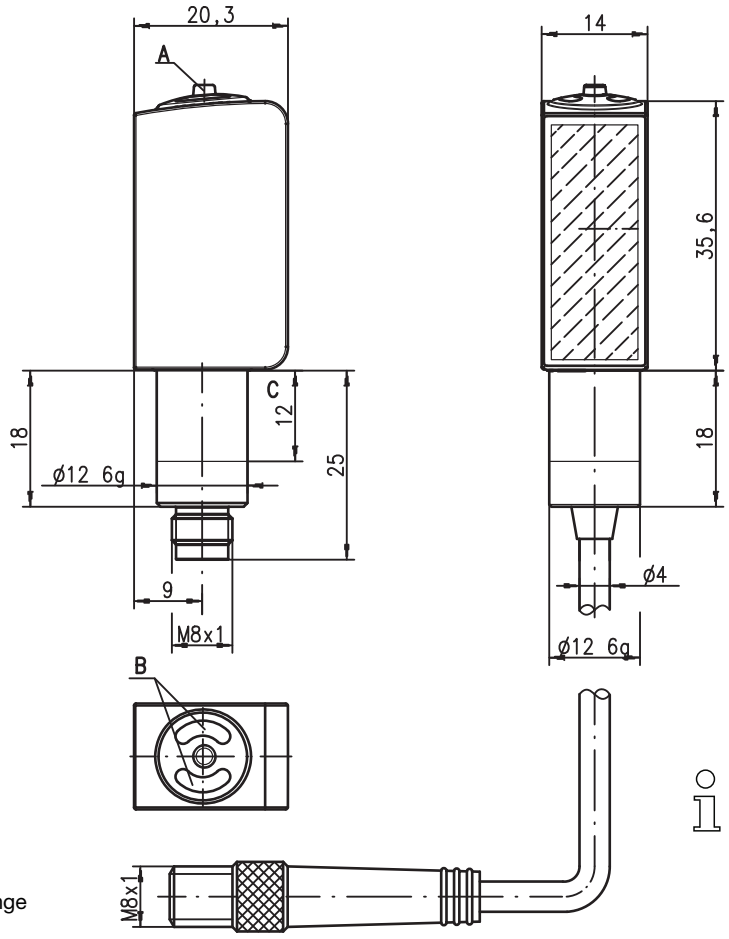
OVERVIEW

Meat processing

Filling of dairy products

Medical technology

Dimensioned drawing



A Operational control
B Indicator diodes
C Permissible clamping range

Further details can be found in the respective data sheet.

2	3B	8	18	25B	46B	53	55	95	96	318	412	618
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53 SERIES

Operating principle	Typ. operating range limits	Page
Throughbeam sensors	0 … 10 m	130
Retro-reflective sensors	0 … 5 m	132
Diffuse reflection scanners	5 … 400 mm	138

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple	≤ 15 % of U_B
	Open-circuit current	≤ 18 mA
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Green LED	Ready to operate
	Yellow LED	Switching output
	Flashing yellow LED	No performance reserve
Mechanical data	Housing	AISI 316L stainless steel, DIN X2CrNiMo17132, 1.4404, Ra ≤ 2.5
	Housing design	Hygiene design
	Optics cover	Plastic (PMMA)
	Weight (connector/cable)	50 g/60 g
Environmental data	Ambient temperature [1] (operation and storage)	-30 °C … +70 °C Operating temperatures of +70 °C permissible only briefly (≤ 15 min).
	VDE safety class	III
	Protection class	IP 67, IP 69K
	Environmental test	ECOLAB, CleanProof+
	Standards applied	IEC 60947-5-2, UL 508

Mounting systems for this series can be found from **page 543** onwards

Features

- **316L stainless steel housing in hygiene design**
- **Scratch resistant and non-diffusive plastic front cover**
- **Enclosed optics design prevents bacterial carry-overs**
- **Paperless device identification**
- **ECOLAB and CleanProof+ tested**
- **Active ambient light suppression A²LS**

Optical Sensor ABC

- Throughbeam sensors Page 593
- Retro-reflective sensors Page 593
- Diffuse reflection scanners Page 594
- A²LS Page 601

THROUGHBEAM SENSORS

Part description Part No.:	Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Throughbeam sensors	▶ = Transmitter ◀ = Receiver				
▶ **LSSR 53.8 - S8** 50108736 ◀ **LSER 53/66 - S8** 50108742	0 – 8.5 0 – 10	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50106154	K - D M8W - 4P - 2m - FAB	Connection cable 2000 mm, M8 angular, 4-pin, Food+Bev.
b	50106152	K - D M8A - 4P - 2m - FAB	Connection cable 2000 mm, M8 axial, 4-pin, Food+Bev.
c	50106155	K - D M8W - 4P - 5m - FAB	Connection cable 5000 mm, M8 angular, 4-pin, Food+Bev.
d	50106153	K - D M8A - 4P - 5m - FAB	Connection cable 5000 mm, M8 axial, 4-pin, Food+Bev.

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53 SERIES

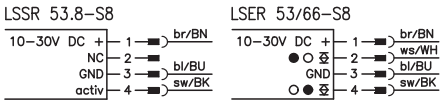
Throughbeam sensors

	Connection	Option	Accessories		Typ. light spot
	M8 connector	1, 2	a, b, c, d		

Optical Sensor ABC

- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1 Transmitter with activation input

2 UL approval (class 2 acc. to NEC)

RETRO-REFLECTIVE SENSORS

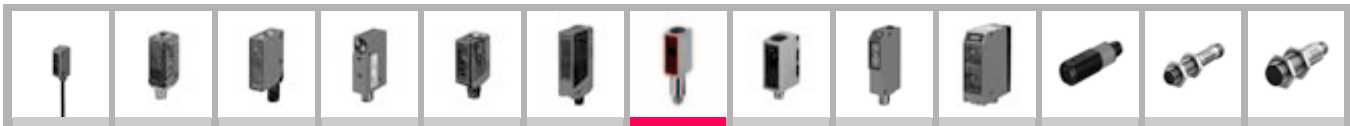
Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching	
Retro-reflective sensors						
RKR 53 / 6.42 - S8 50107607	0 1.5 0 1.8	1000 Hz	Red light	Push-pull/DC	Light/dark antivalent	

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 584

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50106154	K - D M8W - 4P - 2m - FAB	Connection cable 2000 mm, M8 angular, 4-pin, Food+Bev.
b	50106152	K - D M8A - 4P - 2m - FAB	Connection cable 2000 mm, M8 axial, 4-pin, Food+Bev.
c	50106155	K - D M8W - 4P - 5m - FAB	Connection cable 5000 mm, M8 angular, 4-pin, Food+Bev.
d	50106153	K - D M8A - 4P - 5m - FAB	Connection cable 5000 mm, M8 axial, 4-pin, Food+Bev.
e	50110273	K - D M8W - 4P - 10m - FAB	Connection cable 10000 mm, M8 angular, 4-pin, Food+Bev.
f	50110274	K - D M8A - 4P - 10m - FAB	Connection cable 10000 mm, M8 axial, 4-pin, Food+Bev.



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53 SERIES

Retro-reflective sensors

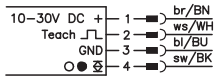
	Connection	Option	Accessories		Typ. performance reserve
	M8 connector	1, 3, 4, 5	a, b, c, d, e, f		

Optical Sensor ABC

- Retro-reflective sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

RKR 53/6.42-S8



Options

1	Teach-in via teach input or lockable teach button
2	Teach-in via teach button
3	Transparent media, especially for foils ≤ 20 µm
4	Autocollimation principle
5	UL approval (class 2 acc. to NEC)

RETRO-REFLECTIVE SENSORS

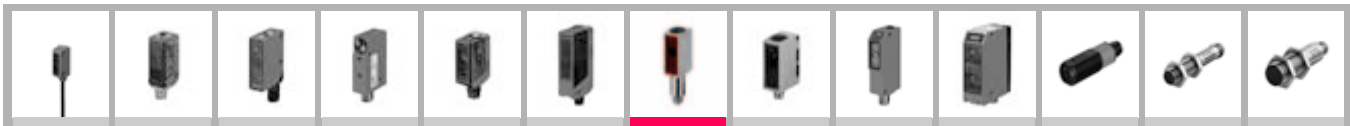
Part description Part No.:	Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors with polarization filter					
PRK 53 / 6.22 - S8 50107603	0 – 4 [1)] 0 – 5 [1)]	1000 Hz	Red light	Push-pull/DC	Light/dark antivalent
PRK 53 / 6.42 - S8 50112475	0 – 3 [1)] 0 – 3.6 [1)]	1000 Hz	Red light	Push-pull/DC	Light/dark antivalent
PRK 53 / 6D.42 - S8 50112476	0 – 3 [1)] 0 – 3.6 [1)]	1000 Hz	Red light	Push-pull/DC	Dark/light antivalent

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 584

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50106154	K - D M8W - 4P - 2m - FAB	Connection cable 2000 mm, M8 angular, 4-pin, Food+Bev.
b	50106152	K - D M8A - 4P - 2m - FAB	Connection cable 2000 mm, M8 axial, 4-pin, Food+Bev.
c	50106155	K - D M8W - 4P - 5m - FAB	Connection cable 5000 mm, M8 angular, 4-pin, Food+Bev.
d	50106153	K - D M8A - 4P - 5m - FAB	Connection cable 5000 mm, M8 axial, 4-pin, Food+Bev.
e	50110273	K - D M8W - 4P - 10m - FAB	Connection cable 10000 mm, M8 angular, 4-pin, Food+Bev.
f	50110274	K - D M8A - 4P - 10m - FAB	Connection cable 10000 mm, M8 axial, 4-pin, Food+Bev.



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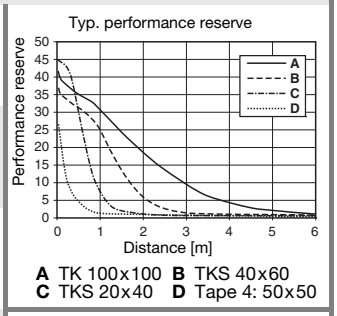
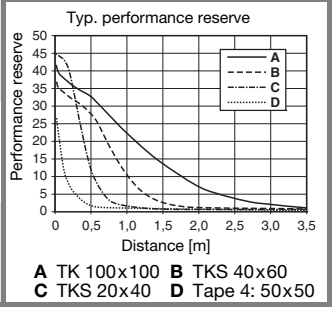
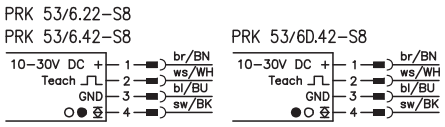
	Connection	Option	Accessories		Typ. performance reserve
	M8 connector	1, 4, 6, 7	a, b, c, d, e, f		
	M8 connector	1, 5, 6, 7	a, b, c, d, e, f		
	M8 connector	1, 5, 6, 7	a, b, c, d, e, f		

A TK 100x100 **B** TKS 40x60
C TKS 20x40 **D** Tape 4: 50x50

Optical Sensor ABC

- Retro-reflective sensors with polarization filter Page 593
- Connection types/Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection



Options

1	Teach-in via teach input or lockable teach button
2	Teach-in via teach button
3	Detection of small parts and very fast events
4	Precise positioning of objects and reflector markers
5	Highly transparent bottles (PET and glass)
6	Autocollimation principle
7	UL approval (class 2 acc. to NEC)

RETRO-REFLECTIVE SENSORS

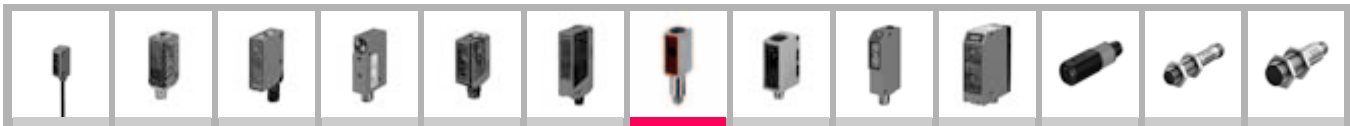
Part description Part No.:	Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Retro-reflective laser sensors with polarization filter					
PRKL 53 / 6.22 - S8 50107605	0 2 [1)] 0 3 [1)]	2000 Hz	Red light laser class 1	Push-pull/DC	Light/dark antivalent

1) The specified values apply in combination with reflectors MTKS 50 x 50, additional reflectors with range specifications can be found on page 584

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50106154	K - D M8W - 4P - 2m - FAB	Connection cable 2000 mm, M8 angular, 4-pin, Food+Bev.
b	50106152	K - D M8A - 4P - 2m - FAB	Connection cable 2000 mm, M8 axial, 4-pin, Food+Bev.
c	50106155	K - D M8W - 4P - 5m - FAB	Connection cable 5000 mm, M8 angular, 4-pin, Food+Bev.
d	50106153	K - D M8A - 4P - 5m - FAB	Connection cable 5000 mm, M8 axial, 4-pin, Food+Bev.
e	50110273	K - D M8W - 4P - 10m - FAB	Connection cable 10000 mm, M8 angular, 4-pin, Food+Bev.
f	50110274	K - D M8A - 4P - 10m - FAB	Connection cable 10000 mm, M8 axial, 4-pin, Food+Bev.


2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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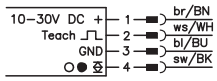
	Connection	Option	Accessories		Typ. performance reserve
	M8 connector	1, 2, 3, 4	a, b, c, d, e, f		

Optical Sensor ABC

- Retro-reflective sensors with polarization filter Page 593
- Connection types/Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection

PRKL 53/6.22-S8



Options

1	Teach-in via teach input or lockable teach button
2	Detection of small parts and very fast events
3	Autocollimation principle
4	UL approval (class 2 acc. to NEC)

DIFFUSE REFLECTION SCANNERS

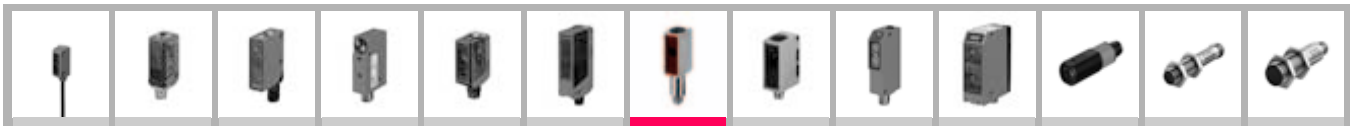
Part description Part No.:	Scanning range [1] [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRTR 53 / 6 - S8.3 50107500	5 200 5 400	1000 Hz	Red light	Push-pull/DC	Light/dark antivalent
HRTR 53 / 66 - S8 50107499	5 200 5 400	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 53 / 66, 200 - S8 50107501	5 200 5 400	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 53 / 6 - S - S8.3 50107504	5 100 5 200	1000 Hz	Red light	Push-pull/DC	Light/dark antivalent
HRTR 53 / 66 - S - S8 50107503	5 100 5 200	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 53 / 6 - XL - S8.3 50107508	5 60 5 100	1000 Hz	Red light	Push-pull/DC	Light/dark antivalent
HRTR 53 / 66 - XL - S8 50107507	5 60 5 100	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

1) Typical scanning range with a black/white error < 10 %

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50106154	K - D M8W - 4P - 2m - FAB	Connection cable 2000 mm, M8 angular, 4-pin, Food+Bev.
d	50106152	K - D M8A - 4P - 2m - FAB	Connection cable 2000 mm, M8 axial, 4-pin, Food+Bev.
e	50106155	K - D M8W - 4P - 5m - FAB	Connection cable 5000 mm, M8 angular, 4-pin, Food+Bev.
f	50106153	K - D M8A - 4P - 5m - FAB	Connection cable 5000 mm, M8 axial, 4-pin, Food+Bev.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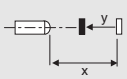
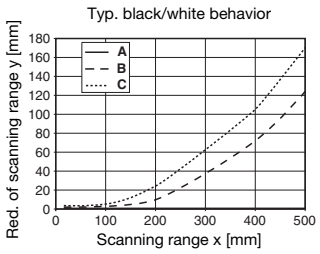
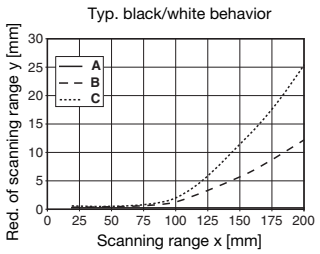
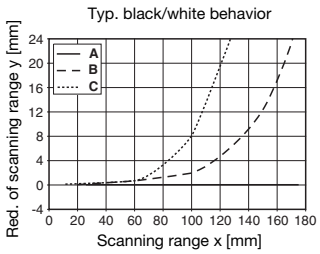
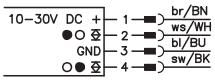
Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % B gray 18 % C black 6 % 
M8 connector	1, 2, 6	a, b	
M8 connector	1, 2, 6	c, d, e, f	
Cable, 0.2 m, with M8 connector	1, 2, 6	c, d, e, f	
M8 connector	1, 3, 4, 6	a, b	
M8 connector	1, 3, 4, 6	c, d, e, f	
M8 connector	1, 5, 6	a, b	
M8 connector	1, 5, 6	c, d, e, f	

Optical Sensor ABC

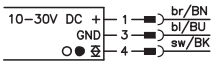
- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

HRTR 53/66-S8
HRTR 53/66,200-S8
HRTR 53/66-S-S8
HRTR 53/66-XL-S8



HRTR 53/6-S8.3
HRTR 53/6-S-S8.3
HRTR 53/6-XL-S8.3



Options

1 Scanning range adjustment via multiturn potentiometer

2 Reliable switching nearly independent of object/background properties

3 Reliable switching even on glossy objects and objects with colored structure

4 Small, homogenous light spot for detecting small parts

5 Broad rectangular light spot guarantees the reliable detection of objects with openings, grid structures, holes, grooves and of objects with changeable position as well as transparent foils/bottles

6 UL approval (class 2 acc. to NEC)

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [1] [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching	
Diffuse reflection laser scanners with background suppression						
HRTL 53 / 66 - S8 50115203	10 170 10 400	2000 Hz	Red light laser class 1	2 x Push-pull/DC	Light/dark antivalent	
HRTL 53 / 66, 5000 50115202	10 170 10 400	2000 Hz	Red light laser class 1	2 x Push-pull/DC	Light/dark antivalent	

1) Typical scanning range with a black/white error < 10 %

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50106154	K - D M8W - 4P - 2m - FAB	Connection cable 2000 mm, M8 angular, 4-pin, Food+Bev.
b	50106152	K - D M8A - 4P - 2m - FAB	Connection cable 2000 mm, M8 axial, 4-pin, Food+Bev.
c	50106155	K - D M8W - 4P - 5m - FAB	Connection cable 5000 mm, M8 angular, 4-pin, Food+Bev.
d	50106153	K - D M8A - 4P - 5m - FAB	Connection cable 5000 mm, M8 axial, 4-pin, Food+Bev.
e	50110273	K - D M8W - 4P - 10m - FAB	Connection cable 10000 mm, M8 angular, 4-pin, Food+Bev.
f	50110274	K - D M8A - 4P - 10m - FAB	Connection cable 10000 mm, M8 axial, 4-pin, Food+Bev.

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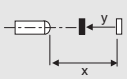
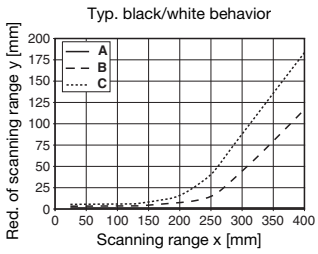
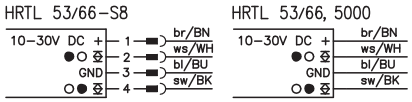
	Connection	Option	Accessories		Typ. b/w behavior
					A white 90 % B gray 18 % C black 6 % 
	M8 connector	1, 4, 6	a, b, c, d, e, f		
	Cable, 5 m	1, 4, 6			

Optical Sensor ABC

- Diffuse reflection scanners with background suppr. Page 594
- Connection types/Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection



Options

1 Scanning range adjustment via multiturn potentiometer

2 Reliable switching nearly independent of object/background properties

3 Reliable switching even on glossy objects and objects with colored structure

4 Small, homogenous light spot for detecting small parts

5 Broad rectangular light spot guarantees the reliable detection of objects with openings, grid structures, holes, grooves and of objects with changeable position as well as transparent foils/bottles

6 UL approval (class 2 acc. to NEC)

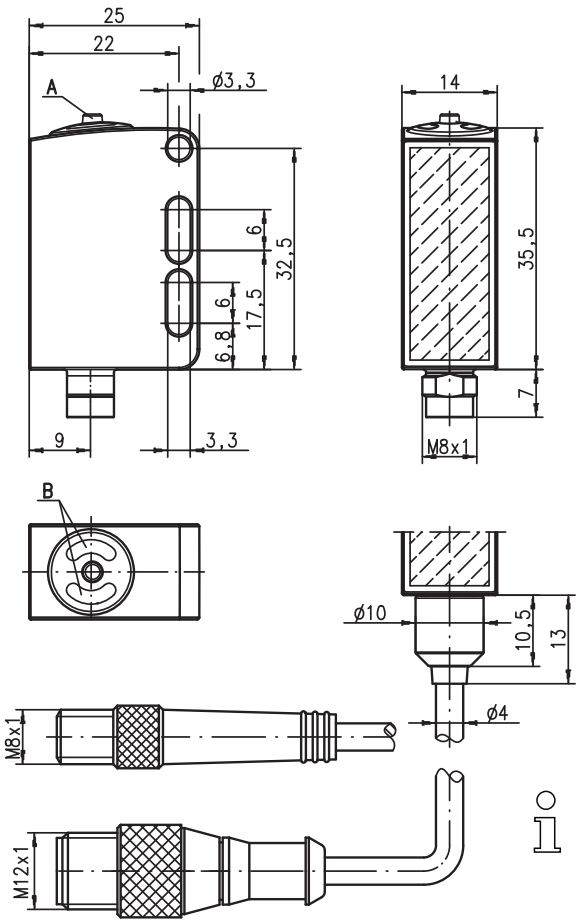
OVERVIEW

Filling of food containers

Detection of baked goods

Filling of beverage containers

Dimensioned drawing



A Operational control
B Indicator diodes

Further details can be found in the respective data sheet.

2	3B	8	18	25B	46B	53	55	95	96	318	412	618
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55 SERIES

Operating principle	Typ. operating range limits	Page
Throughbeam sensors	0 … 10 m	144
Retro-reflective sensors	0 … 6 m	146
Diffuse reflection scanners	5 … 400 mm	152

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple	≤ 15 % of U_B
	Open-circuit current	≤ 18 mA
	Signal voltage high/low	≥ (U_B-2 V)/≤ 2 V
Indicators	Green LED	Ready to operate
	Yellow LED	Switching output
	Flashing yellow LED	No performance reserve
Mechanical data	Housing	AISI 316L stainless steel, DIN X2CrNiMo17132, 1.4404, Ra ≤ 2.5
	Housing design	WASH-DOWN-Design
	Optics cover	Plastic (PMMA)
	Weight (connector/cable)	40 g/60 g
Environmental data	Ambient temp. (operation and storage)	-30 °C … +70 °C Operating temperatures of +70 °C permissible only briefly (≤ 15 min).
	VDE safety class	III
	Protection class	IP 67, IP 69K
	Environmental test	ECOLAB, CleanProof+
	Standards applied	IEC 60947-5-2, UL 508

Mounting systems for this series can be found from **page 537** onwards

Features

- **316L stainless steel housing in Wash-Down-Design**
- **Scratch resistant and non-diffusive plastic front cover**
- **Enclosed optics design prevents bacterial carry-overs**
- **Paperless device identification**
- **ECOLAB and CleanProof+ tested**
- **Active ambient light suppression A²LS**

Optical Sensor ABC

- Throughbeam sensors Page 593
- Retro-reflective sensors Page 593
- Diffuse reflection scanners Page 594
- A²LS Page 601

THROUGHBEAM SENSORS

Part description Part No.:		Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Throughbeam sensors		▶ = Transmitter ◀ = Receiver				
▶ LSSR 55.8 - S8 **◀ LSER 55/66 - S8**	50108715 50108721	0 8.5 0 10	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
▶ LSSR 55.8, 200 - S12 **◀ LSER 55/66, 200 - S12**	50108717 50108723	0 8.5 0 10	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
▶ LSSR 55.8, 5000 **◀ LSER 55/66, 5000**	50111969 50111970	0 8.5 0 10	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50106154	K - D M8W - 4P - 2m - FAB	Connection cable 2000 mm, M8 angular, 4-pin, Food+Bev.
b	50106152	K - D M8A - 4P - 2m - FAB	Connection cable 2000 mm, M8 axial, 4-pin, Food+Bev.
c	50106155	K - D M8W - 4P - 5m - FAB	Connection cable 5000 mm, M8 angular, 4-pin, Food+Bev.
d	50106153	K - D M8A - 4P - 5m - FAB	Connection cable 5000 mm, M8 axial, 4-pin, Food+Bev.
e	50104573	K - D M12W - 4P - 5m - FAB	Connection cable 5000 mm, M12 angular, 4-pin, Food+Bev.
f	50104572	K - D M12A - 4P - 5m - FAB	Connection cable 5000 mm, M12 axial, 4-pin, Food+Bev.

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55 SERIES

Throughbeam sensors

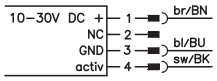
	Connection	Option	Accessories		Typ. light spot
	M8 connector	1, 2	a, b, c, d		
	Cable 0.2 m, with M12 connector	1, 2	e, f		
	Cable 5 m	1, 2			

Optical Sensor ABC

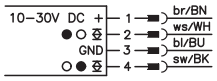
- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

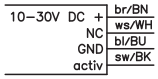
LSSR 55.8–S8
LSSR 55.8, 200–S12



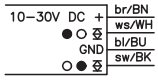
LSER 55/66–S8
LSER 55/66, 200–S12



LSSR 55.8, 5000



LSER 55/66, 5000



Options

1 Transmitter with activation input

2 UL approval (class 2 acc. to NEC)

RETRO-REFLECTIVE SENSORS

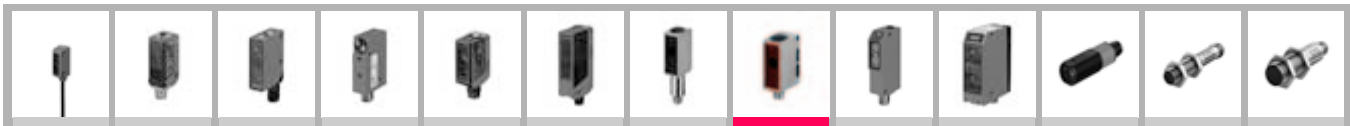
Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors					
RKR 55 / 6.42 - S8.3 50107601	0 1.5 0 1.8	1000 Hz	Red light	Push-pull/DC	Light/dark antivalent
RKR 55 / 6.42 - S8 50105794	0 1.5 0 1.8	1000 Hz	Red light	Push-pull/DC	Light/dark antivalent
RKR 55 / 6.42, 5000 50114073	0 1.5 0 1.8	1000 Hz	Red light	Push-pull/DC	Light/dark antivalent
RKR 55 / 6.42, 200 - S12 50105795	0 1.5 0 1.8	1000 Hz	Red light	Push-pull/DC	Light/dark antivalent
Retro-reflective sensors with polarization filter					
PRK 55 / 6 - S8.3 50107600	0.02 5 0.02 6	1000 Hz	Red light	Push-pull/DC	Light/dark antivalent
PRK 55 / 66 - S8 50105804	0.02 5 0.02 6	1000 Hz	Red light	2xPush-pull/DC	Light/dark antivalent
PRK 55 / 66, 200 - S12 50105805	0.02 5 0.02 6	1000 Hz	Red light	2xPush-pull/DC	Light/dark antivalent
PRK 55 / 66, 5000 50111966	0.02 5 0.02 6	1000 Hz	Red light	2xPush-pull/DC	Light/dark antivalent

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 585

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50106155	K - D M8W - 4P - 5m - FAB	Connection cable 5000 mm, M8 angular, 4-pin, Food+Bev.
d	50106153	K - D M8A - 4P - 5m - FAB	Connection cable 5000 mm, M8 axial, 4-pin, Food+Bev.
e	50104573	K - D M12W - 4P - 5m - FAB	Connection cable 5000 mm, M12 angular, 4-pin, Food+Bev.
f	50104572	K - D M12A - 4P - 5m - FAB	Connection cable 5000 mm, M12 axial, 4-pin, Food+Bev.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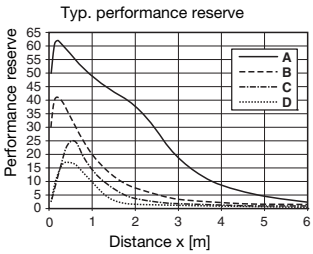
	Connection	Option	Accessories		Typ. performance reserve
	M8 connector	2, 3, 4, 5	a, b		
	M8 connector	1, 3, 4, 5	c, d		
	Cable 5 m	1, 3, 4, 5			
	Cable 0.2 m, with M12 connector	1, 3, 4, 5	e, f		
	M8 connector	5	a, b		
	M8 connector	5	c, d		
	Cable 0.2 m, with M12 connector	5	e, f		
	Cable 5 m	5			



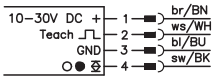
A TK 100x100 **B** TKS 40x60
C TKS 20x40 **D** Tape 4: 50x50

Optical Sensor ABC

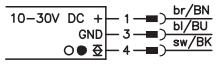
- Retro-reflective sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

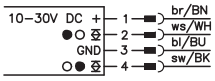
RKR 55/6.42–S8
RKR 55/6.42,200–S12



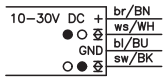
RKR 55/6.42–S8.3
PRK 55/6–S8.3



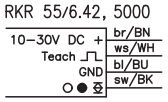
PRK 55/66–S8
PRK 55/66,200–S12



PRK 55/66, 5000



RKR 55/6.42, 5000



Options

1 Teach-in via teach input or lockable teach button

2 Teach-in via teach button

3 Transparent media, especially for foils ≤ 20 µm

4 Autocollimation principle

5 UL approval (class 2 acc. to NEC)

RETRO-REFLECTIVE SENSORS

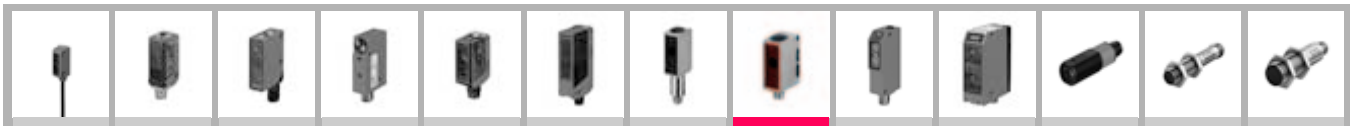
Part description Part No.:	Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors with polarization filter					
PRK 55 / 6.22 - S8.3 50107599	0 – 4 [1] 0 – 5 [1]	1000 Hz	Red light	Push-pull/DC	Light/dark antivalent
PRK 55 / 6.22 - S8 50105792	0 – 4 [1] 0 – 5 [1]	1000 Hz	Red light	Push-pull/DC	Light/dark antivalent
PRK 55 / 6.22, 5000 50111967	0 – 4 [1] 0 – 5 [1]	1000 Hz	Red light	Push-pull/DC	Light/dark antivalent
PRK 55 / 6.22, 200 - S12 50105793	0 – 4 [1] 0 – 5 [1]	1000 Hz	Red light	Push-pull/DC	Light/dark antivalent
PRK 55 / 6.42 - S8 50112991	0 – 3 [1] 0 – 3.6 [1]	1000 Hz	Red light	Push-pull/DC	Light/dark antivalent
PRK 55 / 6.42, 5000 50114071	0 – 3 [1] 0 – 3.6 [1]	1000 Hz	Red light	Push-pull/DC	Light/dark antivalent
PRK 55 / 6.42, 200 - S12 50112477	0 – 3 [1] 0 – 3.6 [1]	1000 Hz	Red light	Push-pull/DC	Light/dark antivalent
PRK 55 / 6D.42 - S8 50112992	0 – 3 [1] 0 – 3.6 [1]	1000 Hz	Red light	Push-pull/DC	Dark/light antivalent
PRK 55 / 6D.42, 200 - S12 50112478	0 – 3 [1] 0 – 3.6 [1]	1000 Hz	Red light	Push-pull/DC	Dark/light antivalent

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 585

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50106155	K - D M8W - 4P - 5m - FAB	Connection cable 5000 mm, M8 angular, 4-pin, Food+Bev.
d	50106153	K - D M8A - 4P - 5m - FAB	Connection cable 5000 mm, M8 axial, 4-pin, Food+Bev.
e	50104573	K - D M12W - 4P - 5m - FAB	Connection cable 5000 mm, M12 angular, 4-pin, Food+Bev.
f	50104572	K - D M12A - 4P - 5m - FAB	Connection cable 5000 mm, M12 axial, 4-pin, Food+Bev.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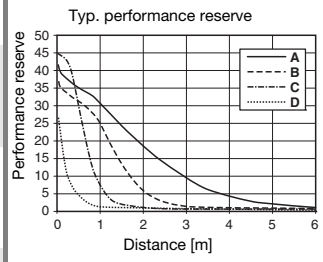
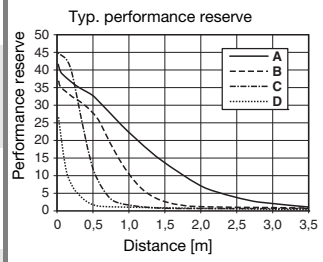
	Connection	Option	Accessories		Typ. performance reserve
	M8 connector	2, 3, 5, 6	a, b		
	M8 connector	1, 3, 5, 6	c, d		
	Cable 5 m	1, 3, 5, 6			
	Cable 0.2 m, with M12 connector	1, 3, 5, 6	e, f		
	M8 connector	1, 4, 5, 6	c, d		
	Cable 5 m	1, 4, 5, 6			
	Cable 0.2 m, with M12 connector	1, 4, 5, 6	e, f		
	M8 connector	1, 4, 5, 6	c, d		
	Cable 0.2 m, with M12 connector	1, 4, 5, 6	e, f		



A TK 100x100 **B** TKS 40x60
C TKS 20x40 **D** Tape 4: 50x50



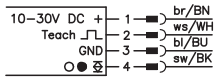
A TK 100x100 **B** TKS 40x60
C TKS 20x40 **D** Tape 4: 50x50

Optical Sensor ABC

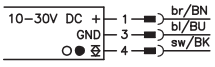
- Retro-reflective sensors with polarization filter Page 593
- Connection types/Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection

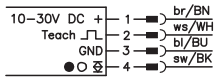
PRK 55/6.22–S8
PRK 55/6.22,200–S12
PRK 55/6.42–S8
PRK 55/6.42,200–S12



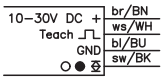
PRK 55/6.22–S8.3



PRK 55/6D.42–S8
PRK 55/6D.42,200–S12



PRK 55/6.22, 5000
PRK 55/6.42, 5000



Options

1	Teach-in via teach input or lockable teach button
2	Teach-in via teach button
3	Precise positioning of objects and reflector markers
4	Highly transparent bottles (PET and glass)
5	Autocollimation principle
6	UL approval (class 2 acc. to NEC)

RETRO-REFLECTIVE SENSORS

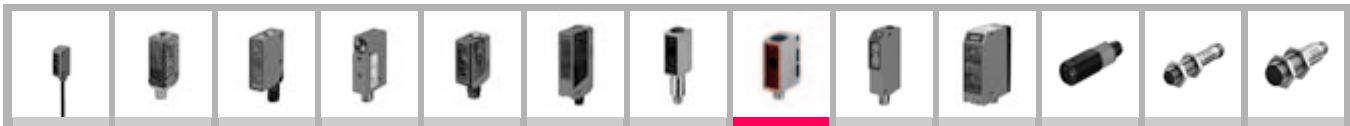
Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective laser sensors with polarization filter					
PRKL 55 / 6.22 - S8.3 50107602	0 2 0 3	2000 Hz	Red light laser class 1	Push-pull/DC	Light/dark antivalent
PRKL 55 / 6.22 - S8 50105796	0 2 0 3	2000 Hz	Red light laser class 1	Push-pull/DC	Light/dark antivalent
PRKL 55 / 6.22, 5000 50114072	0 2 0 3	2000 Hz	Red light laser class 1	Push-pull/DC	Light/dark antivalent
PRKL 55 / 6.22, 200 - S12 50105797	0 2 0 3	2000 Hz	Red light laser class 1	Push-pull/DC	Light/dark antivalent

1) The specified values apply in combination with reflectors MTKS 50 x 50, additional reflectors with range specifications can be found on page 585

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50106155	K - D M8W - 4P - 5m - FAB	Connection cable 5000 mm, M8 angular, 4-pin, Food+Bev.
d	50106153	K - D M8A - 4P - 5m - FAB	Connection cable 5000 mm, M8 axial, 4-pin, Food+Bev.
e	50104573	K - D M12W - 4P - 5m - FAB	Connection cable 5000 mm, M12 angular, 4-pin, Food+Bev.
f	50104572	K - D M12A - 4P - 5m - FAB	Connection cable 5000 mm, M12 axial, 4-pin, Food+Bev.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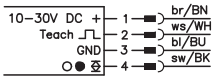
	Connection	Option	Accessories		Typ. performance reserve
	M8 connector	2, 3, 4, 5	a, b		
	M8 connector	1, 3, 4, 5	c, d		
	Cable 5 m	1, 3, 4, 5			
	Cable 0.2 m, with M12 connector	1, 3, 4, 5	e, f		

Optical Sensor ABC

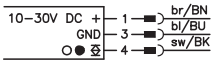
- Retro-reflective sensors with polarization filter Page 593
- Connection types/Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection

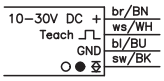
PRKL 55/6.22-S8
PRKL 55/6.22,200-S12



PRKL 55/6.22-S8.3



PRKL 55/6.22, 5000



Options

1	Teach-in via teach input or lockable teach button
2	Teach-in via teach button
3	Detection of small parts and very fast events
4	Autocollimation principle
5	UL approval (class 2 acc. to NEC)

DIFFUSE REFLECTION SCANNERS

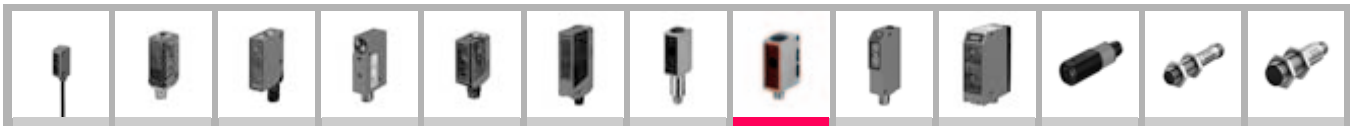
Part description Part No.:	Scanning range [1] [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRTR 55 / 66 - S8 50107484	5 200 5 400	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 55 / 66, 5000 50111968	5 200 5 400	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 55 / 66, 200 - S12 50107492	5 200 5 400	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 55 / 66 - S - S8 50107493	5 100 5 200	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 55 / 66 - S, 5000 50114069	5 100 5 200	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 55 / 66 - S, 200 - S12 50107495	5 100 5 200	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

1) Typical scanning range with a black/white error < 10 %

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50106154	K - D M8W - 4P - 2m - FAB	Connection cable 2000 mm, M8 angular, 4-pin, Food+Bev.
b	50106152	K - D M8A - 4P - 2m - FAB	Connection cable 2000 mm, M8 axial, 4-pin, Food+Bev.
c	50106155	K - D M8W - 4P - 5m - FAB	Connection cable 5000 mm, M8 angular, 4-pin, Food+Bev.
d	50106153	K - D M8A - 4P - 5m - FAB	Connection cable 5000 mm, M8 axial, 4-pin, Food+Bev.
e	50104573	K - D M12W - 4P - 5m - FAB	Connection cable 5000 mm, M12 angular, 4-pin, Food+Bev.
f	50104572	K - D M12A - 4P - 5m - FAB	Connection cable 5000 mm, M12 axial, 4-pin, Food+Bev.


2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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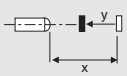
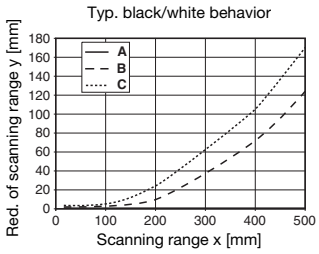
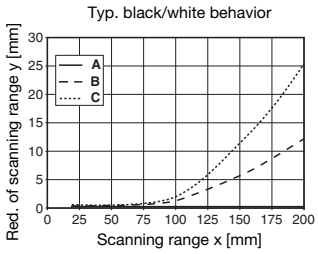
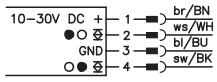
Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % **B** gray 18 % **C** black 6 % 
M8 connector	1, 2, 6	a, b, c, d	
Cable, 5 m	1, 2, 6		
Cable, 0.2 m, with M12 connector	1, 2, 6	e, f	
M8 connector	1, 3, 4, 6	a, b, c, d	
Cable, 5 m	1, 3, 4, 6		
Cable, 0.2 m, with M12 connector	1, 3, 4, 6	e, f	

Optical Sensor ABC

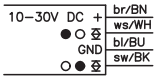
- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

HRTR 55/66-S8
HRTR 55/66,200-S12
HRTR 55/66-S-S8
HRTR 55/66-S,200-S12



HRTR 55/66, 5000
HRTR 55/66-S, 5000



Options

1 Scanning range adjustment via multiturn potentiometer

2 Reliable switching nearly independent of object/background properties

3 Reliable switching even on glossy objects and objects with colored structure

4 Small, homogenous light spot for detecting small parts

5 Broad rectangular light spot guarantees the reliable detection of objects with openings, grid structures, holes, grooves and of objects with changeable position as well as transparent foils/bottles

6 UL approval (class 2 acc. to NEC)

DIFFUSE REFLECTION SCANNERS

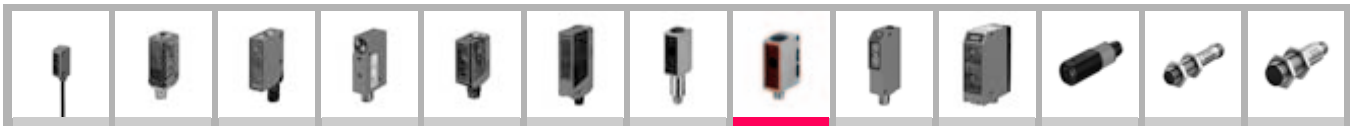
Part description Part No.:	Scanning range [1] [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners with background suppression					
HRTR 55 / 44 - XL, 5000 50116828	5 60 5 100	1000 Hz	Red light	2xPNP/DC	Light/dark antivalent
HRTR 55 / 66 - XL - S8 50107496	5 60 5 100	1000 Hz	Red light	2xPush-pull/DC	Light/dark antivalent
HRTR 55 / 66 - XL, 5000 50114070	5 60 5 100	1000 Hz	Red light	2xPush-pull/DC	Light/dark antivalent
HRTR 55 / 66 - XL, 200 - S12 50107498	5 60 5 100	1000 Hz	Red light	2xPush-pull/DC	Light/dark antivalent
Diffuse reflection laser scanners with background suppression					
HRTL 55 / 66 - S8 50115206	10 170 10 400	2000 Hz	Red light laser class 1	2xPush-pull/DC	Light/dark antivalent
HRTL 55 / 66, 5000 50115205	10 170 10 400	2000 Hz	Red light laser class 1	2xPush-pull/DC	Light/dark antivalent
HRTL 55 / 66, 200 - S12 50115204	10 170 10 400	2000 Hz	Red light laser class 1	2xPush-pull/DC	Light/dark antivalent

1) Typical scanning range with a black/white error < 10 %

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50106154	K - D M8W - 4P - 2m - FAB	Connection cable 2000 mm, M8 angular, 4-pin, Food+Bev.
b	50106152	K - D M8A - 4P - 2m - FAB	Connection cable 2000 mm, M8 axial, 4-pin, Food+Bev.
c	50106155	K - D M8W - 4P - 5m - FAB	Connection cable 5000 mm, M8 angular, 4-pin, Food+Bev.
d	50106153	K - D M8A - 4P - 5m - FAB	Connection cable 5000 mm, M8 axial, 4-pin, Food+Bev.
e	50104573	K - D M12W - 4P - 5m - FAB	Connection cable 5000 mm, M12 angular, 4-pin, Food+Bev.
f	50104572	K - D M12A - 4P - 5m - FAB	Connection cable 5000 mm, M12 axial, 4-pin, Food+Bev.


2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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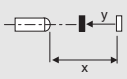
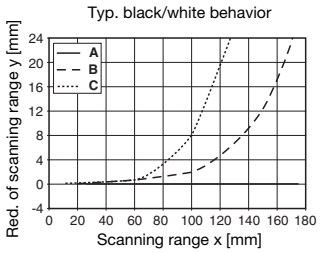
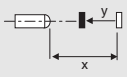
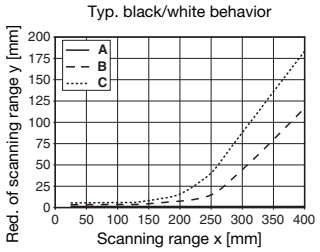
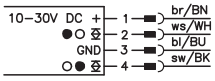
Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % **B** gray 18 % **C** black 6 % 
Cable, 5 m	1, 5, 6		
M8 connector	1, 5, 6	a, b, c, d	
Cable, 5 m	1, 5, 6		
Cable, 0.2 m, with M12 connector	1, 5, 6	e, f	
			A white 90 % **B** gray 18 % **C** black 6 % 
M8 connector	1, 4, 6	a, b, c, d	
Cable, 5 m	1, 4, 6		
Cable, 0.2 m, with M12 connector	1, 4, 6	e, f	

Optical Sensor ABC

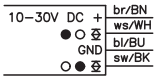
- Diffuse reflection scanners with background suppr. Page 594
- Connection types/Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection

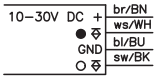
HRTL 55/66–S8
HRTL 55/66,200–S12
HRTR 55/66–XL–S8
HRTR 55/66–XL,200–S12



HRTL 55/66, 5000
HRTR 55/66–XL, 5000



HRTR 55/44–XL, 5000



Options

1 Scanning range adjustment via multiturn potentiometer

2 Reliable switching nearly independent of object/background properties

3 Reliable switching even on glossy objects and objects with colored structure

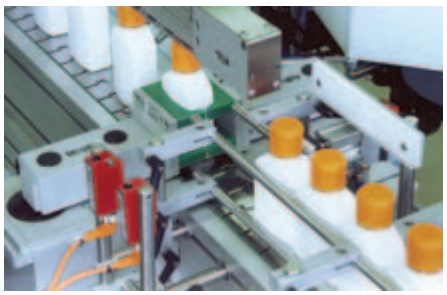
4 Small, homogenous light spot for detecting small parts

5 Broad rectangular light spot guarantees the reliable detection of objects with openings, grid structures, holes, grooves and of objects with changeable position as well as transparent foils/bottles

6 UL approval (class 2 acc. to NEC)

OVERVIEW

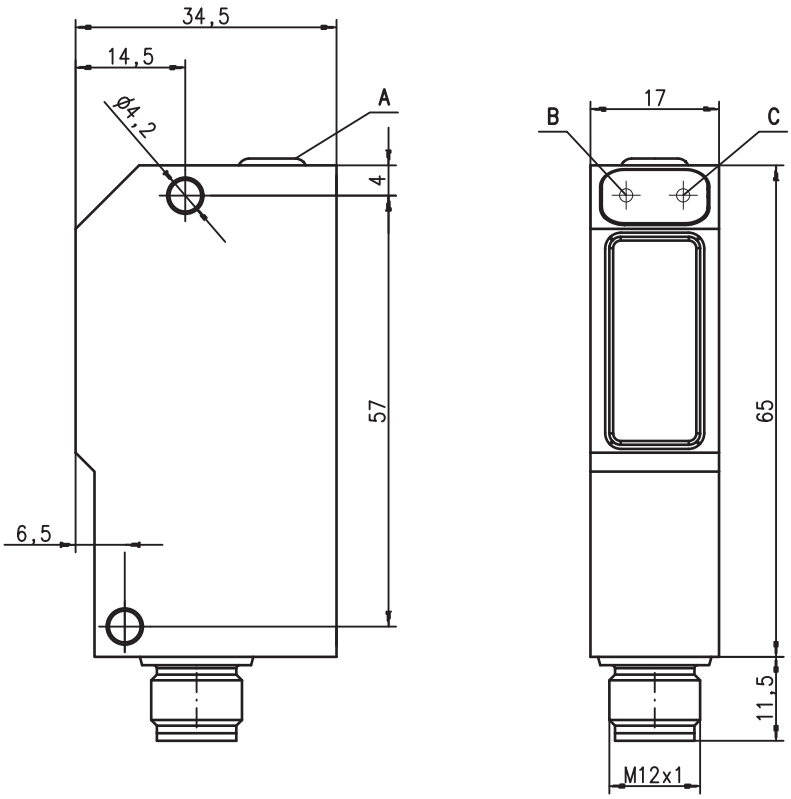
Cover control



Product separation

Postpress applications

Dimensioned drawing



Further details can be found in the respective data sheet.

A Scanning range adjustment
B Yellow switching indicator
C Green operation indicator

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95 SERIES

Operating principle	Typ. operating range limits	Page
Throughbeam sensors	0 … 20 m	158
Retro-reflective sensors	0 … 9 m	160
Diffuse reflection scanners	10 … 900 mm	162

Other 95 Series products:

Protective sensors	SLSR 95	510
AS-interface sensors	PRK 95	534

Common technical data

Electrical data	Operating voltage U_B	10(18) … 30 VDC
	Residual ripple	≤ 15 % of U_B
	Open-circuit current	≤ 35 mA
	Signal voltage high/low	≥ (U_B-2 V)/≤ 2 V
Indicators	Green LED	Ready to operate
	Yellow LED	Switching output
	Flashing yellow LED	No performance reserve
Mechanical data	Housing	Diecast zinc
	Optics cover	Glass
	M12 connector	Stainless steel
	Weight	90 g
Environmental data	Ambient temperature (operation)	-30 °C … +55 °C
	VDE safety class	II, all-insulated
	Protection class	IP 67, IP 69K
	Standards applied	IEC 60947-5-2, UL 508

Mounting systems for this series can be found from **page 544** onwards

Features

- **Metal housing**
- **Glass optics**
- **IP 67 and IP 69K**
- **Active ambient light suppression A²LS**
- **Detection of PET, foil, and glass**

Optical Sensor ABC

- Throughbeam sensors Page 593
- Retro-reflective sensors Page 593
- Diffuse reflection scanners Page 594
- A²LS Page 601

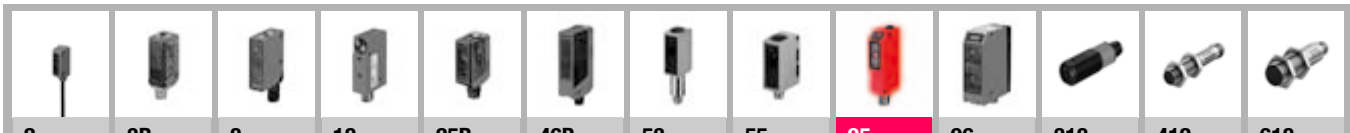
THROUGHBEAM SENSORS

Part description Part No.:		Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Throughbeam sensors		▶ = Transmitter ◀ = Receiver				
▶ LSR 95 / 2.8 SE - L.1 **◀ ILSR 95 / 44 E - L.1**	50034509 50034510	0 12 0 18	1000 Hz	Red light	2 x PNP/DC	Light/dark antivalent
▶ LS 95 / 2.8 SE - L.1 **◀ ILS 95 / 44 E - L.1**	50026835 50026836	0 12 0 20	1000 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000 mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000 mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC
e	50104560	K - D M12W - 5P - 10m - PVC	Connection cable 10000 mm, M12 angular, 5-pin, PVC
f	50104559	K - D M12A - 5P - 10m - PVC	Connection cable 10000 mm, M12 axial, 5-pin, PVC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95 SERIES

Throughbeam sensors

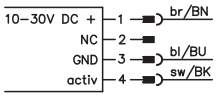
	Connection	Option	Accessories		Typ. light spot
	M12 connector	1, 2, 3, 4	a, b, c, d, e, f		
	M12 connector	2, 3, 4	a, b, c, d, e, f		

Optical Sensor ABC

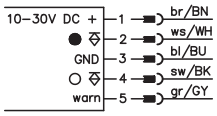
- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

LS 95/2.8 SE-L.1 (500 26835)
LSR 95/2.8 SE-L.1 (500 34509)



ILS 95/44 E-L.1 (500 26836)
ILSR 95/44 E-L.1 (500 34510)



Options

1	Sensitivity adjustment via multiturn potentiometer
2	Transmitter with activation input
3	Receiver with warning output
4	UL approval

RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors with polarization filter					
PRK 95 / 44 L 50034511	0.2 … 6 0.2 … 9	1000 Hz	Red light	2xPNP/DC	Light/dark antivalent
IPRK 95 / 44 L.5 50034512	0.2 … 6 0.2 … 9	1000 Hz	Red light	2xPNP/DC	Light/dark antivalent
IPRK 95 / 4.8 L.2 50030257	0 … 4.2 0 … 6	1000 Hz	Red light	PNP/DC	Light
IPRK 95 / 44 L.2 50022680	0 … 4.2 0 … 6	1000 Hz	Red light	2xPNP/DC	Light/dark antivalent
IPRK 95 / 44 L.21 50102613	0 … 4.2 0 … 6	1000 Hz	Red light	2xPNP/DC	Light/dark antivalent
PRK 95 / 4 L.2 50027993	0 … 3.4 0 … 5	200 Hz	Red light	PNP/DC	Light
IPRK 95 / 44 L.3 50022681	0 … 0.3 (with refl. tape 4, 10x10) 0 … 0.3 (with refl. tape 4, 10x10)	1000 Hz	Red light	2xPNP/DC	Light/dark antivalent
PRK 95 / 44 L.4 50025609	0 … 1.8 0 … 3	1000 Hz	Red light	2xPNP/DC	Light/dark antivalent

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 585

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
f	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC

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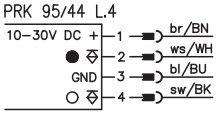
	Connection	Option	Accessories		Typ. light spot
	M12 connector	8	a, b, c, d		
	M12 connector	1, 5, 8	e, f		
	M12 connector	3, 4, 5, 8	e, f		
	M12 connector	3, 5, 8	e, f		
	M12 connector	1, 3, 5, 8	e, f		
	M12 connector	3, 6, 8	a, b, c, d		
	M12 connector	3, 5, 7, 8	e, f		
	M12 connector	1, 2, 3, 8	a, b, c, d		

Optical Sensor ABC

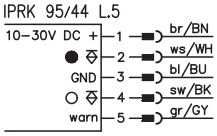
- Retro-reflective sensors with polarization filter Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

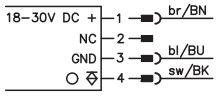
PRK 95/44 L
PRK 95/44 L.4



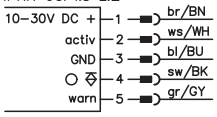
IPRK 95/44 L.21
IPRK 95/44 L.2
IPRK 95/44 L.3
IPRK 95/44 L.5



PRK 95/4 L.2



IPRK 95/4.8 L.2



Options

1	Sensitivity adjustment via multiturn potentiometer
2	Transparent media
3	Autocollimation principle
4	Activation input
5	Warning output
6	Direct connection to AS-interface I/O coupling modules
7	Focus at 100 mm
8	UL approval

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Energetic diffuse reflection scanners					
RKR 95 / 44 - 600 L 50034513	20 600 20 900	1000 Hz	Red light	2xPNP/DC	Light/dark antivalent
IRKR 95 / 44 - 250 L 50025612	10 250 10 400	1000 Hz	Red light	2xPNP/DC	Light/dark antivalent
IRK 95 / 44 - 250 L 50025611	10 250 10 400	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
Diffuse reflection scanners with background suppression					
FRKR 95 / 44 - 350 L 50034514	20 350 20 500	1000 Hz	Red light	2xPNP/DC	Light/dark antivalent
FRK 95 / 44 - 350 L 50034515	20 350 20 500	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
FRKR 95 / 44 - 150 L 50025610	20 150 20 190	1000 Hz	Red light	2xPNP/DC	Light/dark antivalent
FRK 95 / 44 - 150 L 50019925	20 150 20 230	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
FRK 95 / 22 - 150 L 50022794	20 150 20 230	1000 Hz	Infrared light	2xNPN/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
b	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC

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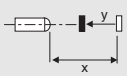
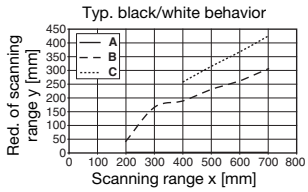
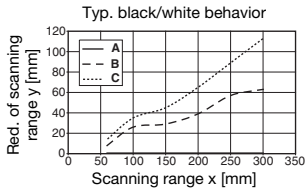
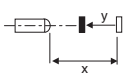
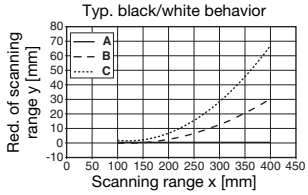
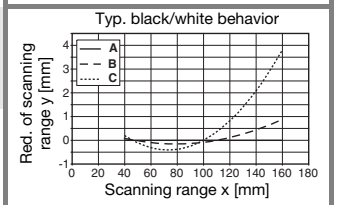
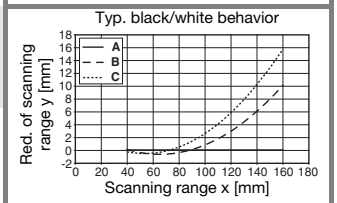
Connection	Option	Accessories		Typ. b/w behavior
				A white 90 % B gray 18 % C black 6 % 
M12 connector	1, 5	a, b		
M12 connector	1, 2, 5	c, d		
M12 connector	1, 2, 5	c, d		
				A white 90 % B gray 18 % C black 6 % 
M12 connector	1, 4, 5	a, b		
M12 connector	1, 3, 5	a, b		
M12 connector	1, 4, 5	a, b		
M12 connector	1, 5	a, b		
M12 connector	1, 5	a, b		

Options

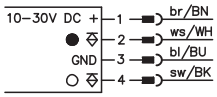
1	Scanning range adjustment via potentiometer/multiturn potentiometer
2	Warning output
3	Shiny/inclined surfaces
4	Focussed light beam
5	UL approval

Optical Sensor ABC

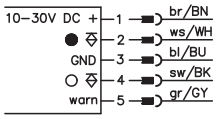
- Diffuse reflection scanners Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

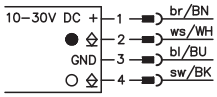
RKR 95/44-600 L
FRK 95/44-350 L
FRKR 95/44-350 L
FRK 95/44-150 L
FRKR 95/44-150 L



IRK 95/44-250 L
IRKR 95/44-250 L

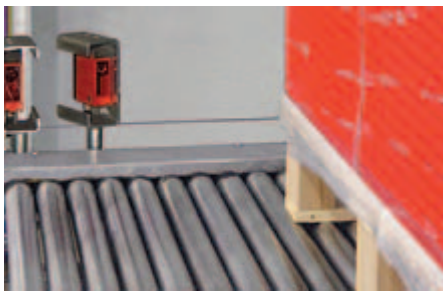


FRK 95/22-150 L



OVERVIEW

Compartment occupancy monitoring

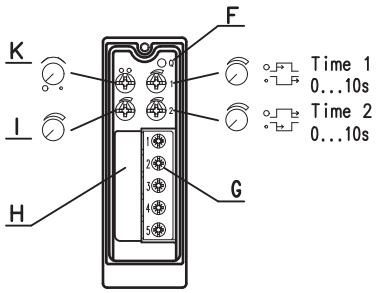


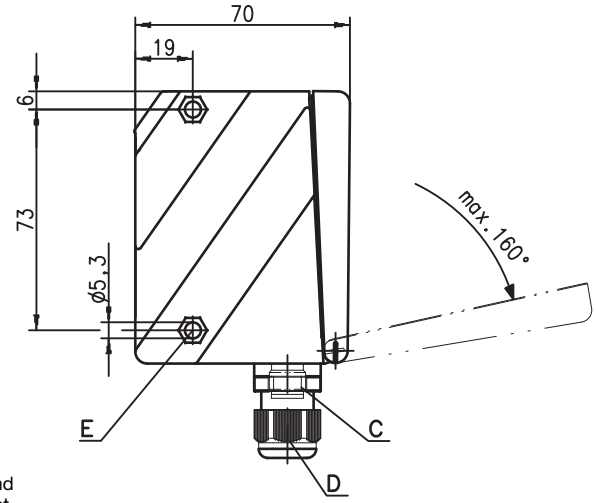
Pallet detection

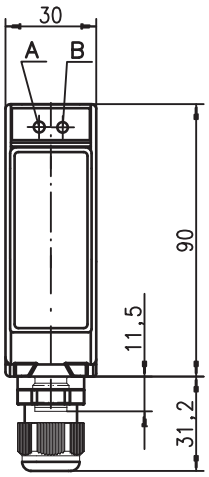
Pallet repositioning

Dimensioned drawing

A Green indicator diode
B Yellow indicator diode
C Device plug M12x1
D Screwed cable gland M16x1.5 for Ø 5 ... 10mm
E Countersinking for SK nut M5, 4.2 deep
F Output with switching delay option
G Connection terminals
H Cable entry
I Scanning range adjustment
K Light/dark switching







Further details can be found in the respective data sheet.

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96 SERIES / DC

Operating principle	Typ. operating range limits	Page
Throughbeam sensors	0 150 m	166
Retro-reflective sensors	0 28 m	170
Diffuse reflection scanners	0.01 25 m	176

Other 96 Series products:

AC-DC versions	LS 96, (P)RK 96, (H)RT 96	190
Optical distance sensors	ODS 96, ODSL 96	262
Protective sensors	SLS 96	512

Common technical data

Electrical data	Operating voltage U_B	10[1] … 30VDC
	Residual ripple	≤ 15% of U_B
	Open-circ. curr. (heating)	≤ 50mA (≤ 130mA)
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Green LED	Ready to operate
	Yellow LED	Switching output
	Flashing yellow LED	No performance reserve
Mechanical data	Housing	Metal or plastic
	Optics cover	Glass or plastic
	Weight (metal/plastic)	380g/150g
Environmental data	Ambient temperature (operation)	-40°C … +55°C Laser: -40°C … +50°C
	VDE safety class	II, all-insulated
	Protection class	IP 67, IP 69K [2]
	Standards applied	IEC 60947-5-2, UL 508

1) Laser sensors have different values
2) IP 69K only with metal housing

Mounting systems for this series can be found from **page 545** onwards

Features

- **Metal or plastic housing**
- **Large, dirt-resistant optical surface**
- **IP 67 and IP 69K**
- **Active ambient light suppression A²LS**
- **Universally usable due to long operating ranges and high performance reserve**
- **Connection via terminals or M12 connectors**
- **Laser class 1**

Optical Sensor ABC

- Throughbeam sensors Page 593
- Retro-reflective sensors Page 593
- Diffuse reflection scanners Page 594
- A²LS Page 601

THROUGHBEAM SENSORS / DC

Part description Part No.:		Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Throughbeam sensors in metal housing			▶ = Transmitter ◀ = Receiver			
▶ **LSS 96 M - 120W - 43**	50031574	0 30	500 Hz	Red light	2xPNP/DC	Light/dark antivalent
◀ **LSE 96 M/P - 181W - 41**	50031575	0 39				
▶ **LSS 96 M - 1206 - 43**	50032129	0 30	500 Hz	Red light	2xPNP/DC	Light/dark antivalent
◀ **LSE 96 M/P - 1816 - 41**	50032128	0 39				
▶ **LSS 96 M - 1200 - 23**	50025217	0 30	500 Hz	Red light	PNP/DC	Light
◀ **LSE 96 M/P - 1170 - 22**	50025195	0 39				
▶ **LSS 96 M - 1070 - 43**	50025228	0 120	500 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
◀ **LSE 96 M/P - 3010 - 41**	50034128	0 150				
▶ **LSS 96 M - 1090 - 43**	50103290	0 120	500 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
◀ **LSE 96 M/P - 3012 - 41**	50103291	0 150				
▶ **LSS 96 M - 1070 - 23**	50025225	0 120	500 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
◀ **LSE 96 M/P - 3010 - 21**	50082296	0 150				
▶ **LSS 96 M - 1090 - 24**	50025223	0 120	500 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
◀ **LSE 96 M/P - 3012 - 21**	50033328	0 150				
▶ **LSS 96 M - 1070 - 43**	50025228	0 50	500 Hz	Infrared light	PNP/DC	Light
◀ **LSE 96 M/P - 1040 - 42**	50025205	0 65				
▶ **LSS 96 M - 1090 - 24**	50025223	0 50	500 Hz	Infrared light	PNP/DC	Light
◀ **LSE 96 M/P - 1130 - 22**	50025201	0 65				
▶ **LSS 96 M - 1070 - 23**	50025225	0 50	500 Hz	Infrared light	2xNPN/DC	Light/dark antivalent
◀ **LSE 96 M/N - 1010 - 27**	50031295	0 65				

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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	Connection	Option	Accessories		Typ. light spot
	M12 connector	2, 7	a, b, c, d, e, f		
	M12 connector	2, 5, 7	a, b, c, d, e, f		
	Terminals	1, 4, 6, 7			
	M12 connector	1, 7	a, b, c, d, e, f		
	M12 connector	1, 3, 5, 7	a, b, c, d, e, f		
	Terminals	1, 7			
	Terminals	1, 3, 5, 7			
	M12 connector	1, 4, 6, 7	a, b, c, d, e, f		
	Terminals	1, 3, 4, 5, 6, 7			
	Terminals	1, 7			

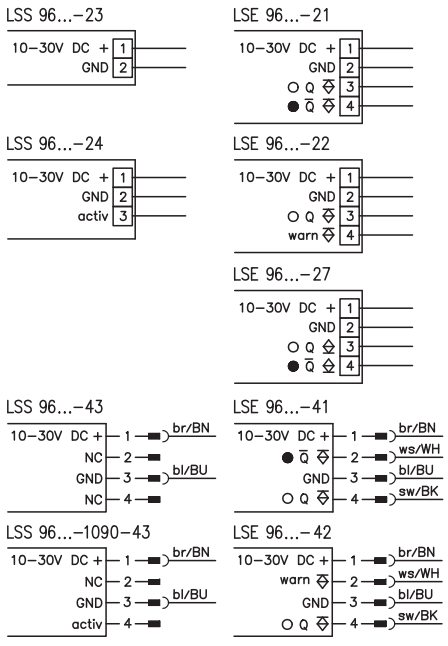
Options

1	Sensitivity adjustment via potentiometer
2	Wide angle version for easy alignment
3	Transmitter with activation input
4	Receiver with warning output
5	Low-temperature version with optics heating
6	Switching delay
7	UL approval

Optical Sensor ABC

- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection



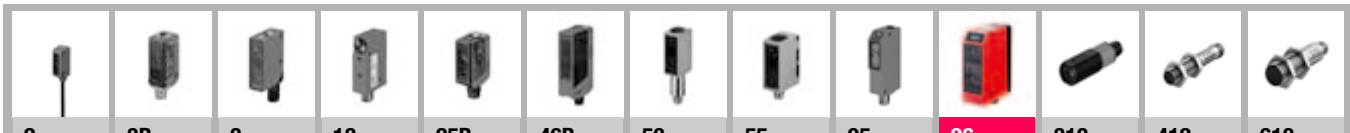
THROUGHBEAM SENSORS / DC

Part description Part No.:	Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Throughbeam sensors in metal housing		▶ = Transmitter ◀ = Receiver			
▶ **LSS 96 M - 1093 - 24** 50106871 ◀ **LSE 96 M/P 3012 - 21** 50033328	0 120 0 150	500 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
▶ **LSS 96 M - 1206 - 43** 50032129 ◀ **LSE 96 M/P - 1170 - 42** 50025197	0 30 0 39	500 Hz	Red light	2 x PNP/DC	Light/dark antivalent
Throughbeam sensors in plastic housing		▶ = Transmitter ◀ = Receiver			
▶ **LSS 96 K - 1213 - 24** 50080657 ◀ **LSE 96 K/P - 1140 - 21** 50030269	0 30 0 39	500 Hz	Red light	2 x PNP/DC	Light/dark antivalent
▶ **LSS 96 K - 1070 - 43** 50025254 ◀ **LSE 96 K/P - 1015 - 45** 50103004	0 50 0 65	500 Hz	Infrared light	PNP/DC	Dark
▶ **LSS 96 K - 1070 - 43** 50025254 ◀ **LSE 96 K/P - 1010 - 41** 50025258	0 50 0 65	500 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
▶ **LSS 96 K - 1070 - 43** 50025254 ◀ **LSE 96 K/P - 1030 - 41** 50080483	0 50 0 65	500 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
▶ **LSS 96 K - 1070 - 23** 50025255 ◀ **LSE 96 K/P - 1030 - 21** 50025259	0 50 0 65	500 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
▶ **LSS 96 K - 1079 - 43** 50108812 ◀ **LSE 96 K/P - 1039.1 - 41** 50108813	0 30 0 35	500 Hz	Infrared light	1 x PNP/DC	Light/dark reversible

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC


2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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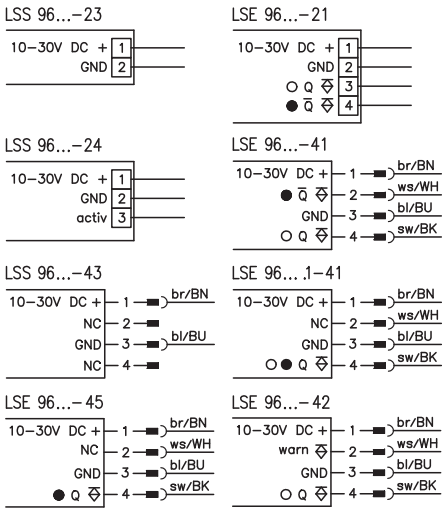
	Connection	Option	Accessories		Typ. light spot
	Terminals	1, 5, 7, 8, 3			
	M12 connector	1, 4, 6, 8	a, b, c, d, e, f		
	Terminals	1, 3, 8			
	M12 connector	1, 2, 8	a, b, c, d, e, f		
	M12 connector	1, 8	a, b, c, d, e, f		
	M12 connector	1, 6, 8	a, b, c, d, e, f		
	Terminals	1, 6, 8			
	M12 connector	1, 2, 6, 8	a, b, c, d, e, f		

Optical Sensor ABC

- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1	Sensitivity adjustment via potentiometer
2	Direct connection to AS-interface I/O coupling modules
3	Transmitter with activation input
4	Warning output
5	Low-temperature version with optics heating
6	Switching delay
7	Transmitter activated when activation input = low
8	UL approval

RETRO-REFLECTIVE SENSORS / DC

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors in metal housing					
RK 96 M/P - 1440 - 21 50030648	0.3 – 15 0.1 – 18	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
Retro-reflective sensors in metal housing with polarization filter					
PRK 96 M/P - 3380 - 41 50061452	0.3 – 15 0.1 – 18	1000 Hz	Red light	2xPNP/DC	Light/dark antivalent
PRK 96 M/P - 3360 - 21 50082065	0.3 – 15 0.1 – 18	1000 Hz	Red light	2xPNP/DC	Light/dark antivalent
PRK 96 M/N - 3366 - 27 50102379	0.3 – 15 0.1 – 18	1000 Hz	Red light	2xNPN/DC	Light/dark antivalent
PRK 96 M/P - 1361.1 - 47 50104279	0.3 – 8 0.1 – 10	1000 Hz	Red light	PNP/DC	Light/dark reversible
PRK 96 M/P - 1362 - 47 50080477	0.3 – 8 0.1 – 10	1000 Hz	Red light	PNP/DC	Light
PRK 96 M/P - 1361 - 47 50082092	0.3 – 8 0.1 – 10	1000 Hz	Red light	PNP/DC	Light
PRK 96 M/P - 1370 - 42 50025186	0.3 – 8 0.1 – 10	1000 Hz	Red light	PNP/DC	Light
PRK 96 M/P - 1375 - 22 50109208	0.3 – 8 0.1 – 10	1000 Hz	Red light	PNP/DC	Dark

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 586

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC

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96 SERIES

Retro-reflective sensors

	Connection	Option	Accessories		Typ. light spot
	Terminals	1, 7			
	M12 connector	1, 5, 7	a, b, c, d		
	Terminals	1, 7			
	Terminals	1, 4, 7			
	M12 connector	1, 2, 7	a, b, c, d		
	M12 connector	1, 2, 4, 7	a, b, c, d		
	M12 connector	1, 2, 7	a, b, c, d		
	M12 connector	1, 3, 7	a, b, c, d		
	Terminals	1, 3, 7			

Options

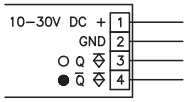
1	Sensitivity adjustment via potentiometer
2	Activation input
3	Warning output
4	Low-temperature version with optics heating
5	Switching delay
6	Direct connection to AS-interface I/O coupling modules
7	UL approval

Optical Sensor ABC

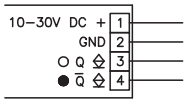
- Retro-reflective sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

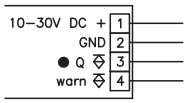
PRK 96...–21



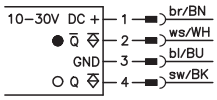
PRK 96...–27



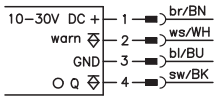
PRK 96...–22



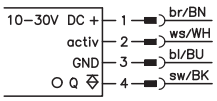
PRK 96...–41



PRK 96...–42



PRK 96...–47



RETRO-REFLECTIVE SENSORS / DC

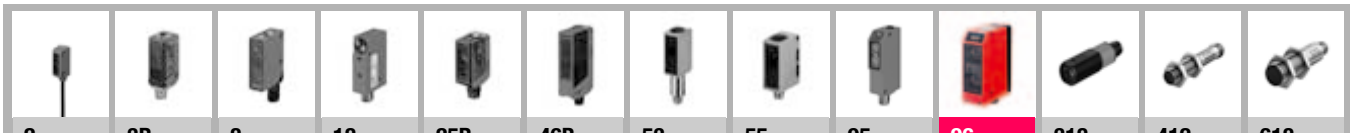
Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors in metal housing with polarization filter					
PRK 96 M/P - 1400 - 42 50031549	0.3 … 8 0.1 … 10	1000 Hz	Red light	PNP/DC	Light
PRK 96 M/P - 1370 - 22 50025182	0.3 … 8 0.1 … 10	1000 Hz	Red light	PNP/DC	Light
PRK 96 M/P - 1400 - 22 50025178	0.3 … 8 0.1 … 10	1000 Hz	Red light	PNP/DC	Light
PRK 96 M/P - 1832 - 41 50105622	0 … 7 0 … 8.5	1000 Hz	Red light	PNP/DC	Light/dark reversible
PRK 96 M/P - 1838 - 41 50080760	0 … 7 0 … 8.5	1000 Hz	Red light	PNP/DC	Light/dark reversible
PRK 96 M/P - 1838 - 21 50029880	0 … 7 0 … 8.5	1000 Hz	Red light	PNP/DC	Light/dark reversible
PRK 96 M/P - 2838 - 28 50082060	0 … 7 0 … 8.5	1000 Hz	Red light	2 x PNP/DC	Light/dark antivalent
PRK 96 M/P - 1830 - 41 50080469	0 … 1.5 0 … 1.85	1000 Hz	Red light	PNP/DC	Light/dark reversible
PRK 96 M/P - 1830 - 21 50028975	0 … 1.5 0 … 1.85	1000 Hz	Red light	PNP/DC	Light/dark reversible

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 586

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC


2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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96 SERIES

Retro-reflective sensors

	Connection	Option	Accessories		Typ. light spot
	M12 connector	2, 3, 4, 5, 9	a, b, c, d, e, f		
	Terminals	2, 3, 9			
	Terminals	2, 3, 4, 5, 9			
	M12 connector	3, 9	a, b, c, d, e, f		
	M12 connector	1, 6, 7, 9	a, b, c, d, e, f		
	Terminals	1, 6, 7, 9			
	Terminals	2, 6, 9			
	M12 connector	1, 6, 7, 8, 9	a, b, c, d, e, f		
	Terminals	1, 6, 7, 8, 9			

Options

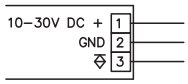
1	Intelligent sensitivity adjustment via 10-turn-potentiometer
2	Sensitivity adjustment via potentiometer
3	Warning output
4	Low-temperature version with optics heating
5	Switching delay
6	Autocollimation principle
7	Transparent media
8	Integrated slit diaphragm for detection of the smallest gaps
9	UL approval

Optical Sensor ABC

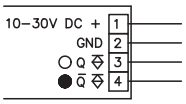
- Retro-reflective sensors with polarization filter — Page 593
- Connection types — Page 598
- Outputs — Page 598

Electrical connection

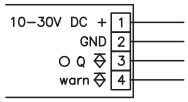
PRK 96...–21



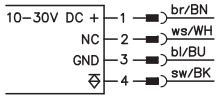
PRK 96...–28



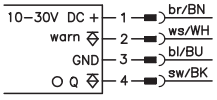
PRK 96...–22



PRK 96...–41



PRK 96...–42



RETRO-REFLECTIVE SENSORS / DC

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors in plastic housing with polarization filter					
PRK 96 K/P - 3368 - 41 50041042	0.3 – 26 0.1 – 28	1000 Hz	Red light	2xPNP/DC	Light/dark antivalent
PRK 96 K/P - 1361 - 29 50080476	0.3 – 8 0.1 – 10	1000 Hz	Red light	PNP/DC	Light
PRK 96 K/P - 1360.1 - 41 50103216	0.3 – 8 0.1 – 10	1000 Hz	Red light	PNP/DC	Light/dark reversible
PRK 96 K/P - 1360 - 41 50025165	0.3 – 8 0.1 – 10	1000 Hz	Red light	2xPNP/DC	Light/dark antivalent
PRK 96 K/P - 1380 - 41 50025166	0.3 – 8 0.1 – 10	1000 Hz	Red light	2xPNP/DC	Light/dark antivalent
PRK 96 K/P - 1360 - 21 50025163	0.3 – 8 0.1 – 10	1000 Hz	Red light	2xPNP/DC	Light/dark antivalent
PRK 96 K/N - 1380 - 46 50081325	0.3 – 8 0.1 – 10	1000 Hz	Red light	2xNPN/DC	Light/dark antivalent

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 586

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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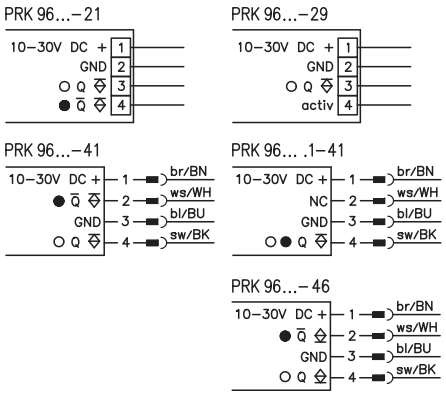
	Connection	Option	Accessories		Typ. light spot
	M12 connector	1, 6	a, b, c, d, e, f		
	Terminals	1, 2, 6			
	M12 connector	1, 5, 6	a, b, c, d, e, f		
	M12 connector	1, 6	a, b, c, d, e, f		
	M12 connector	1, 4, 6	a, b, c, d, e, f		
	Terminals	1, 6			
	M12 connector	1, 4, 6	a, b, c, d, e, f		

Optical Sensor ABC

- Retro-reflective sensors with polarization filter — Page 593
- Connection types — Page 598
- Outputs — Page 598

Electrical connection



Options

1	Sensitivity adjustment via potentiometer
2	Activation input (active high)
3	Activation input (active low)
4	Switching delay
5	Direct connection to AS-interface I/O coupling modules
6	UL approval

DIFFUSE REFLECTION SCANNERS / DC

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Energetic diffuse reflection scanners in metal housing					
RT 96 M/P - 1474 - 800 - 42 50041597	20 800 20 1200	1000 Hz	Infrared light	PNP/DC	Light
Energetic diffuse reflection scanners in plastic housing					
RT 96 K/P - 1444 - 800 - 41 50081178	20 800 20 1200	1000 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
RT 96 K/P - 1444 - 800 - 21 50081177	20 800 20 1200	1000 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
RT 96 K/N - 1444 - 800 - 46 50041595	20 800 20 1200	1000 Hz	Infrared light	2 x NPN/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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96 SERIES

Diffuse reflection scanners

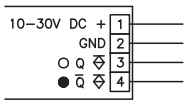
	Connection	Option	Accessories		Typ. b/w behavior
	M12 connector	1, 2, 3, 4, 5	a, b, c, d, e, f		
	M12 connector	1, 3, 5	a, b, c, d, e, f		
	Terminals	1, 3, 5			
	M12 connector	1, 3, 5	a, b, c, d, e, f		

Optical Sensor ABC

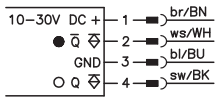
- Diffuse reflection scanners energetic Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

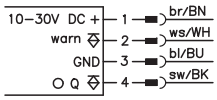
RT 96...–21



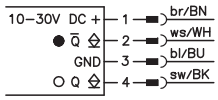
RT 96...–41



RT 96...–42



RT 96...–46



Options

1	Scanning range adjustment via potentiometer
2	Warning output
3	Short range 20mm
4	Switching delay
5	UL approval

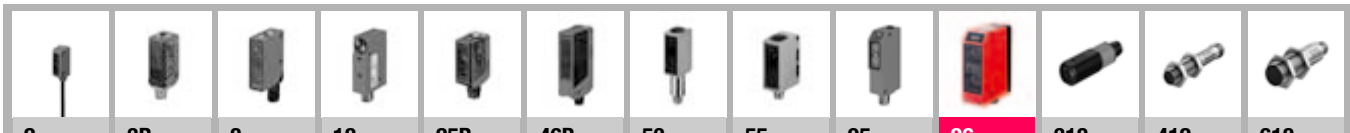
DIFFUSE REFLECTION SCANNERS / DC

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners in metal housing with background suppression					
HRT 96 M/P - 1630 - 800 - 41 50080047	100 800 100 1200	300 Hz	Red light	2 x PNP/DC	Light/dark antivalent
HRT 96 M/P - 1636 - 800 - 41 50032127	100 800 100 1200	300 Hz	Red light	2 x PNP/DC	Light/dark antivalent
HRT 96 M/P - 1640 - 800 - 41 50025126	100 800 100 1200	300 Hz	Red light	2 x PNP/DC	Light/dark antivalent
HRT 96 M/P - 1640 - 800 - 21 50025124	100 800 100 1200	300 Hz	Red light	2 x PNP/DC	Light/dark antivalent
HRT 96 M/P - 3604 - 2000 - 42 50060858	10 2000 10 2500	300 Hz	Infrared light	2 x PNP/DC	Light, configurable
HRT 96 M/P - 1600 - 2000 - 42 50060857	100 2000 100 2500	300 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
HRT 96 M/P - 1620 - 1800 - 41 50113909	100 1800 100 2000	300 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC


2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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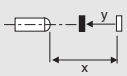
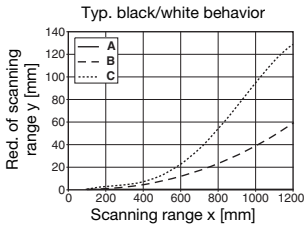
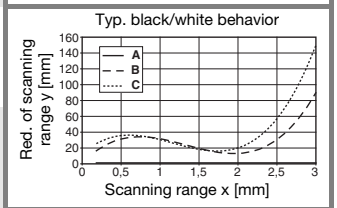
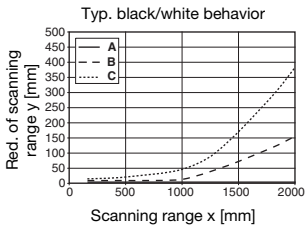
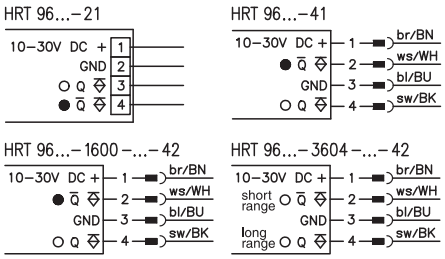
Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % **B** gray 18 % **C** black 6 % 
M12 connector	1, 5	a, b, c, d, e, f	
M12 connector	1, 3, 5	a, b, c, d, e, f	
M12 connector	1, 4, 5	a, b, c, d, e, f	
Terminals	1, 4, 5		
M12 connector	1, 2, 4, 5	a, b, c, d, e, f	
M12 connector	1, 4, 5	a, b, c, d, e, f	
M12 connector	1, 3, 5	a, b, c, d, e, f	

Optical Sensor ABC

- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1	Scanning range adjustment via multiturn potentiometer
2	2 switching points for short/distant range, programmable switching outputs
3	Low-temperature version with optics heating
4	Switching delay
5	UL approval

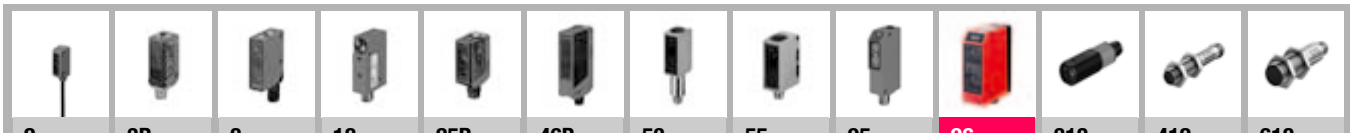
DIFFUSE REFLECTION SCANNERS / DC

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners in metal housing with background suppression					
HRT 96 M/P - 1610 - 1200 - 41 50025118	100 1200 100 1800	300 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
HRT 96 M/P - 1620 - 1200 - 41 50061102	100 1200 100 1800	300 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
HRT 96 M/P - 1610 - 1200 - 21 50025116	100 1200 100 1800	300 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
HRT 96 M/P - 1620 - 1200 - 21 50025114	100 1200 100 1800	300 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
HRT 96 M/N - 1606 - 1200 - 27 50040358	100 1200 100 1800	300 Hz	Infrared light	2 x NPN/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC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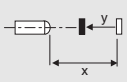
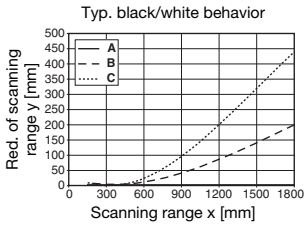
96 SERIES

Diffuse reflection scanners

	Connection	Option	Accessories		Typ. b/w behavior
					A white 90 % **B** gray 18 % **C** black 6 % 
	M12 connector	1, 3, 4	a, b, c, d, e, f		
	M12 connector	1, 2, 3, 4	a, b, c, d, e, f		
	Terminals	1, 3, 4			
	Terminals	1, 2, 3, 4			
	Terminals	1, 2, 4			



Optical Sensor ABC

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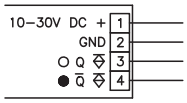
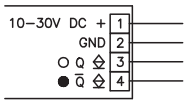
Electrical connection

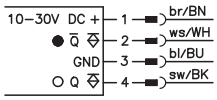
HRT 96...–21



HRT 96...–27



HRT 96...–41



Options

1	Scanning range adjustment via multiturn potentiometer
2	Low-temperature version with optics heating
3	Switching delay
4	UL approval

DIFFUSE REFLECTION SCANNERS / DC

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection laser scanners in metal housing with background suppression					
HRTL 96B M/6.9S - S12 50110990	100 6000 50 6500	100Hz	Red light laser class 2	1xPush-pull/DC	Light
HRTL 96B M/6.4.02S - S12 50111815	100 6000 50 6500	100Hz	Red light laser class 2	1xPush-pull/DC	Light
HRTL 96B M/6.49.02S - S12 50112803	100 6000 50 6500	100Hz	Red light laser class 2	1xPush-pull/DC	Light
HRTL 96B M/66.01S - S12 50108889	100 6000 50 6500	100Hz	Red light laser class 2	2xPush-pull/DC	Light
HRTL 96B M/666.01S - S12 50112804	100 6000 50 6500	100Hz	Red light laser class 2	3xPush-pull/DC	Light
HRTL 96B M/V66.01S - S12 50110952	100 6000 50 6500	100Hz	Red light laser class 2	Analog/V 2xpush-pull/DC	Light
HRTL 96B M/C66.01S - S12 50111208	100 6000 50 6500	100Hz	Red light laser class 2	Analog/mA[1)] 2xpush-pull/DC	Light
HRTL 96B M/C66.03S - S12 50114306	100 6000 50 6500	100Hz	Red light laser class 2	Analog/mA[2)] 2xpush-pull/DC	Light

1) Analog output 4 … 20mA corresponding to 150 … 12000mm / reference: white 90%
2) Analog output 4 … 20mA corresponding to 150 … 2000mm / reference: white 90%

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000mm, M12 axial, 5-pin, PVC
e	50104560	K - D M12W - 5P - 10m - PVC	Connection cable 10000mm, M12 angular, 5-pin, PVC
f	50104559	K - D M12A - 5P - 10m - PVC	Connection cable 10000mm, M12 axial, 5-pin, PVC
g	50111527	REF 7 - A - 100 x 100	HG foil 100x100mm² for realizing large scanning ranges

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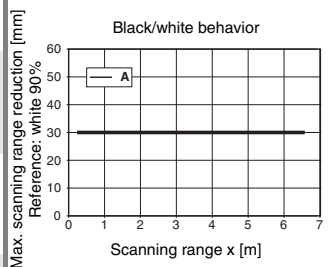
	Connection	Option	Accessories		Typ. b/w behavior
	M12 connector	2, 6, 7, 8, 9	a, b, c, d, e, f		
	M12 connector	2, 6, 8, 9, 10	a, b, c, d, e, f		
	M12 connector	2, 6, 8, 9, 10, 11	a, b, c, d, e, f		
	M12 connector	2, 3, 6, 8, 9	a, b, c, d, e, f		
	M12 connector	2, 4, 6, 9	a, b, c, d, e, f		
	M12 connector	2, 5, 6, 8, 9	a, b, c, d, e, f		
	M12 connector	2, 5, 6, 8, 9	a, b, c, d, e, f		
	M12 connector	2, 5, 6, 8, 9	a, b, c, d, e, f		

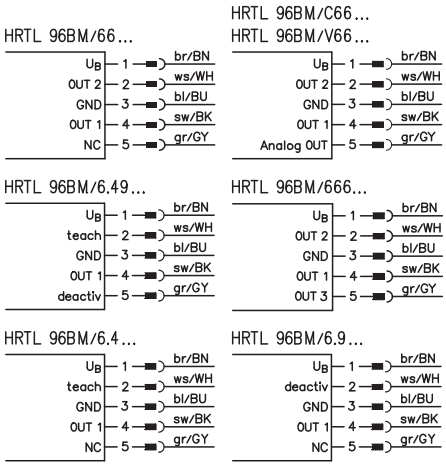


A 6 ... 90 % diffuse reflection

Optical Sensor ABC

- Diffuse reflection scanners Page 594
- Sensors w. laser transmitter Page 599
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1	Switching point adjustment via potentiometer
2	Switching point adjustment via teach buttons
3	2 independently adjustable switching points
4	3 independently adjustable switching points
5	2 independently adjustable switching points + analog output
6	Adjustable switching behavior: light/dark
7	Deactivation input
8	Switching state indicator diodes for each switching output
9	Preset reserve + hysteresis for optimum, reliable switching behavior
10	Input for external teach with window function
11	External mode changeover via deactivation input

DIFFUSE REFLECTION SCANNERS / DC

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection laser scanners in metal housing with background suppression					
HRTL 96B M/66.9.03S - S12 50112862	150 25000 [1) 2)]	100 Hz	Red light laser class 2	2 x Push-pull/DC	Light
HRTL 96B M/66.04S - S12 50115690	150 25000 [1)]	100 Hz	Red light laser class 2	2 x Push-pull/DC	Dark
HRTL 96B M/C66.01.C1S - S12 50116678	100 6000 50 6500	50 Hz	Red light laser class 1	Analog/mA[3)] 2 x push-pull/DC	Light
HRTIL 96B M/66.01S - S12 50115016	100 6000 50 6500	100 Hz	Infrared light laser class 1	2 x Push-pull/DC	Light
HRTIL 96B M/C66.01S - S12 50115015	100 6000 50 6500	100 Hz	Infrared light laser class 1	Analog/mA[4)] 2 x push-pull/DC	Light

1) Teach range against HG foil (high gain) REF 7-A-100x100 (50111527), larger scanning ranges on request
2) Teach range against standard objects (6 % … 90 % diffuse reflection) up to 6000 mm
3) Analog output 4 … 20 mA corresponding to 150 … 3000 mm / reference: white 90 %
4) Analog output 4 … 20 mA corresponding to 150 … 15000 mm / reference: white 90 %

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000 mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000 mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC
e	50104560	K - D M12W - 5P - 10m - PVC	Connection cable 10000 mm, M12 angular, 5-pin, PVC
f	50104559	K - D M12A - 5P - 10m - PVC	Connection cable 10000 mm, M12 axial, 5-pin, PVC
g	50111527	REF 7 - A - 100 x 100	HG foil 100 x 100 mm² for realizing large scanning ranges
h	50038060	Refl. tape No. 4 50x1000 mm	Reflective tape, suitable for collision protection, additional dimensions on request

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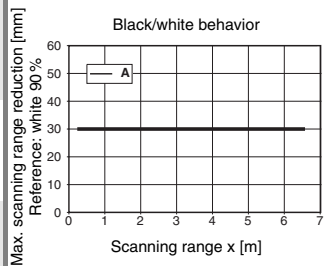
	Connection	Option	Accessories		Typ. b/w behavior
	M12 connector	2, 3, 6, 7, 8, 9	a, b, c, d, e, f, g, h		
	M12 connector	2, 3, 6, 8, 9, 12	a, b, c, d, e, f, g, h		
	M12 connector	2, 5, 6, 8, 9	a, b, c, d, e, f		
	M12 connector	2, 3, 6, 8, 9, 13	a, b, c, d, e, f		
	M12 connector	2, 5, 6, 8, 9, 13	a, b, c, d, e, f		



A 6 ... 90 % diffuse reflection

Optical Sensor ABC

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- Sensors w. laser transmitter Page 599
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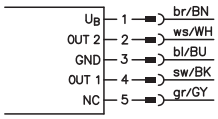
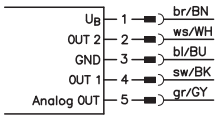
- Outputs Page 598

Electrical connection

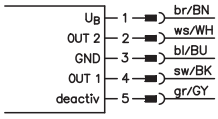
HRTL 96BM/66...
HRTIL 96BM/66...



HRTL 96BM/C66...
HRTIL 96BM/C66...



HRTL 96BM/66.9...



Options

1	Switching point adjustment via potentiometer
2	Switching point adjustment via teach buttons
3	2 independently adjustable switching points
4	3 independently adjustable switching points
5	2 independently adjustable switching points + analog output
6	Adjustable switching behavior: light/dark
7	Deactivation input
8	Switching state indicator diodes for each switching output
9	Preset reserve + hysteresis for optimum, reliable switching behavior
10	Input for external teach with window function
11	External mode changeover via deactivation input
12	For telpher line application, detects reflective tape or high-gloss foil
13	Red light laser for exact alignment activation/deactivation via teach button

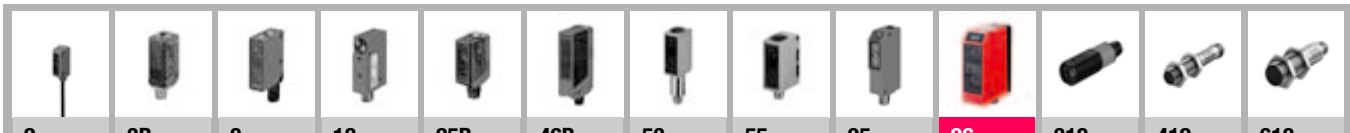
DIFFUSE REFLECTION SCANNERS / DC

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners in plastic housing with background suppression					
HRT 96 K/P - 1631 - 800 - 47 50038471	100 800 100 1200	300 Hz	Red light	PNP/DC	Light
HRT 96 K/P - 1630 - 800 - 41 50080242	100 800 100 1200	300 Hz	Red light	2xPNP/DC	Light/dark antivalent
HRT 96 K/P - 1640 - 800 - 41 50081464	100 800 100 1200	300 Hz	Red light	2xPNP/DC	Light/dark antivalent
HRT 96 K/P - 1630 - 800 - 21 50080327	100 800 100 1200	300 Hz	Red light	2xPNP/DC	Light/dark antivalent
HRT 96 K/P - 1600 - 1800 - 41 50105667	100 1800 100 2000	300 Hz	Infrared light	2xPNP/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC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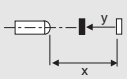
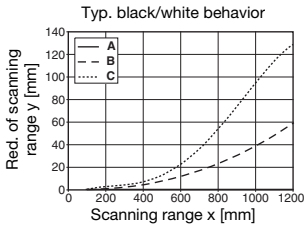
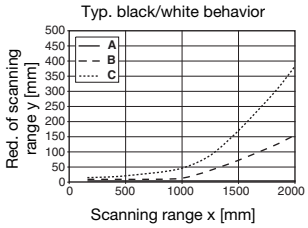
96 SERIES

Diffuse reflection scanners

Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % **B** gray 18 % **C** black 6 % 
M12 connector	1, 2, 4	a, b, c, d, e, f	
M12 connector	1, 4	a, b, c, d, e, f	
M12 connector	1, 3, 4	a, b, c, d, e, f	
Terminals	1, 4		
M12 connector	1, 4	a, b, c, d, e, f	

Optical Sensor ABC

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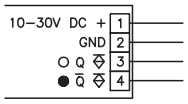
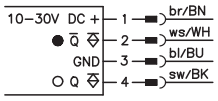
Electrical connection

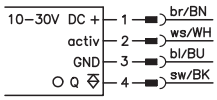
HRT 96...–21



HRT 96...–41



HRT 96...–47



Options

1 Scanning range adjustment via multiturn potentiometer

2 Activation input

3 Switching delay

4 UL approval

DIFFUSE REFLECTION SCANNERS / DC

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners in plastic housing with background suppression					
HRT 96 K/P - 1607 - 1200 - 49 50103090	100 1200 100 1800	300 Hz	Infrared light	PNP/DC	Light
HRT 96 K/P - 1600.1 - 1200 - 41 50103217	100 1200 100 1800	300 Hz	Infrared light	PNP/DC	Light/dark reversible
HRT 96 K/P - 1600 - 1200 - 41 50025133	100 1200 100 1800	300 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
HRT 96 K/P - 1600 - 1200 - 21 50025135	100 1200 100 1800	300 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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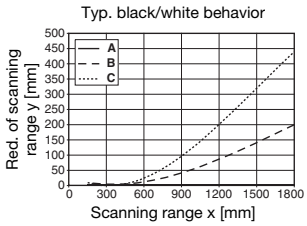
96 SERIES

Diffuse reflection scanners

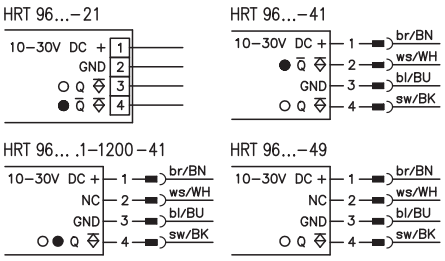
Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % B gray 18 % C black 6 %
M12 connector	1, 2, 3	a, b, c, d, e, f	
M12 connector	1, 2, 3	a, b, c, d, e, f	
M12 connector	1, 3	a, b, c, d, e, f	
Terminals	1, 3		



Optical Sensor ABC

- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

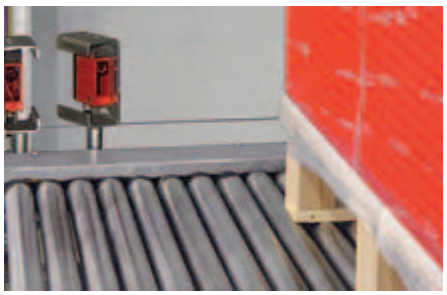
1 Scanning range adjustment via multiturn potentiometer

2 Direct connection to AS-interface I/O coupling modules

3 UL approval

OVERVIEW

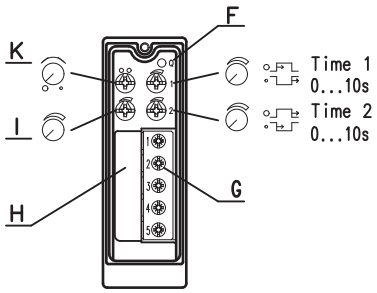
Compartment occupancy monitoring

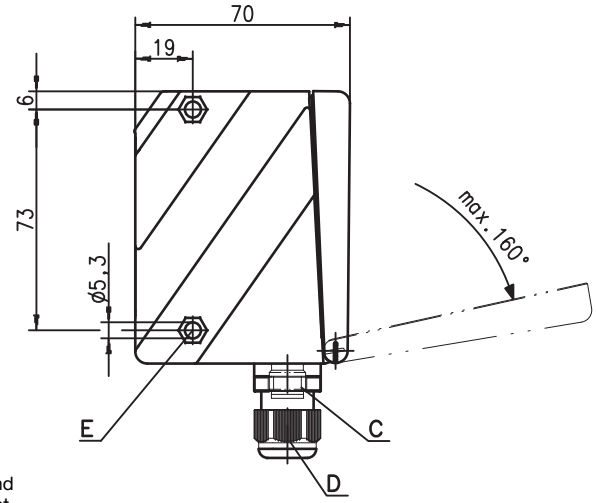

Pallet detection

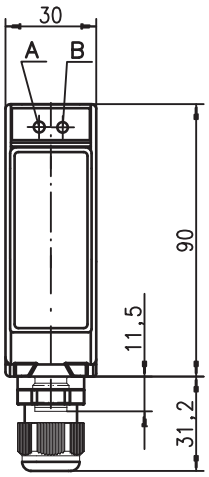
Pallet repositioning

Dimensioned drawing

A Green indicator diode
B Yellow indicator diode
C Device plug M12x1
D Screwed cable gland M16x1.5 for Ø 5 … 10mm
E Countersinking for SK nut M5, 4.2 deep
F Output with switching delay option
G Connection terminals
H Cable entry
I Scanning range adjustment
K Light/dark switching







Further details can be found in the respective data sheet.

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2	3B	8	18	25B	46B	53	55	95	96	318	412	618
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96 SERIES / AC-DC

Operating principle	Typ. operating range limits	Page
Throughbeam sensors	0 … 150 m	192
Retro-reflective sensors	0 … 24 m	194
Diffuse reflection scanners	20 … 1800 mm	198

Other 96 Series products:

DC versions	LS 96, (P)RK 96, (H)RT 96	164
Optical distance sensors	ODS 96, ODSL 96	262
Protective sensors	SLS 96	512

Common technical data

Electrical data	Operating voltage U_B	20 … 230VAC, 50/60Hz
		20 … 230VDC
	Power consumption	≤ 2VA
	Switching voltage	250VAC/DC
	Switching current	3A (at 250VAC/30VDC)
	Switching power	750VA, cosφ=1
Indicators	Green LED	Ready to operate
	Yellow LED	Switching output
	Flashing yellow LED	No performance reserve
Mechanical data	Housing	Metal or plastic
	Optics cover	Glass or plastic
	Weight (metal/plastic)	380g/150g
Environmental data	Ambient temperature (operation)	-30°C … +55°C
	VDE safety class	II, all-insulated
	Protection class	IP 67, IP 69K 1)
	Standards applied	IEC 60947-5-2, UL 508

1) IP 69K with metal housing

Mounting systems for this series can be found from **page 545** onwards

Features

- **Metal or plastic housing**
- **Large, dirt-resistant optical surface**
- **IP 67 and IP 69K**
- **Active ambient light suppression A²LS**
- **AC-DC version (20 … 230V AC-DC) with relay output**
- **Universally usable due to long operating ranges and high performance reserve**

Optical Sensor ABC

- Throughbeam sensors Page 593
- Retro-reflective sensors Page 593
- Diffuse reflection scanners Page 594
- A²LS Page 601

THROUGHBEAM SENSORS / AC-DC

Part description Part No.:		Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Throughbeam sensors in metal housing			▶ = Transmitter ◀ = Receiver			
▶ **LSS 96 M - 175W - 26**	50032004	0 30 0 39	20 Hz	Red light	Relay	NC/NO
◀ **LSE 96 M/R - 176W - 25**	50032003					
▶ **LSS 96 M - 1350 - 26**	50080081	0 120 0 150	20 Hz	Infrared light	Relay	NC/NO
◀ **LSE 96 M/R - 3310 - 25**	50031651					
▶ **LSS 96 M - 1350 - 26**	50080081	0 50 0 65	20 Hz	Infrared light	Relay	NC/NO
◀ **LSE 96 M/R - 1310 - 25**	50080080					
Throughbeam sensors in plastic housing			▶ = Transmitter ◀ = Receiver			
▶ **LSS 96 K - 1350 - 26**	50025253	0 50 0 65	20 Hz	Infrared light	Relay	NC/NO
◀ **LSE 96 K/R - 1310 - 25**	50025257					
▶ **LSS 96 K - 1350 - 26**	50025253	0 50 0 65	20 Hz	Infrared light	Relay	NC/NO
◀ **LSE 96 K/R - 1320 - 25**	50025256					

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96 SERIES

Throughbeam sensors

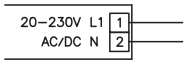
	Connection	Option	Accessories		Typ. light spot
	Terminals	1, 2, 4			
	Terminals	1, 4			
	Terminals	1, 4			
	Terminals	1, 4			
	Terminals	1, 3, 4			

Optical Sensor ABC

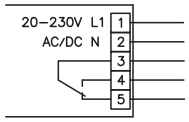
- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

LSS 96...-26



LSE 96...-25



Options

1 Sensitivity adjustment via potentiometer

2 Wide angle version for easy alignment

3 Switching delay

4 UL approval

RETRO-REFLECTIVE SENSORS / AC-DC

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors in plastic housing					
RK 96 K/R - 1560 - 25 50080484	0.3 … 15 0.1 … 18	20 Hz	Infrared light	Relay	NC/NO
Retro-reflective sensors in metal housing with polarization filter					
PRK 96 M/R - 3420 - 25 50082066	0.3 … 15 0.1 … 18	20 Hz	Red light	Relay	NC/NO
PRK 96 M/R - 3430 - 25 50061111	0.3 … 15 0.1 … 18	20 Hz	Red light	Relay	NC/NO
PRK 96 M/R - 1858 - 25 50029881	0 … 7 0 … 8.5	20 Hz	Red light	Relay	NC/NO
PRK 96 M/R - 1850 - 25 50080470	0 … 1.5 0 … 1.85	20 Hz	Red light	Relay	NC/NO

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 587

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96 SERIES

Retro-reflective sensors

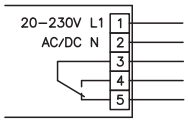
	Connection	Option	Accessories		Typ. light spot
	Terminals	2, 7, 8			
	Terminals	2, 8			
	Terminals	2, 5, 8			
	Terminals	1, 3, 4, 5, 8			
	Terminals	1, 3, 4, 5, 6, 8			

Optical Sensor ABC

- Retro-reflective sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

RK 96...–25
PRK 96...–25



Options

1 Intelligent sensitivity adjustment via 10-turn-potentiometer
2 Sensitivity adjustment via potentiometer
3 Autocollimation principle
4 Transparent media
5 Switching delay
6 Integrated slit diaphragm 3.7x20mm
7 Light/dark switching reversible
8 UL approval

RETRO-REFLECTIVE SENSORS / AC-DC

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors in plastic housing with polarization filter					
PRK 96 K/R - 3428 - 25 50035351	0.3 – 20 0.1 – 24	20 Hz	Red light	Relay	NC/NO
PRK 96 K/R - 3428.1 - 25 50107216	0.3 – 20 0.1 – 24	20 Hz	Red light	Relay	NC/NO
PRK 96 K/R - 1420 - 25 50025167	0.3 – 8 0.1 – 10	20 Hz	Red light	Relay	NC/NO
PRK 96 K/R - 1420.1 - 25 50105587	0.3 – 8 0.1 – 10	20 Hz	Red light	Relay	NC/NO
PRK 96 K/R - 1430 - 25 50025168	0.3 – 8 0.1 – 10	20 Hz	Red light	Relay	NC/NO

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 587

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96 SERIES

Retro-reflective sensors

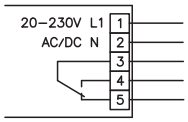
	Connection	Option	Accessories		Typ. light spot
	Terminals	1, 4			
	Terminals	1, 3, 4			
	Terminals	1, 4			
	Terminals	1, 3, 4			
	Terminals	1, 2, 4			

Optical Sensor ABC

- Retro-reflective sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

RK 96...–25
PRK 96...–25



Options

1	Sensitivity adjustment via potentiometer
2	Switching delay
3	Light/dark switching reversible
4	UL approval

DIFFUSE REFLECTION SCANNERS / AC-DC

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching	
Energetic diffuse reflection scanners in metal housing						
RT 96 M/R - 1574 - 800 - 25 50041598	20 800 20 1200	20 Hz	Infrared light	Relay	NC/NO	
Diffuse reflection scanners in metal housing with background suppression						
HRT 96 M/R - 1680 - 1200 - 25 50080076	100 1200 100 1800	20 Hz	Infrared light	Relay	NC/NO	
HRT 96 M/R - 1690 - 1200 - 25 50080075	100 1200 100 1800	20 Hz	Infrared light	Relay	NC/NO	
Diffuse reflection scanners in plastic housing with background suppression						
HRT 96 K/R - 1680 - 1200 - 25 50025132	100 1200 100 1800	20 Hz	Infrared light	Relay	NC/NO	
HRT 96 K/R - 1690 - 1200 - 25 50025131	100 1200 100 1800	20 Hz	Infrared light	Relay	NC/NO	

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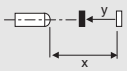
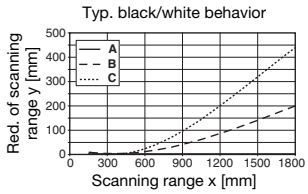
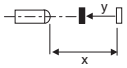
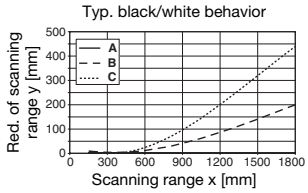
96 SERIES

Diffuse reflection scanners

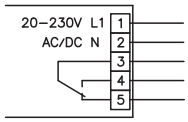
	Connection	Option	Accessories		Typ. b/w behavior
	Terminals	1, 2, 3, 4			
					A white 90 % **B** gray 18 % **C** black 6 % 
	Terminals	1, 4			
	Terminals	1, 3, 4			
					A white 90 % **B** gray 18 % **C** black 6 % 
	Terminals	1, 4			
	Terminals	1, 3, 4			

Optical Sensor ABC

- Diffuse reflection scanners Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

RT 96...–25
HRT 96...–25



Options

1 Scanning range adjustment via potentiometer

2 Short range (20 mm)

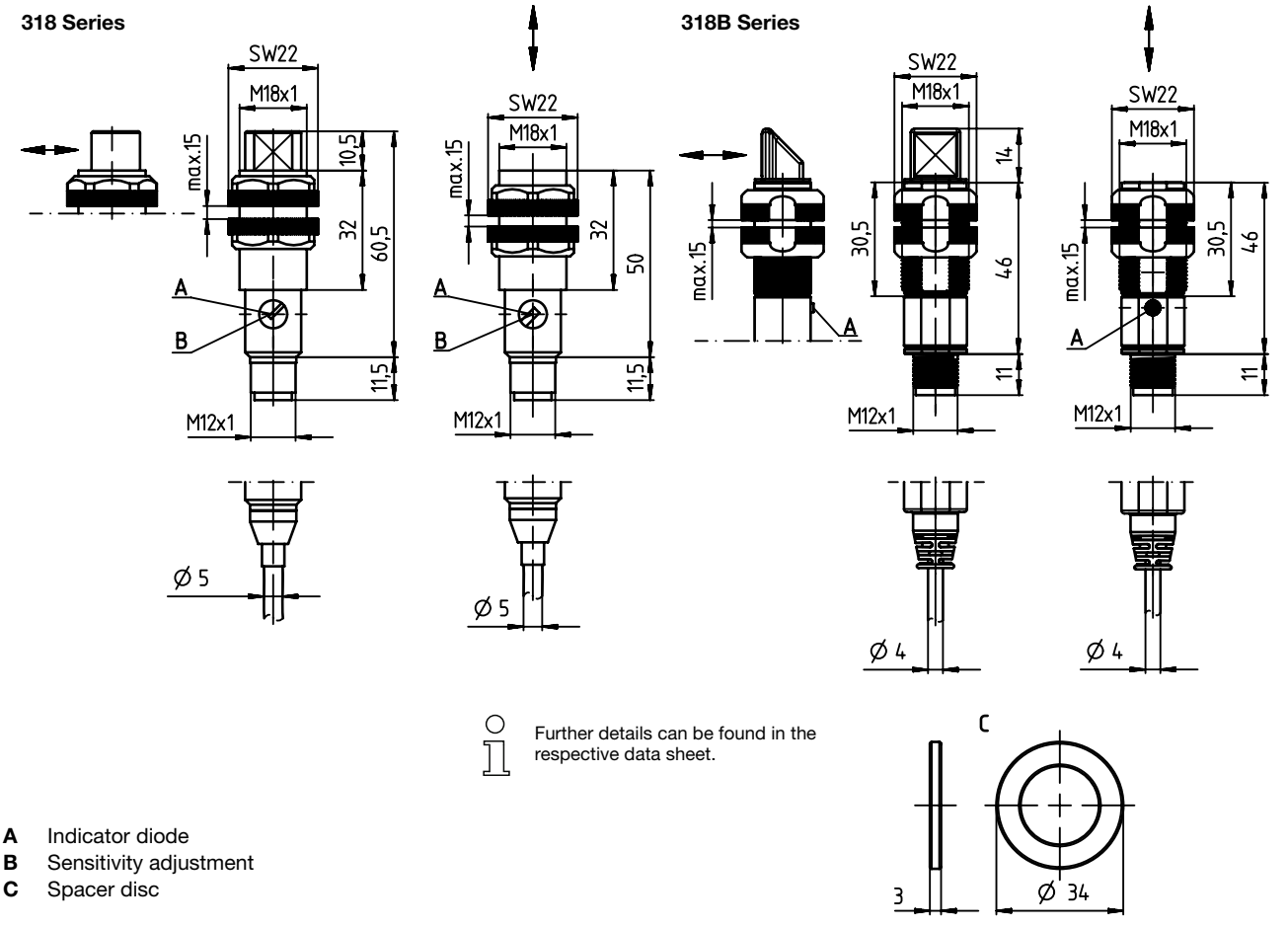
3 Switching delay

4 UL approval

OVERVIEW

Mould-removal monitoring

Dimensioned drawing



Further details can be found in the respective data sheet.

A Indicator diode
B Sensitivity adjustment
C Spacer disc

We reserve the right to make changes • BR318_Overview_EN.fm

2	3B	8	18	25B	46B	53	55	95	96	318	412	618
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318(B) SERIES

Operating principle	Typ. operating range limits	Page
Throughbeam sensors	0 … 120 m	204
Retro-reflective sensors	0.02 … 15 m	208
Diffuse reflection scanners	0 … 700 mm	214

Other 318 Series products:

Protective sensors	SLS 318	514

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple	≤ 10(15) % of U_B
	Open-circuit current	≤ 25 mA
	Signal voltage high/low	…318: ≥ (U_B-1.6V)/≤ 1.6V
		…318B: ≥ (U_B-2V)/≤ 2V
Indicators	**…318…** :	
	Red LED	Switching output
	Flashing red LED	No performance reserve
	…318B… :	
	Green LED	Ready to operate
	Yellow LED	Switching output
	Flashing yellow LED	No performance reserve
Mechanical data	Housing	Plastic or stainless steel
	Optics cover	Plastic
	Weight (connector/cable)	20 g/90 g
Environmental data	Ambient temperature (operation)	-25 °C … +65 °C Laser: -25 °C … +60 °C …318B: -40 °C … +60 °C
	VDE safety class	II, all-insulated / III
	Protection class	IP 67
	Standards applied	IEC 60947-5-2, UL 508

Mounting systems for this series can be found from **page 546** onwards

Features

- **Very small construction for limited spaces**
- **Available in plastic and stainless steel housing**
- **Available with straight and angular optics**
- **Powerful laser devices available in M18 cylindrical housing**

CE · cULus LISTED · CDRH

Optical Sensor ABC

- Throughbeam sensors Page 593
- Retro-reflective sensors Page 593
- Diffuse reflection scanners Page 594

THROUGHBEAM SENSORS

Part description Part No.:		Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Throughbeam sensors in plastic housing			▶ = Transmitter ◀ = Receiver			
▶ LS 318B / 9D - S12 **◀ LE 318B / 4P - S12**	50116853 50116847	0 10 0 15	500 Hz	Red light	2 x PNP/DC	Light/dark antivalent
▶ LS 318B / 9D **◀ LE 318B / 4P**	50116852 50116846	0 10 0 15	500 Hz	Red light	2 x PNP/DC	Light/dark antivalent
▶ LS 318B / 9D - S12 **◀ LE 318B / 2N - S12**	50116853 50116845	0 10 0 15	500 Hz	Red light	2 x NPN/DC	Light/dark antivalent
▶ LS 318B / 9D **◀ LE 318B / 2N**	50116852 50116844	0 10 0 15	500 Hz	Red light	2 x NPN/DC	Light/dark antivalent
▶ LS 318B.W / 9D - S12 **◀ LE 318B.W / 4P - S12**	50116855 50116851	0 5.5 0 8	500 Hz	Red light	2 x PNP/DC	Light/dark antivalent
▶ LS 318B.W / 9D **◀ LE 318B.W / 4P**	50116854 50116850	0 5.5 0 8	500 Hz	Red light	2 x PNP/DC	Light/dark antivalent
▶ LS 318B.W / 9D - S12 **◀ LE 318B.W / 2N - S12**	50116855 50116849	0 5.5 0 8	500 Hz	Red light	2 x NPN/DC	Light/dark antivalent
▶ LS 318B.W / 9D **◀ LE 318B.W / 2N**	50116854 50116848	0 5.5 0 8	500 Hz	Red light	2 x NPN/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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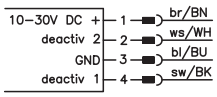
	Connection	Option	Accessories		Typ. light spot
	M12 connector	1, 3, 4	a, b, c, d, e, f		
	Cable, 2 m	1, 3, 4			
	M12 connector	1, 3, 4	a, b, c, d, e, f		
	Cable, 2 m	1, 3, 4			
	M12 connector	1, 2, 3, 4	a, b, c, d, e, f		
	Cable, 2 m	1, 2, 3, 4			
	M12 connector	1, 2, 3, 4	a, b, c, d, e, f		
	Cable, 2 m	1, 2, 3, 4			

Optical Sensor ABC

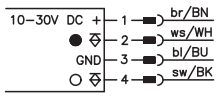
- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

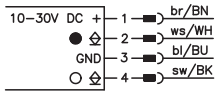
LS 318B/9D-S12
LS 318B.W/9D-S12



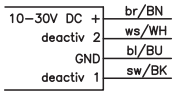
LE 318B/4P-S12
LE 318B.W/4P-S12



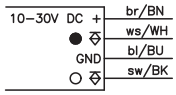
LE 318B/2N-S12
LE 318B.W/2N-S12



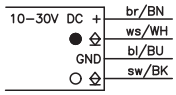
LS 318B/9D
LS 318B.W/9D



LE 318B/4P
LE 318B.W/4P



LE 318B/2N
LE 318B.W/2N



Options

1 Transmitter with two deactivation inputs (complementary)

2 90° optics

3 Integrated *omni-mount* fine adjustment

4 UL approval (class 2 acc. to NEC)

THROUGHBEAM SENSORS

Part description Part No.:		Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Throughbeam sensors in metal housing			▶ = Transmitter ◀ = Receiver			
▶ **LSS 318 M - 70 - S12**	50082177	0 35	1000 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
◀ **LSE 318 M/P - S12**	50081340	0 45				
▶ **LSS 318 M - 70**	50082188	0 35	1000 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
◀ **LSE 318 M/P**	50081342	0 45				
▶ **LSS 318 M - S12**	50081339	0 15	1000 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
◀ **LSE 318 M/P - S12**	50081340	0 20				
▶ **LSS 318 M**	50081341	0 15	1000 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
◀ **LSE 318 M/P**	50081342	0 20				
▶ **LSS 318 M**	50081341	0 15	1000 Hz	Infrared light	2 x NPN/DC	Light/dark antivalent
◀ **LSE 318 M/N**	50108613	0 20				
▶ **LSS 318 WM - S12**	50082154	0 10	1000 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
◀ **LSE 318 WM/P - S12**	50082158	0 13				
▶ **LSS 318 WM**	50082152	0 10	1000 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
◀ **LSE 318 WM/P**	50082156	0 13				
▶ **LSS 318 WM**	50082152	0 10	1000 Hz	Infrared light	2 x NPN/DC	Light/dark antivalent
◀ **LSE 318 WM/N**	50083246	0 13				

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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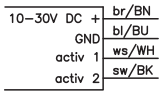
	Connection	Option	Accessories		Typ. light spot
	M12 connector	1, 2, 4	a, b, c, d, e, f		
	Cable, 2 m	1, 2, 4			
	M12 connector	1, 2, 4	a, b, c, d, e, f		
	Cable, 2 m	1, 2, 4			
	Cable, 2 m	1, 2, 4			
	M12 connector	1, 2, 3, 4	a, b, c, d, e, f		
	Cable, 2 m	1, 2, 3, 4			
	Cable, 2 m	1, 2, 3, 4			

Optical Sensor ABC

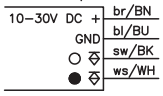
- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

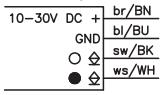
LSS 318M
LSS 318M-70
LSS 318WM



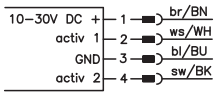
LSE 318M/P
LSE 318WM/P



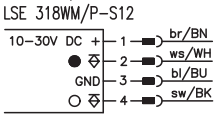
LSE 318M/N
LSE 318WM/N



LSS 318M-S12
LSS 318M-70-S12
LSS 318WM-S12



LSE 318M/P-S12
LSE 318WM/P-S12



Options

1	Sensitivity adjustment via potentiometer
2	Transmitter with 2 activation inputs
3	90° optics
4	UL approval (class 2 acc. to NEC)

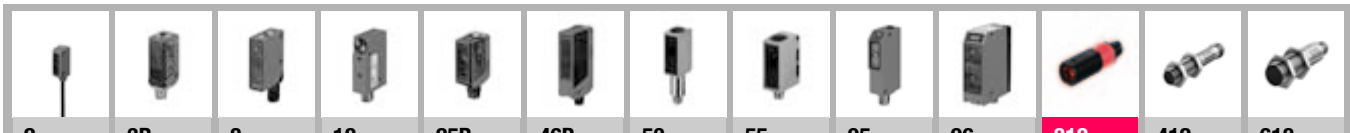
THROUGHBEAM SENSORS

Part description Part No.:	Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Throughbeam laser sensors in metal housing		▶ = Transmitter ◀ = Receiver			
▶ **LSSL 318 M - S12** 50083172 ◀ **LSEL 318 M/P - S12** 50083176	0 100 0 120	5000 Hz	Red light laser class 1	2 x PNP/DC	Light/dark antivalent
▶ **LSSL 318 M** 50083171 ◀ **LSEL 318 M/P** 50083175	0 100 0 120	5000 Hz	Red light laser class 1	2 x PNP/DC	Light/dark antivalent
▶ **LSSL 318 M - S12** 50083172 ◀ **LSEL 318 M/P - B5 - S12** 50083180	0 15 0 18	5000 Hz	Red light laser class 1	2 x PNP/DC	Light/dark antivalent
▶ **LSSL 318 M** 50083171 ◀ **LSEL 318 M/P - B5** 50083179	0 15 0 18	5000 Hz	Red light laser class 1	2 x PNP/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC



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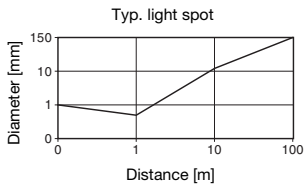
318 SERIES

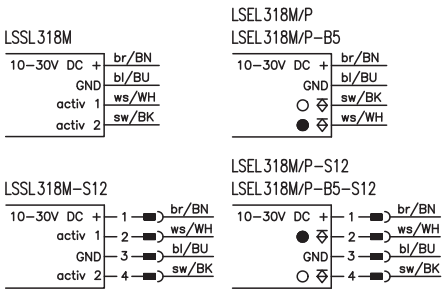
Throughbeam sensors

	Connection	Option	Accessories		Typ. light spot
	M12 connector	1, 2, 4	a, b, c, d, e, f		
	Cable, 2m	1, 2, 4			
	M12 connector	1, 2, 3, 4	a, b, c, d, e, f		
	Cable, 2m	1, 2, 3, 4			

Optical Sensor ABC

- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection



Options

1	Sensitivity adjustment via potentiometer
2	Transmitter with 2 activation inputs
3	Integrated pin diaphragm Ø 1.0mm for detection of small parts
4	UL approval (class 2 acc. to NEC)

RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors in metal housing					
RK 318 M/P - S12 50081345	0.03 – 4.6 0.02 – 6	1000 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
RK 318 M/P 50081346	0.03 – 4.6 0.02 – 6	1000 Hz	Infrared light	2 x PNP/DC	Light/dark antivalent
RK 318 M/N - S12 50082143	0.03 – 4.6 0.02 – 6	1000 Hz	Infrared light	2 x NPN/DC	Light/dark antivalent
RK 318 M/N 50083234	0.03 – 4.6 0.02 – 6	1000 Hz	Infrared light	2 x NPN/DC	Light/dark antivalent

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 588

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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318 SERIES

Retro-reflective sensors

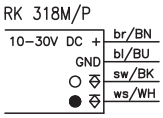
	Connection	Option	Accessories		Typ. light spot
	M12 connector	1, 2	a, b, c, d, e, f		
	Cable, 2 m	1, 2			
	M12 connector	1, 2	a, b, c, d, e, f		
	Cable, 2 m	1, 2			

Optical Sensor ABC

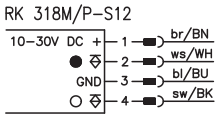
- Retro-reflective sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

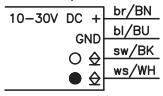
RK 318M/P



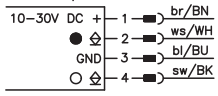
RK 318M/P–S12



RK 318M/N



RK 318M/N–S12



Options

1 Sensitivity adjustment via potentiometer

2 UL approval (class 2 acc. to NEC)

RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors in plastic housing with polarization filter					
PRK 318B/4P - S12 50116859	0.02 4.5 0.02 6	500 Hz	Red light	2xPNP/DC	Light/dark antivalent
PRK 318B/4P 50116858	0.02 4.5 0.02 6	500 Hz	Red light	2xPNP/DC	Light/dark antivalent
PRK 318B/2N- S12 50116857	0.02 4.5 0.02 6	500 Hz	Red light	2xNPN/DC	Light/dark antivalent
PRK 318B/2N 50116856	0.02 4.5 0.02 6	500 Hz	Red light	2xNPN/DC	Light/dark antivalent
PRK 318B.W/4P - S12 50116863	0.02 4 0.02 5	500 Hz	Red light	2xPNP/DC	Light/dark antivalent
PRK 318B.W/4P 50116862	0.02 4 0.02 5	500 Hz	Red light	2xPNP/DC	Light/dark antivalent
PRK 318B.W/2N- S12 50116861	0.02 4 0.02 5	500 Hz	Red light	2xNPN/DC	Light/dark antivalent
PRK 318B.W/2N 50116860	0.02 4 0.02 5	500 Hz	Red light	2xNPN/DC	Light/dark antivalent

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 588

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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318B SERIES

Retro-reflective sensors

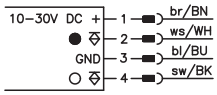
	Connection	Option	Accessories		Typ. light spot
	M12 connector	2, 3	a, b, c, d, e, f		
	Cable, 2 m	2, 3			
	M12 connector	2, 3	a, b, c, d, e, f		
	Cable, 2 m	2, 3			
	M12 connector	1, 2, 3	a, b, c, d, e, f		
	Cable, 2 m	1, 2, 3			
	M12 connector	1, 2, 3	a, b, c, d, e, f		
	Cable, 2 m	1, 2, 3			

Optical Sensor ABC

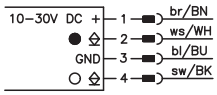
- Retro-reflective sensors with polarization filter Page 593
- Connection types/Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection

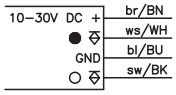
PRK 318B/4P-S12
PRK 318B.W/4P-S12



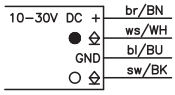
PRK 318B/2N-S12
PRK 318B.W/2N-S12



PRK 318B/4P
PRK 318B.W/4P



PRK 318B/2N
PRK 318B.W/2N



Options

1 90° optics

2 Integrated *omni-mount* fine adjustment

3 UL approval (class 2 acc. to NEC)

RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors in metal housing with polarization filter					
PRK 318 M/4D - S12 50110932	0.03 – 4.6 [1] 0.02 – 6 [1]	1000 Hz	Red light	1 x PNP/DC	Dark
PRK 318 M/P - S12 50081349	0.03 – 4.6 [1] 0.02 – 6 [1]	1000 Hz	Red light	2 x PNP/DC	Light/dark antivalent
PRK 318 M/P 50081350	0.03 – 4.6 [1] 0.02 – 6 [1]	1000 Hz	Red light	2 x PNP/DC	Light/dark antivalent
PRK 318 M/N - S12 50082145	0.03 – 4.6 [1] 0.02 – 6 [1]	1000 Hz	Red light	2 x NPN/DC	Light/dark antivalent
PRK 318 M/N 50083140	0.03 – 4.6 [1] 0.02 – 6 [1]	1000 Hz	Red light	2 x NPN/DC	Light/dark antivalent
Retro-reflective laser sensors in metal housing with polarization filter					
PRKL 318 M/P - S12 50083184	0.12 – 12 [2] 0.10 – 15 [2]	5000 Hz	Red light laser class 1	2 x PNP/DC	Light/dark antivalent
PRKL 318 M/P 50083183	0.12 – 12 [2] 0.10 – 15 [2]	5000 Hz	Red light laser class 1	2 x PNP/DC	Light/dark antivalent

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 588
2) The specified values apply in combination with reflectors MTK(S) 50 x 50, additional reflectors with range specifications can be found on page 588

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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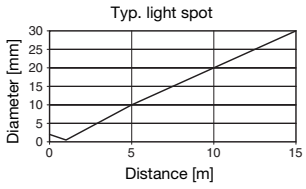
	Connection	Option	Accessories		Typ. light spot
	M12 connector	1, 2, 3	a, b, c, d, e, f		
	M12 connector	1, 3	a, b, c, d, e, f		
	Cable, 2 m	1, 3			
	M12 connector	1, 3	a, b, c, d, e, f		
	Cable, 2 m	1, 3			
	M12 connector	1, 3	a, b, c, d, e, f		
	Cable, 2 m	1, 3			

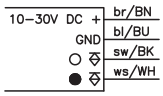


Optical Sensor ABC

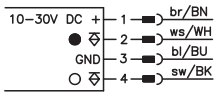
- Retro-reflective sensors with polarization filter Page 593
- Connection types/Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection

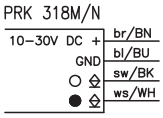
PRK 318M/P
PRKL 318M/P



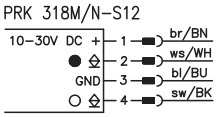
PRK 318M/P–S12
PRKL 318M/P–S12



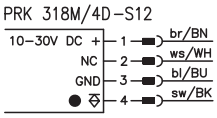
PRK 318M/N



PRK 318M/N–S12



PRK 318M/4D–S12



Options

1 Sensitivity adjustment via potentiometer

2 Direct connection to AS-interface I/O coupling modules

3 UL approval (class 2 acc. to NEC)

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Energetic diffuse reflection scanners in metal housing					
RT 318 M/P - 550 - S12 50082196	0 550 0 700	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 M/P - 550 50082198	0 550 0 700	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 M/P - 400 - S12 50081353	0 400 0 500	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 WM/P - 400 - S12 50082174	0 400 0 500	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 M/P - 400 50081354	0 400 0 500	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 M/N - 400 - S12 50082147	0 400 0 500	1000 Hz	Infrared light	2xNPN/DC	Light/dark antivalent
RT 318 M/N - 400 50083112	0 400 0 500	1000 Hz	Infrared light	2xNPN/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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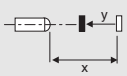
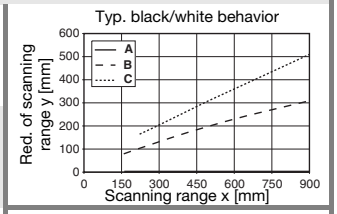
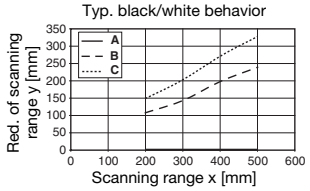
318 SERIES

Diffuse reflection scanners

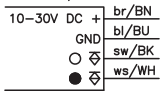
Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % **B** gray 18 % **C** black 6 % 
M12 connector	1, 3	a, b, c, d, e, f	
Cable, 2 m	1, 3		
M12 connector	1, 3	a, b, c, d, e, f	
M12 connector	1, 2, 3	a, b, c, d, e, f	
Cable, 2 m	1, 3		
M12 connector	1, 3	a, b, c, d, e, f	
Cable, 2 m	1, 3		

Optical Sensor ABC

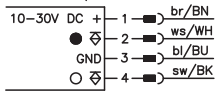
- Diffuse reflection scanners energetic Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

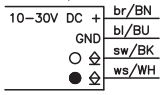
RT 318M/P-550
RT 318M/P-400



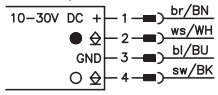
RT 318M/P-550-S12
RT 318M/P-400-S12
RT 318 WM/P-400-S12



RT 318M/N-400



RT 318M/N-400-S12



Options

1	Scanning range adjustment via potentiometer
2	90° optics
3	UL approval (class 2 acc. to NEC)

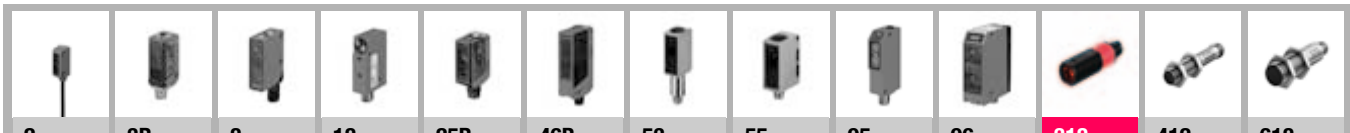
DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Energetic diffuse reflection scanners in metal housing					
RT 318 M/P - 200 - S12 50081357	0 200 0 250	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 M/P - 200 50081358	0 200 0 250	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 M/N - 200 - S12 50083102	0 200 0 250	1000 Hz	Infrared light	2xNPN/DC	Light/dark antivalent
RT 318 M/N - 200 50082050	0 200 0 250	1000 Hz	Infrared light	2xNPN/DC	Light/dark antivalent
RT 318 WM/P - 100 - S12 50082170	0 … 100 0 … 130	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 M/P - 100 - S12.11 50109471	0 … 100 0 … 120	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 M/P - 100.11 50109470	0 … 100 0 … 120	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 M/N - 100 - S12.11 50083249	0 … 100 0 … 120	1000 Hz	Infrared light	2xNPN/DC	Light/dark antivalent
RT 318 M/N - 100.11 50108611	0 … 100 0 … 120	1000 Hz	Infrared light	2xNPN/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC



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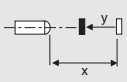
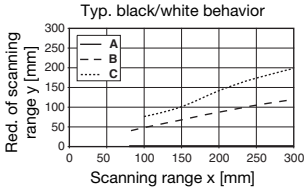
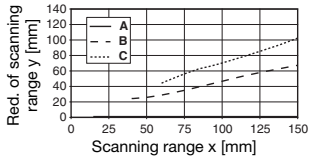
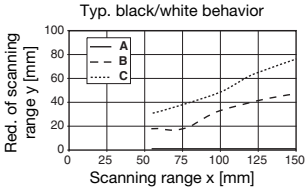
318 SERIES

Diffuse reflection scanners

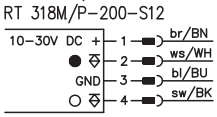
Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % **B** gray 18 % **C** black 6 % 
M12 connector	1, 4	a, b, c, d, e, f	Typ. black/white behavior 
Cable, 2 m	1, 4		
M12 connector	1, 4	a, b, c, d, e, f	
Cable, 2 m	1, 4		
M12 connector	1, 3, 4	a, b, c, d, e, f	Typ. black/white behavior 
M12 connector	1, 2, 4	a, b, c, d, e, f	Typ. black/white behavior 
Cable, 2 m	1, 2, 4		
M12 connector	1, 2, 4	a, b, c, d, e, f	
Cable, 2 m	1, 2, 4		

Optical Sensor ABC

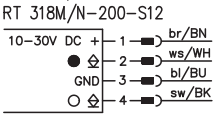
- Diffuse reflection scanners energetic Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

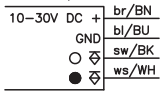
RT 318M/P-100-S12.11
RT 318WM/P-100-S12
RT 318M/P-200-S12



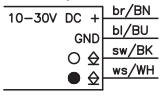
RT 318M/N-100-S12.11
RT 318M/N-200-S12



RT 318M/P-100.11
RT 318M/P-200



RT 318M/N-100.11
RT 318M/N-200



Options

1	Scanning range adjustment via potentiometer
2	V-optics for background suppression (Fading)
3	90° optics
4	UL approval (class 2 acc. to NEC)

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source Light spot 1)	Output	Switching	
Energetic diffuse reflection laser scanners in metal housing						
RTL 318 M/P - 300 - S12 50083188	0 300 0 350	5000 Hz	Red light laser class 2 Ø 5 mm	2 x PNP/DC	Light/dark antivalent	

1) At the specified scanning range

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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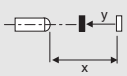
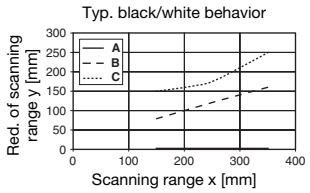
318 SERIES

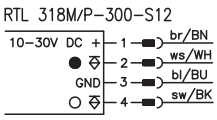
Diffuse reflection scanners

	Connection	Option	Accessories		Typ. b/w behavior
					A white 90 % **B** gray 18 % **C** black 6 % 
	M12 connector	1, 2, 4	a, b, c, d, e, f		

Optical Sensor ABC

- Diffuse reflection scanners energetic Page 594
- Connection types/Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection



Options

1	Scanning range adjustment via potentiometer
2	UL approval (class 2 acc. to NEC)

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Energetic diffuse reflection scanners in plastic housing					
RT 318 K/P - 550 - S12 50082175	0 – 550 0 – 700	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 K/P - 550 50082197	0 – 550 0 – 700	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 K/N - 550 - S12 50083194	0 – 550 0 – 700	1000 Hz	Infrared light	2xNPN/DC	Light/dark antivalent
RT 318 K/N - 550 50115969	0 – 550 0 – 700	1000 Hz	Infrared light	2xNPN/DC	Light/dark antivalent
RT 318 K/P - 400 - S12 50081351	0 – 400 0 – 500	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 K/P - 400 50081352	0 – 400 0 – 500	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 WK/P - 400 - S12 50082173	0 – 400 0 – 500	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 WK/P - 400 50082171	0 – 400 0 – 500	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 K/N - 400 - S12 50082146	0 – 400 0 – 500	1000 Hz	Infrared light	2xNPN/DC	Light/dark antivalent
RT 318 K/N - 400 50083113	0 – 400 0 – 500	1000 Hz	Infrared light	2xNPN/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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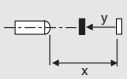
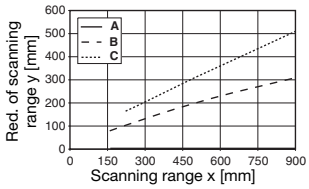
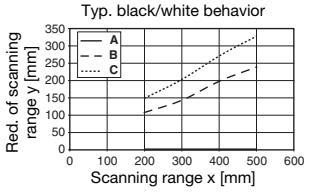
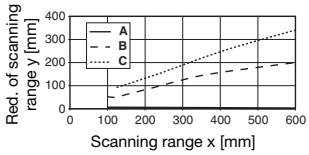
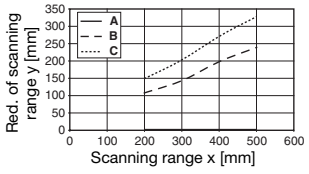
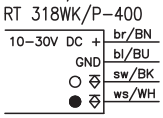
Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % **B** gray 18 % **C** black 6 % 
M12 connector	1, 3	a, b, c, d, e, f	Typ. black/white behavior 
Cable, 2 m	1, 3		
M12 connector	1, 3	a, b, c, d, e, f	
Cable, 2 m	1, 3		
M12 connector	1, 3	a, b, c, d, e, f	Typ. black/white behavior 
Cable, 2 m	1, 3		
M12 connector	1, 2, 3	a, b, c, d, e, f	Typ. black/white behavior 
Cable, 2 m	1, 2, 3		
M12 connector	1, 3	a, b, c, d, e, f	Typ. black/white behavior 
Cable, 2 m	1, 3		

Optical Sensor ABC

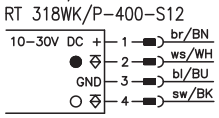
- Diffuse reflection scanners energetic Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

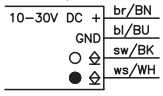
RT 318K/P-400
RT 318K/P-550
RT 318WK/P-400



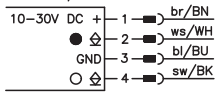
RT 318K/P-400-S12
RT 318K/P-550-S12
RT 318WK/P-400-S12



RT 318K/N-400
RT 318K/N-550



RT 318K/N-400-S12
RT 318K/N-550-S12



Options

1 Scanning range adjustment via potentiometer

2 90° optics

3 UL approval (class 2 acc. to NEC)

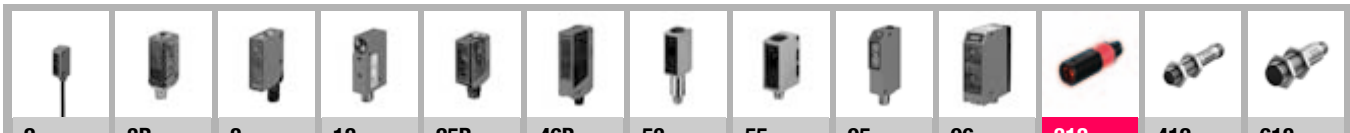
DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Energetic diffuse reflection scanners in plastic housing					
RT 318 K/P - 200 - S12 50081355	0 200 0 250	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 K/P - 200 50081356	0 200 0 250	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 K/N - 200 - S12 50082148	0 200 0 250	1000 Hz	Infrared light	2xNPN/DC	Light/dark antivalent
RT 318 K/N - 200 50083163	0 200 0 250	1000 Hz	Infrared light	2xNPN/DC	Light/dark antivalent
RT 318 WK/P - 100 - S12 50082169	0 … 100 0 … 130	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 WK/P - 100 50082167	0 … 100 0 … 130	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 WK/N - 100 - S12 50083139	0 … 100 0 … 130	1000 Hz	Infrared light	2xNPN/DC	Light/dark antivalent
RT 318 K/P - 100 - S12.11 50083244	0 … 100 0 … 120	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 K/P - 100.11 50109473	0 … 100 0 … 120	1000 Hz	Infrared light	2xPNP/DC	Light/dark antivalent
RT 318 K/N - 100.11 50108612	0 … 100 0 … 120	1000 Hz	Infrared light	2xNPN/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC


2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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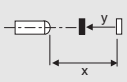
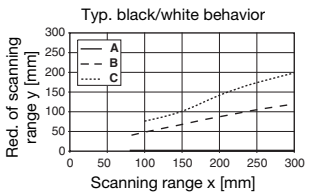
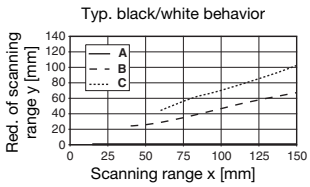
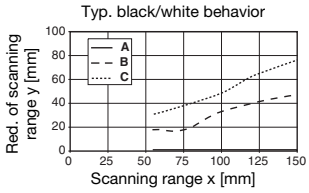
318 SERIES

Diffuse reflection scanners

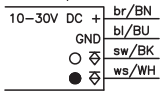
Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % B gray 18 % C black 6 % 
M12 connector	1, 4	a, b, c, d	
Cable, 2 m	1, 4		
M12 connector	1, 4	a, b, c, d	
Cable, 2 m	1, 4		
M12 connector	1, 3, 4	a, b, c, d	
Cable, 2 m	1, 3, 4		
M12 connector	1, 3, 4	a, b, c, d	
M12 connector	1, 2, 4	a, b, c, d	
Cable, 2 m	1, 2, 4		
Cable, 2 m	1, 2, 4		

Optical Sensor ABC

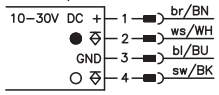
- Diffuse reflection scanners energetic Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

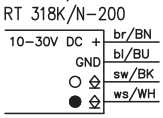
RT 318K/P-100.11
RT 318WK/P-100
RT 318K/P-200



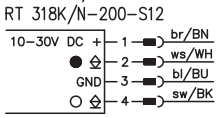
RT 318K/P-100–S12.11
RT 318WK/P-100–S12
RT 318K/P-200–S12



RT 318K/N-100.11
RT 318K/N-200



RT 318WK/N-100–S12
RT 318K/N-200–S12



Options

1 Scanning range adjustment via potentiometer

2 V-optics for background suppression (Fading)

3 90° optics

4 UL approval (class 2 acc. to NEC)

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching
Diffuse reflection scanners in metal housing with background suppression					
HRTR 318 M/66 - 120 - S12 50106086	1 120 1 140	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 318 M/66 - 120 50106090	1 120 1 140	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
Diffuse reflection scanners in plastic housing with background suppression					
HRTR 318 K/66 - 120 - S12 50106085	1 120 1 140	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent
HRTR 318 K/66 - 120 50106089	1 120 1 140	1000 Hz	Red light	2 x Push-pull/DC	Light/dark antivalent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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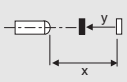
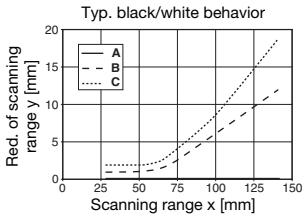
318 SERIES

Diffuse reflection scanners

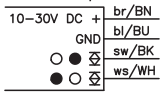
Connection	Option	Accessories	Typ. b/w behavior
			A white 90 % **B** gray 18 % **C** black 6 % 
M12 connector	1, 2, 3	a, b, c, d, e, f	
Cable, 2 m	1, 2, 3		
			
M12 connector	1, 2, 3	a, b, c, d, e, f	
Cable, 2 m	1, 2, 3		

Optical Sensor ABC

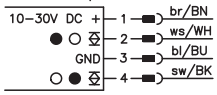
- Diffuse reflection scanners with background suppr. Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

HRTR 318M/66-120
HRTR 318K/66-120



HRTR 318M/66-120-S12
HRTR 318K/66-120-S12



Options

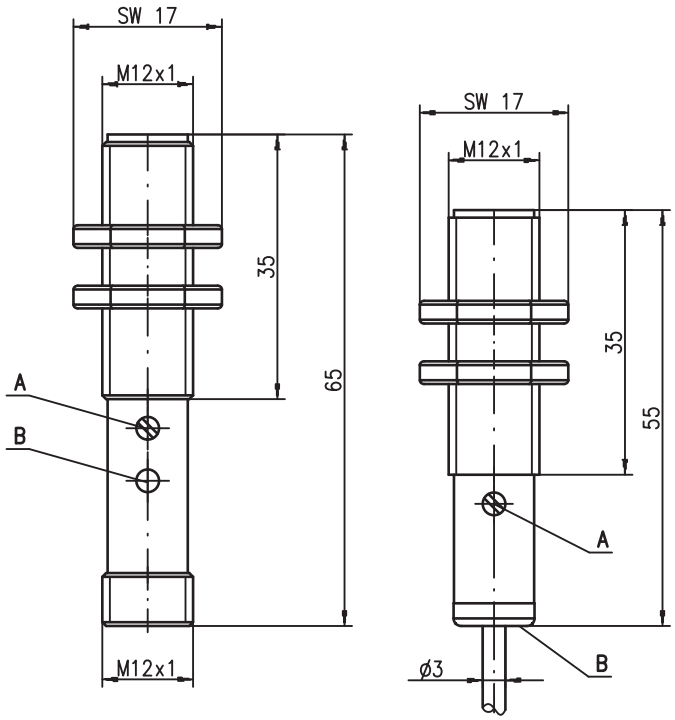
1 Scanning range adjustment via multiturn potentiometer

2 Reliable switching nearly independent of object/background properties

3 UL approval (class 2 acc. to NEC)

OVERVIEW

Dimensioned drawing



Further details can be found in the respective data sheet.

A Sensitivity adjustment
B Indicator diode

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2	3B	8	18	25B	46B	53	55	95	96	318	412	618
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412 SERIES

Operating principle	Typ. operating range limits	Page
Throughbeam sensors	0 … 8 m	228
Retro-reflective sensors	0.05 … 1.6 m	230
Diffuse reflection scanners	0 … 400 mm	232

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple	≤ 10 % of U_B
	Open-circuit current	≤ 20 mA
	Signal voltage high/low	≥ (U_B-3V)/≤ 3V
Indicators	Yellow LED	Switching output
Mechanical data	Housing	Nickel-faced brass
	Optics cover	Plastic
	Weight (connector/cable)	18 g/46 g
Environmental data	Ambient temperature (operation)	-25 °C … +55 °C
	VDE safety class	III
	Protection class	IP 67
	Standards applied	IEC 60947-5-2

Mounting systems for this series can be found from **page 547** onwards

Features

- **Slim and short M12 construction**
- **Robust metal housing**
- **Visible red light for easy alignment**

CE

Optical Sensor ABC

- Throughbeam sensors Page 593
- Retro-reflective sensors Page 593
- Diffuse reflection scanners Page 594

THROUGHBEAM SENSORS

Part description Part No.:	Operating range [m] Typ. op. range limit [m]	Switching frequency	Light source	Output	Switching
Throughbeam sensors					
Set LS 412 M/P - S12 [1] 50081431	0 6 0 8	500 Hz	Red light	PNP/DC	Light/dark reversible
LS 412 M/P [1] 50081432	0 6 0 8	500 Hz	Red light	PNP/DC	Light/dark reversible

1) Set with transmitter and receiver

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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412 SERIES

Throughbeam sensors

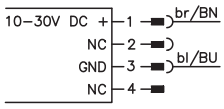
	Connection	Option	Accessories		Typ. light spot
	M12 connector	1, 2	a, b, c, d, e, f		
	Cable, 2 m	1, 2			

Optical Sensor ABC

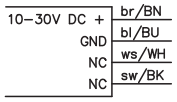
- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

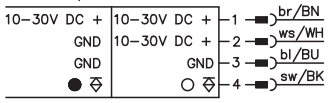
LSS 412M-S12



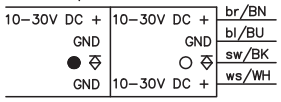
LSS 412M



LSE 412M/P-S12



LSE 412M/P



Options

1 Sensitivity adjustment via potentiometer

2 Light/dark switching via control cable

RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching
Retro-reflective sensors in metal housing with polarization filter					
PRK 412 M/P - S12 50081407	0.15 – 1.3 0.05 – 1.6	700 Hz	Red light	PNP/DC	Light/dark reversible
PRK 412 M/P 50081408	0.15 – 1.3 0.05 – 1.6	700 Hz	Red light	PNP/DC	Light/dark reversible

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 589

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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412 SERIES

Retro-reflective sensors

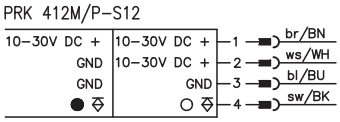
	Connection	Option	Accessories		Typ. light spot
	M12 connector	1, 2	a, b, c, d, e, f		
	Cable, 2 m	1, 2			

Optical Sensor ABC

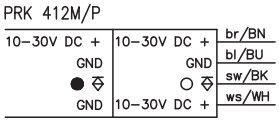
- Retro-reflective sensors with polarization filter — Page 593
- Connection types — Page 598
- Outputs — Page 598

Electrical connection

PRK 412M/P-S12



PRK 412M/P



Options

1 Sensitivity adjustment via potentiometer

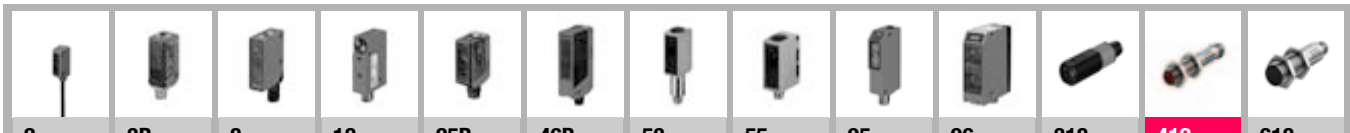
2 Light/dark switching via control cable

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching	
Energetic diffuse reflection scanners						
RT 412 M/P - 200 - S12 50081409	0 200 0 400	700 Hz	Red light	PNP/DC	Light/dark reversible	
RT 412 M/P - 200 50081410	0 200 0 400	700 Hz	Red light	PNP/DC	Light/dark reversible	

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC


2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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412 SERIES

Diffuse reflection scanners

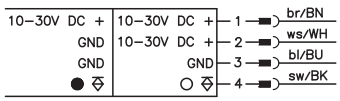
	Connection	Option	Accessories		Typ. b/w behavior
	M12 connector	1, 2	a, b, c, d, e, f		
	Cable, 2 m	1, 2			

Optical Sensor ABC

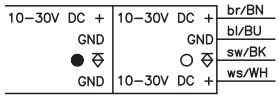
- Diffuse reflection scanners energetic Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection

RT 412M/P-200-S12



RT 412M/P-200



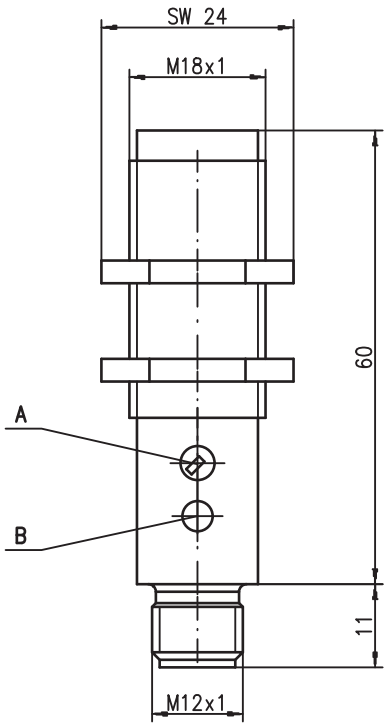
Options

1 Scanning range adjustment via potentiometer

2 Light/dark switching via control cable

OVERVIEW

Dimensioned drawing



Further details can be found in the respective data sheet.

A Sensitivity adjustment
B Indicator diode

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2	3B	8	18	25B	46B	53	55	95	96	318	412	618
Page 20	Page 32	Page 64	Page 78	Page 86	Page 112	Page 128	Page 142	Page 156	Page 164	Page 200	Page 226	Page 234

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618 SERIES

Operating principle	Typ. operating range limits	Page
Retro-reflective sensors	0 … 7 m	236
Diffuse reflection scanners	0 … 300 mm	238

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple	≤ 10 % of U_B
	Open-circuit current	≤ 30 mA
	Signal voltage high/low	≥ (U_B-2.5 V)/≤ 2.5 V
Indicators	Green dual LED	Ready to operate
	Yellow dual LED	Switching output
	Flashing yellow dual LED	No performance reserve
Mechanical data	Housing	Nickel-faced brass
	Optics cover	Plastic
	Weight	40 g
Environmental data	Ambient temperature (operation)	-25 °C … +55 °C
	Protective circuit	Short circuit and overload protection
	Protection class	IP 67
	Standards applied	IEC 60947-5-2

Mounting systems for this series can be found from **page 546** onwards

Features

- **Short M18 construction for limited spaces**
- **Robust metal housing**
- **Dual LED display for easy commissioning**

CE

Optical Sensor ABC

- Retro-reflective sensors Page 593
- Diffuse reflection scanners Page 594

RETRO-REFLECTIVE SENSORS

Part description Part No.:	Operating range [1] [m] Typ. op. range limit [1] [m]	Switching frequency	Light source	Output	Switching	
Retro-reflective sensors with polarization filter						
PRK 618 / 4 - S12 50038450	0 5 0 7	500 Hz	Red light	PNP/DC	Light/dark reversible	

1) The specified values apply in combination with reflectors TK(S) 100 x 100, additional reflectors with range specifications can be found on page 589

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

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618 SERIES

Retro-reflective sensors

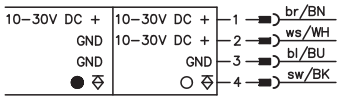
	Connection	Option	Accessories		Typ. light spot
	M12 connector	1, 2	a, b, c, d, e, f		

Optical Sensor ABC

- Retro-reflective sensors with polarization filter — Page 593
- Connection types — Page 598
- Outputs — Page 598

Electrical connection

PRK 618/4-S12



Options

1 Sensitivity adjustment via potentiometer

2 Light/dark switching via control cable

DIFFUSE REFLECTION SCANNERS

Part description Part No.:	Scanning range [mm] Typ. scan range limit [mm]	Switching frequency	Light source	Output	Switching	
Energetic diffuse reflection scanners						
RT 618 / 4 - 200 - S12 50038449	0 200 0 300	500 Hz	Infrared light	PNP/DC	Light/dark reversible	

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000 mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000 mm, M12 axial, 4-pin, PVC

2 Page 20 | **3B** Page 32 | **8** Page 64 | **18** Page 78 | **25B** Page 86 | **46B** Page 112 | **53** Page 128 | **55** Page 142 | **95** Page 156 | **96** Page 164 | **318** Page 200 | **412** Page 226 | **618** Page 234

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618 SERIES

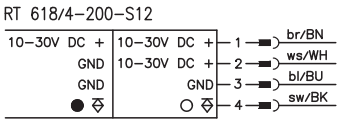
Diffuse reflection scanners

	Connection	Option	Accessories		Typ. b/w behavior
	M12 connector	1, 2	a, b, c, d, e, f		

Optical Sensor ABC

- Diffuse reflection scanners energetic Page 594
- Connection types Page 598
- Outputs Page 598

Electrical connection



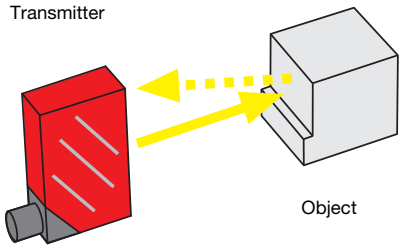
Options

1	Scanning range adjustment via potentiometer
2	Light/dark switching via control cable

SELECTION GUIDE

Optical distance sensors

Measurement principle



Selection table ODS(L) on **page 244**

The diffuse light reflected by the object is analysed using various measurement techniques. The results are used to determine the distance from the object to the sensor.

Products and typ. measurement ranges [mm]

ODSL 8 from **page 246** onwards

20 — 500

ODSL 9 from **page 250** onwards

50 — 650

ODS(L) 96(B) / ODKL 96B from **page 262** onwards

60 — 25000

ODSL 30 from **page 258** onwards

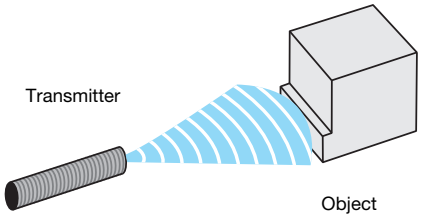
200 — 30000

Features

- To a large extent, the measurement technique is independent of the color and structure of the object
- Measurement of small object in the entire measurement range
- Up to 1000 measurements per second
- Three different measurement principles:
  1. Triangulation principle for measurement ranges between 20 mm and 2300 mm
  2. Time of Flight Prinzip for measurement ranges up to 25,000 mm
  3. Phase measurement principle for measurement ranges up to 65,000 mm

Ultrasonic distance sensors

Measurement principle



Ultrasonic distance sensors measure the propagation time of the ultrasonic waves which are reflected back to the sensor. The distance to the object is then calculated using this propagation time.

Products and typ. measurement ranges [mm]

HRTU 418 from **page 278** onwards

50 — 1000

VRTU 430 from **page 282** onwards

60 — 6000

Features

- Detection of diffuse, transparent and shiny as well as solid, liquid or powdered objects
- Detection of objects with overhanging material
- Can be used at low measurement rates (typically 10 measurements per second)
- Not affected by dust, fog and smoke

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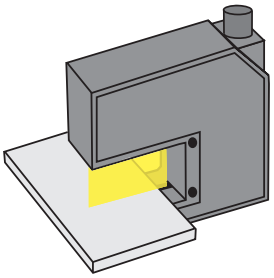
Measuring forked sensors

Measurement principle



The transmitted light is spread into a parallel light band by means of a lens and received by the opposing CCD line. Interrupting this light band allows, for example, the edge of an object to be determined or the width of an object to be measured.

Products and typ. measurement ranges [mm]

GS 754(B) from **page 286** onwards

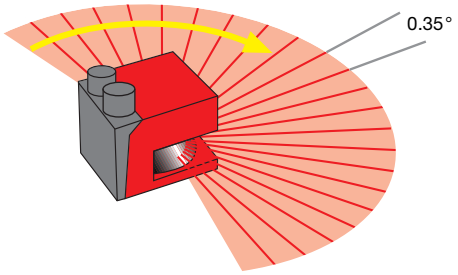
0 25

Features

- Edge and object detection of up to 3 objects in 25mm wide light band
- Minimum object diameter 0.5mm
- Resolution 14µm
- Analogue, digital and switching outputs
- Typical applications
  - Edge detection and height verification
  - Gap measurement with and without projecting edge
  - Position determination of punched holes
  - Detection of broken objects

Optical surface distance sensors

Measurement principle



The surface distance sensor scans its surroundings within a 190° arc by transmitting 529 laser beams per cycle.
The distances to the objects located in the scanning range are determined using the pulse propagation time technique.

Products and typ. measurement ranges [mm]

ROD 4 / ROD 4plus from **page 290** onwards

0 65000

Features

- To a large extent, the measurement technique is independent of the color and structure of the object
- Scanning angle 190°
- Scanning rate 25 scans per second
- Measurement value resolution 5mm
- Typical applications
  - Collision prevention on driverless transportation systems
  - Projection monitoring
  - Fill-level monitoring of bulk materials

SELECTION GUIDE

Line Profile Sensors

Measurement principle	Products and typ. measurement ranges [mm]
In the light-section method, a linear, deflected laser beam is used to measure the profile of moving or static objects. When scanning moving objects, an additional encoder connection facilitates the creation of 3D data.	**LPS 36** from **page 296** onwards 200 … 800

Features

- Laser measurement technology with light-section method for 2D and 3D object measurement (calibrate measuring system)
- Laser line 600mm at a distance of 800mm
- Resolution 1 … 3mm, measurement time 10ms
- Sensor activation/triggering and ability to cascade up to 9 sensors
- Compact construction 160 x 74 x 56mm
- Ethernet interface

Line Edge Sensors

Measurement principle	Products and typ. scanning areas [mm]
In the light-section method, a linear, deflected laser beam is used to measure the edge position as well as the width and height of moving or static objects. Up to 8 objects can be simultaneously measured with one sensor.	**LES 36** from **page 300** onwards 200 … 800

Features

- Laser measurement technology with light-section method for width, height and position measuring
- Resolution 1 … 3mm, measurement time 10ms
- Sensor activation/triggering and ability to cascade up to 9 sensors
- Data calculation and processing directly inside the sensor
- Compact construction 160 x 74 x 56mm
- Ethernet
- Analog interface or PROFIBUS

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Line Range Sensors

Measurement principle

In the light-section method, a linear, deflected laser beam is used to detect the presence of moving or static objects. Up to 16 objects can be simultaneously detected with one sensor.

Products and typ. scanning areas [mm]

LRS 36 from **page 304** onwards

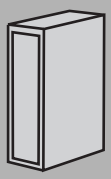
200 — 800

Features

- Laser scanning with light-section method for object detection
- Minimum object size 3 … 6mm, response time 10ms
- Sensor activation/triggering and ability to cascade up to 9 sensors
- Data calculation and processing directly inside the sensor
- Compact construction 160 x 74 x 56mm
- Ethernet
- I/O interface or PROFIBUS

Detailed product information can be found at **www.leuze.com**.

SELECTION TABLE

 Series	Dimensions in mm (WxHxD)	Housing material: Plastic	Housing material: Metal	Typ. measurement range [mm]: 200 / 500 / 5000 / 65000
ODSL 8	15 x 48 x 38		●	20 – 500
ODSL 9	21 x 50 x 50	●		50 – 650
ODS 96(B) ODKL 96B	30 x 90 x 70	●	●	60 – 25000
ODSL 30	79 x 70 x 150		●	200 – 30000 – 65000

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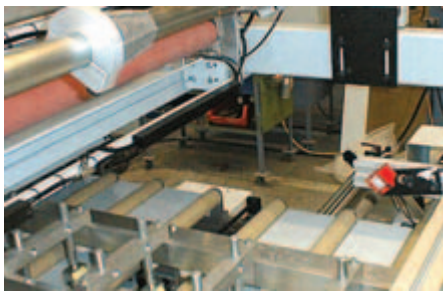
OPTICAL DISTANCE SENSORS

	Operating voltage		Light source			Switching output								Connection		
	10 … 30VDC	18 … 30VDC	Infrared light	Red light	Laser	Analog / Current	Analog / Voltage	Serial / RS 232	Serial / RS 485	PNP switching outputs	NPN switching outputs	Push-pull switching outputs	Warning outp. PNP / NPN	M12 connector	Terminals	Page
	●	●			●	●	●	●	●	●	●	●		●		246
	●	●			●	●	●	●	●	●	●	●		●		250
	●	●	●	●	●	●	●	●	●	●	●	●	●	●		262
	●	●			●	●	●	●	●	●	●			●		258

OVERVIEW OF OPTICAL DISTANCE SENSORS

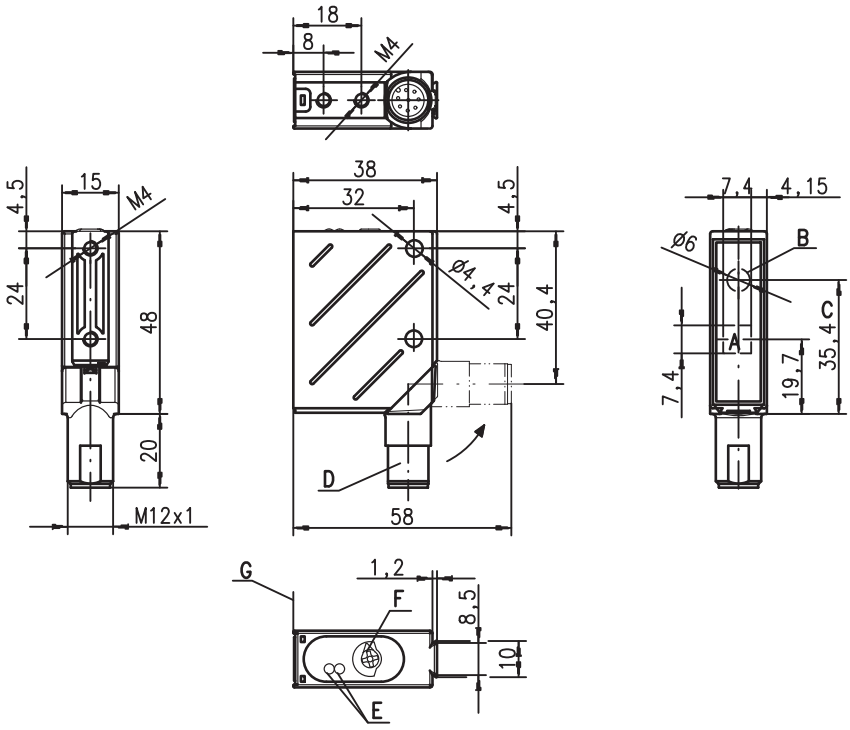
Stack positioning



Diameter determination

Orientation position inspection

Dimensioned drawing



A Receiver
B Transmitter
C Optical axis
D 90° turning connector
E Yellow, green LED
F Operational control (rotary switch)
G Reference edge for the measurement (cover glass)

Further details can be found in the respective data sheet.

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ODSL 8 Page 246

ODSL 9 Page 250

ODSL 30 Page 258

ODS 96(B) Page 262

HRTU 418 Page 278

VRTU 430 Page 282

GS 754(B) Page 286

ROD 4 Page 290

LPS 36 Page 296

LES 36 Page 300

LRS 36 Page 304

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ODSL 8

Optical distance sensors	Measurement range	Page
Optical distance sensors ODSL 8	20 … 500 mm	248

Other 8 Series products:

Throughbeam sensors	LSR 8, LSRL 8	66
Retro-reflective sensors	PRK 8. PRKL 8	68
Diffuse reflection scanners	RTR 8, VRTR 8, HRTR 8,	72
Ultrasonic sensors	LSU 8, RKU 8, HRTU 8	312
Luminescence scanners	LRT 8	474

Common technical data

Electrical data	Operating voltage U_B	10 … 30/18 … 30 VDC
	Residual ripple	≤ 15 % of U_B
	Open-circuit current	≤ 50 mA
	Signal voltage high/low	≥ (U_B-2 V)/≤ 2 V
Indicators	Green LED	Ready to operate
	Yellow LED	Obj. detected, teach-in
Mechanical data	Housing	Metal
	Optics cover	Glass
	Weight (connector/cable)	70 g
Environmental data	Ambient temperature (operation)	-20 °C … +50 °C
	VDE safety class	II, all-insulated
	Protection class	IP 67, IP 69K
	Laser class	2 acc. to EN 60825-1
	Standards applied	IEC 60947-5-2, UL 508

Mounting systems for this series can be found from **page 536** onwards

Features

- **Measurement range 20 … 500 mm**
- **Resolution up to 0.01 mm**
- **High measurement accuracy**
- **PC configuration provides high flexibility**

CE CDRH

Optical Sensor ABC

- Optical distance sensors Page 595

OPTICAL DISTANCE SENSORS

Part description Part No.:	Meas. range [mm]	Operating voltage	Light source Light spot [1]	Output	Connection	Meas. time [ms]
Optical laser distance sensors						
ODSL 8 / C66 - 45 - S12 50108364	25 … 45 [2]	18 … 30VDC	Red light laser, class 2 Ø 1mm	Analog/mA 2x push-pull	M12 connector	≤ 7
ODSL 8 / V66 - 45 - S12 50108363	25 … 45 [2]	18 … 30VDC	Red light laser, class 2 Ø 1mm	Analog/V 2xpush-pull	M12 connector	≤ 7
ODSL 8 / C66 - 200 - S12 50108362	20 200 [3]	18 … 30VDC	Red light laser, class 2 1x6mm²	Analog/mA 2x push-pull	M12 connector	≤ 7
ODSL 8 / V66 - 200 - S12 50105761	20 200 [3]	18 … 30VDC	Red light laser, class 2 1x6mm²	Analog/V 2xpush-pull	M12 connector	≤ 7
ODSL 8 / C66 - 500 - S12 50108361	20 500 [3]	18 … 30VDC	Red light laser, class 2 1x6mm²	Analog/mA 2x push-pull	M12 connector	≤ 7
ODSL 8 / V66 - 500 - S12 50101879	20 500 [3]	18 … 30VDC	Red light laser, class 2 1x6mm²	Analog/V 2xpush-pull	M12 connector	≤ 7
ODSL 8 / 66 - 500 - S12 50101880	20 500 [3]	18 … 30VDC	Red light laser, class 2 1x6mm²	2 x push-pull	M12 connector	≤ 7

1) At the measurement range end value
2) Luminosity coefficient 6 … 90%, at 20°C, measurement object ≥ 20x20mm²
3) Luminosity coefficient 6 … 90%, at 20°C, measurement object ≥ 50x50mm²

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000mm, M12 axial, 5-pin, PVC

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ODSL 8

Optical distance sensors

	Abs. meas. accuracy	Repeatability [4]	Resolution [mm]	Option	Accessories	
	± 1.5% [2]	± 0.2%	0.03	1	a, b	
	± 1.5% [2]	±0.2%	0.03	1	a, b	
	± 2% [3]	± 1%	0.1 … 0.2 [5]	1	a, b	
	± 2% [3]	± 1%	0.1 … 0.2 [5]	1	a, b	
	± 2 … ± 4% [3]	± 1 … ± 3%	0.1 … 0.5 [5]	1	a, b	
	± 2 … ± 4% [3]	± 1 … ± 3%	0.1 … 0.5 [5]	1	a, b	
	± 2 … ± 4% [3]	± 1 … ± 3%	0.1 … 0.5 [5]	1, 2	a, b	

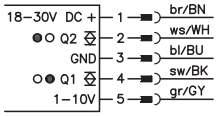
4) Same object, identical environmental conditions, measurement object ≥ 50x50mm²
5) Minimum and maximum value depend on measurement distance

Optical Sensor ABC

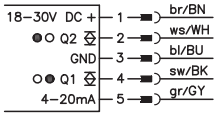
- Optical distance sensors Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection

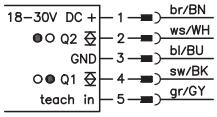
ODSL 8/V 66-45-S12
ODSL 8/V 66-200-S12
ODSL 8/V 66-500-S12



ODSL 8/C 66-45-S12
ODSL 8/C 66-200-S12
ODSL 8/C 66-500-S12



ODSL 8/66-500-S12



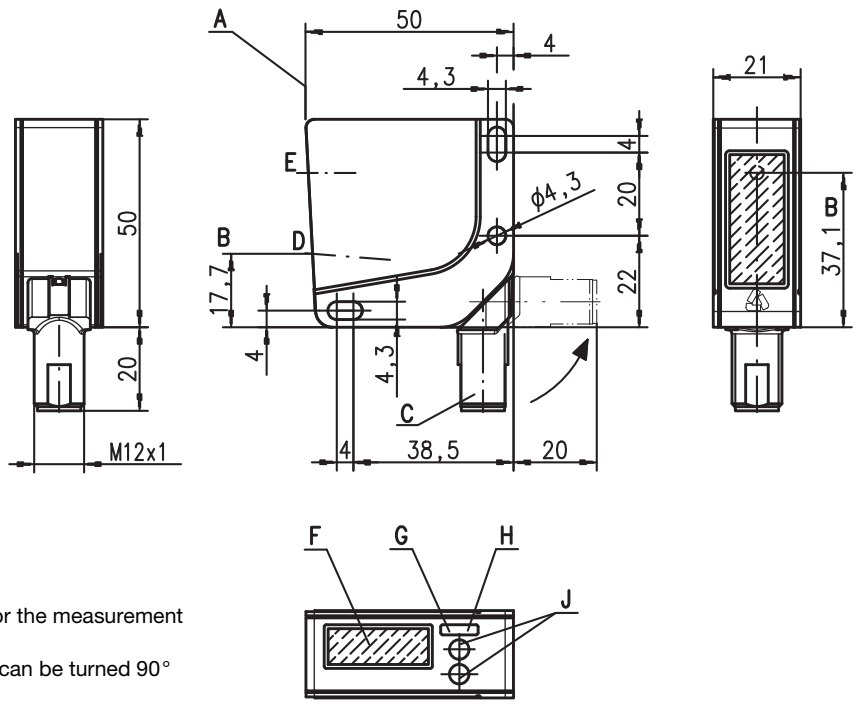
Options

1 Teach-in via rotary switch

2 Teach-in via teach input

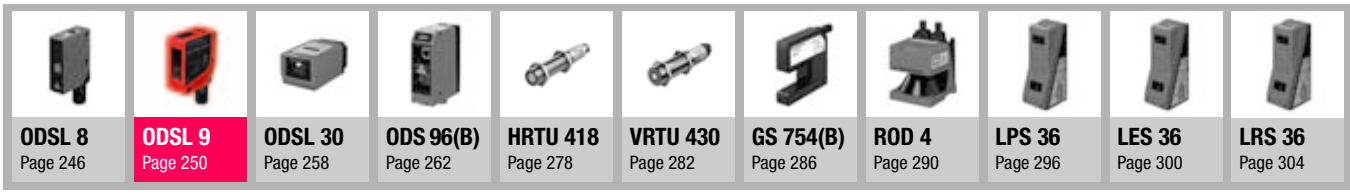
OVERVIEW OF OPTICAL DISTANCE SENSORS

Dimensioned drawing



A Reference edge for the measurement
B Optical axis
C M12 device plug, can be turned 90°
D Receiver
E Transmitter
F LCD display
G Yellow indicator diode
H Green indicator diode
J Control buttons

Further details can be found in the respective data sheet.


ODSL 8 Page 246 | ODSL 9 Page 250 | ODSL 30 Page 258 | ODS 96(B) Page 262 | HRTU 418 Page 278 | VRTU 430 Page 282 | GS 754(B) Page 286 | ROD 4 Page 290 | LPS 36 Page 296 | LES 36 Page 300 | LRS 36 Page 304

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ODSL 9

Optical distance sensors	Measurement range	Page
Optical distance sensors ODSL 9	50 … 650 mm	252

Common technical data

Electrical data	Operating voltage U_B	10 … 30/18 … 30 VDC
	Residual ripple	≤ 15 % of U_B
	Open-circuit current	≤ 180 mA
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Green LED	Ready to operate
	Yellow LED	Obj. detected, teach-in
Mechanical data	Housing	Plastic
	Optics cover	Glass
	Weight	Approx. 50 g
Environmental data	Ambient temperature (operation)	-20 °C … +50 °C
	VDE safety class	II, all-insulated
	Protection class	IP 67
	Laser class	2 acc. to EN 60825-1
	Standards applied	IEC 60947-5-2, UL 508

Mounting systems for this series can be found from **page 548** onwards

Features

- **LCD measurement value display in mm**
- **Measurement range 50 … 650 mm**
- **Resolution up to 0.01 mm**
- **High measurement accuracy**
- **Menu-driven configuration via LCD display/control buttons or via configuration software**
- **Laser class 1 and class 2**

Optical Sensor ABC

- Optical distance sensors Page 595

OPTICAL DISTANCE SENSORS

Part description Part No.:	Meas. range [mm]	Operating voltage	Light source Light spot [1]	Output	Connection	Measurement time [ms] [2]
Optical laser distance sensors						
ODSL 9 / C6 - 100 - S12 50111167	50 100 [2]	18 … 30VDC	Red light laser, class 2 1x1mm²	Analog/mA 1x push-pull	M12 connector	2
ODSL 9 / V6 - 100 - S12 50111168	50 100 [2]	18 … 30VDC	Red light laser, class 2 1x1mm²	Analog/V 1xpush-pull	M12 connector	2
ODSL 9 / C66 - 100 - S12 50111171	50 100 [2]	18 … 30VDC	Red light laser, class 2 1x1mm²	Analog/mA 2x push-pull	M12 connector	2
ODSL 9 / V66 - 100 - S12 50111172	50 100 [2]	18 … 30VDC	Red light laser, class 2 1x1mm²	Analog/V 2xpush-pull	M12 connector	2
ODSL 9 / D26 - 100 - S12 50111169	50 100 [2]	10 … 30VDC	Red light laser, class 2 1x1mm²	Serial/RS 232 1xpush-pull	M12 connector	2
ODSL 9 / D36 - 100 - S12 50111170	50 100 [2]	10 … 30VDC	Red light laser, class 2 1x1mm²	Serial/RS 485 1xpush-pull	M12 connector	2
ODSL 9 / 66 - 100 - S12 50111173	50 100 [2]	10 … 30VDC	Red light laser, class 2 1x1mm²	2 x push-pull	M12 connector	2

1) At the measurement range end value
2) Luminosity coefficient 6% … 90%, complete measurement range, "Standard" operating mode, at 20°C, medium range of U_B, measurement object ≥ 50x50mm²
3) Same object, identical environmental conditions, measurement object ≥ 50x50mm²

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000mm, M12 axial, 5-pin, PVC
e	50104560	K - D M12W - 5P - 10m - PVC	Connection cable 10000mm, M12 angular, 5-pin, PVC
f	50107223	UPG 10	Configuration adaptor for ODS 96B

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	Abs. meas. accuracy	Repeatability [3]	Resolution [mm]	Option	Accessories	
	± 0.5 % [2]	± 0.25 %	0.01	1, 2, 3, 5	a, b, c, d, e, f	
	± 0.5 % [2]	± 0.25 %	0.01	1, 2, 3, 5	a, b, c, d, e, f	
	± 0.5 % [2]	± 0.25 %	0.01	1, 3, 5	a, b, c, d, e, f	
	± 0.5 % [2]	± 0.25 %	0.01	1, 3, 5	a, b, c, d, e, f	
	± 0.5 % [2]	± 0.25 %	0.01	1, 3, 4, 5	a, b, c, d, e, f	
	± 0.5 % [2]	± 0.25 %	0.01	1, 3, 5	a, b, c, d, e, f	
	± 0.5 % [2]	± 0.25 %	0.01	1, 2, 3, 5	a, b, c, d, e, f	

Configuration software - free download at *www.leuze.com*.

Options

1 PC/LC display and control buttons for configuration

2 Input for deactivating the laser, triggering, offset correction, reference measurement or teach-in

3 Adjustable measurement range and measurement mode

4 Direct connection to MA 2xx*i* fieldbus gateway possible, see page 569

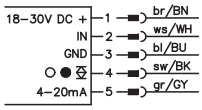
5 UL approval (class 2 acc. to NEC)

Optical Sensor ABC

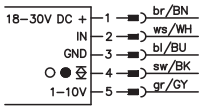
- Optical distance sensors Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection

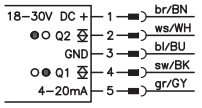
ODSL 9/C6...–S12



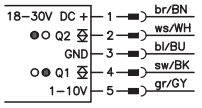
ODSL 9/V6...–S12



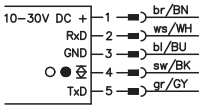
ODSL 9/C66–...–S12



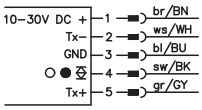
ODSL 9/V66–...–S12



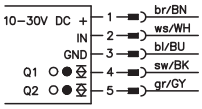
ODSL 9/D26–...–S12



ODSL 9/D36–...–S12



ODSL 9/66–...–S12



OPTICAL DISTANCE SENSORS

Part description Part No.:	Meas. range [mm]	Operating voltage	Light source Light spot [1]	Output	Connection	Measurement time [ms] [2]
Optical laser distance sensors						
ODSL 9 / C6 - 450 - S12 50111157	50 … 450 [2]	18 … 30VDC	Red light laser, class 2 1x1mm²	Analog/mA 1x push-pull	M12 connector	2
ODSL 9 / C6.C1 - 450 - S12 50115029	50 … 450 [2]	18 … 30VDC	Red light laser, class 1 1x1mm²	Analog/mA 1x push-pull	M12 connector	4
ODSL 9 / V6 - 450 - S12 50111158	50 … 450 [2]	18 … 30VDC	Red light laser, class 2 1x1mm²	Analog/V 1xpush-pull	M12 connector	2
ODSL 9 / V6.C1 - 450 - S12 50115030	50 … 450 [2]	18 … 30VDC	Red light laser, class 1 1x1mm²	Analog/V 1xpush-pull	M12 connector	4
ODSL 9 / C66 - 450 - S12 50111161	50 … 450 [2]	18 … 30VDC	Red light laser, class 2 1x1mm²	Analog/mA 2x push-pull	M12 connector	2
ODSL 9 / V66 - 450 - S12 50111162	50 … 450 [2]	18 … 30VDC	Red light laser, class 2 1x1mm²	Analog/V 2xpush-pull	M12 connector	2
ODSL 9 / D26 - 450 - S12 50111159	50 … 450 [2]	10 … 30VDC	Red light laser, class 2 1x1mm²	Serial/RS 232 1xpush-pull	M12 connector	2
ODSL 9 / D36 - 450 - S12 50111160	50 … 450 [2]	10 … 30VDC	Red light laser, class 2 1x1mm²	Serial/RS 485 1xpush-pull	M12 connector	2
ODSL 9 / 66 - 450 - S12 50111163	50 … 450 [2]	10 … 30VDC	Red light laser, class 2 1x1mm²	2 x push-pull	M12 connector	2

1) At the measurement range end value
2) Luminosity coefficient 6% … 90%, complete measurement range, "Standard" operating mode, at 20°C, medium range of U_B, measurement object ≥ 50x50mm²
3) Same object, identical environmental conditions, measurement object ≥ 50x50mm²

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000mm, M12 axial, 5-pin, PVC
e	50104560	K - D M12W - 5P - 10m - PVC	Connection cable 10000mm, M12 angular, 5-pin, PVC
f	50107223	UPG 10	Configuration adaptor for ODS 96B

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	Abs. meas. accuracy	Repeatability [3]	Resolution [mm]	Option	Accessories	
	± 1.0 % [2]	±0.5 %	0.1	1, 2, 3, 5	a, b, c, d, e, f	
	± 1.0 % [2]	±0.5 %	0.1	1, 2, 3	a, b, c, d, e, f	
	± 1.0 % [2]	±0.5 %	0.1	1, 2, 3, 5	a, b, c, d, e, f	
	± 1.0 % [2]	±0.5 %	0.1	1, 2, 3	a, b, c, d, e, f	
	± 1.0 % [2]	±0.5 %	0.1	1, 3, 5	a, b, c, d, e, f	
	± 1.0 % [2]	±0.5 %	0.1	1, 3, 5	a, b, c, d, e, f	
	± 1.0 % [2]	±0.5 %	0.1	1, 3, 4, 5	a, b, c, d, e, f	
	± 1.0 % [2]	±0.5 %	0.1	1, 3, 5	a, b, c, d, e, f	
	± 1.0 % [2]	± 0.5 %	0.1	1, 2, 3, 5	a, b, c, d, e, f	

Configuration software - free download at *www.leuze.com*.

Options

1 PC/LC display and control buttons for configuration

2 Input for deactivating the laser, triggering, offset correction, reference measurement or teach-in

3 Adjustable measurement range and measurement mode

4 Direct connection to MA 2xx*i* fieldbus gateway possible, see page 569

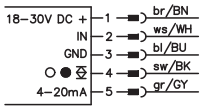
5 UL approval (class 2 acc. to NEC)

Optical Sensor ABC

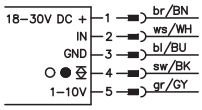
- Optical distance sensors Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection

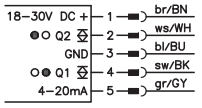
ODSL 9/C6...–S12



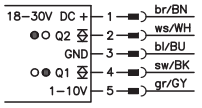
ODSL 9/V6...–S12



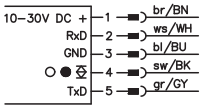
ODSL 9/C66–...–S12



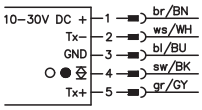
ODSL 9/V66–...–S12



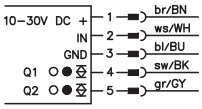
ODSL 9/D26–...–S12



ODSL 9/D36–...–S12



ODSL 9/66–...–S12



OPTICAL DISTANCE SENSORS

Part description Part No.:	Meas. range [mm]	Operating voltage	Light source Light spot [1]	Output	Connection	Measurement time [ms] [2]	
Optical laser distance sensors							
ODSL 9 / C6 - 650 - S12 50113583	50 … 650 [2]	18 … 30 VDC	Red light laser, class 2 1 x 1 mm²	Analog/mA 1 x push-pull	M12 connector	2	
ODSL 9 / V6 - 650 - S12 50114627	50 … 650 [2]	18 … 30 VDC	Red light laser, class 2 1 x 1 mm²	Analog/V 1 x push-pull	M12 connector	2	

1) At 450 mm
2) Luminosity coefficient 6 % … 90 %, complete measurement range, "Standard" operating mode, at 20 °C, medium range of U_B, measurement object ≥ 50 x 50 mm²
3) Same object, identical environmental conditions, measurement object ≥ 50 x 50 mm²

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000 mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000 mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC
e	50104560	K - D M12W - 5P - 10m - PVC	Connection cable 10000 mm, M12 angular, 5-pin, PVC
f	50107223	UPG 10	Configuration adaptor for ODS 96B

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ODSL 9

Optical distance sensors

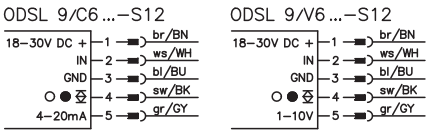
	Abs. meas. accuracy	Repeatability [3]	Resolution [mm]	Option	Accessories	
	± 1.0 % [2]	±0.5 %	0.1 … 0.5	1, 2, 3	a, b, c, d, e, f	
	± 1.0 % [2]	±0.5 %	0.1 … 0.5	1, 2, 3	a, b, c, d, e, f	

Configuration software - free download at *www.leuze.com*.

Optical Sensor ABC

- Optical distance sensors Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1 PC/LC display and control buttons for configuration

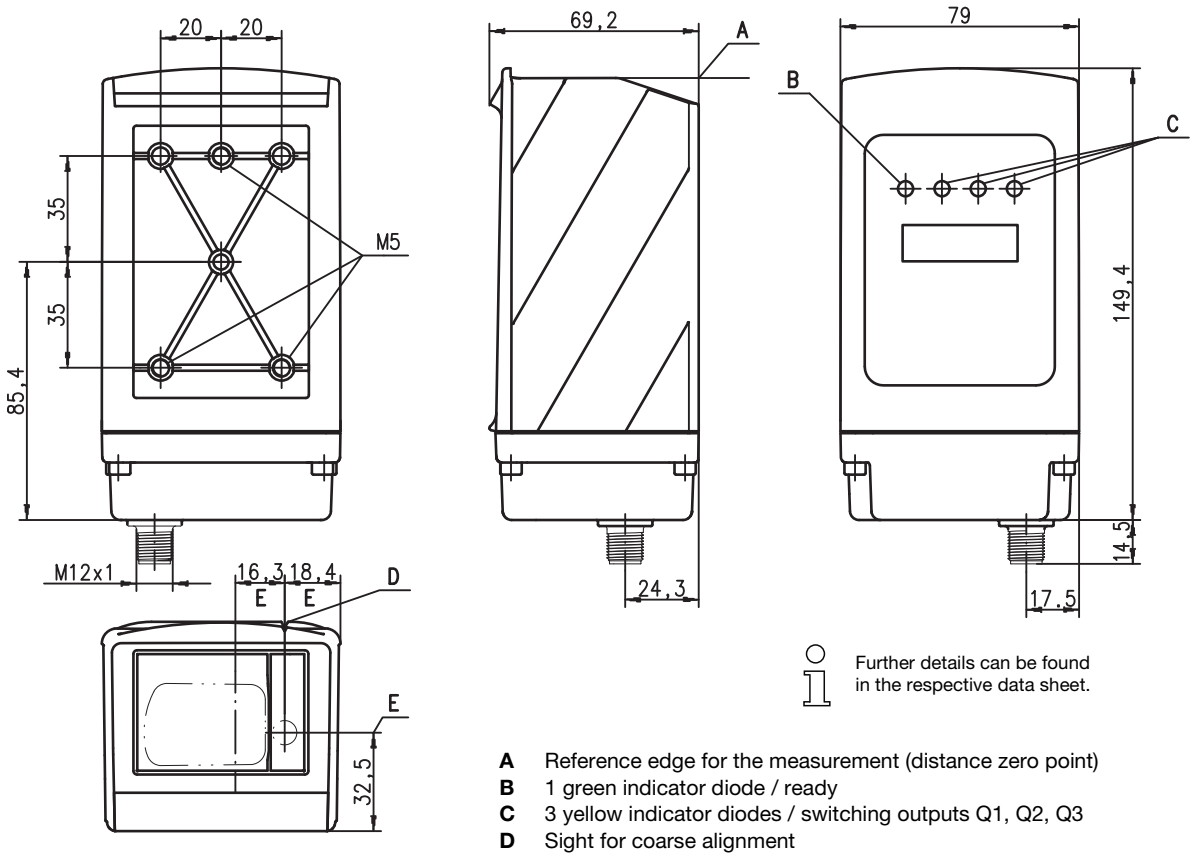
2 Input for deactivating the laser, triggering, offset correction, reference measurement or teach-in

3 Adjustable measurement range and measurement mode

4 UL approval (class 2 acc. to NEC)

OVERVIEW OF OPTICAL DISTANCE SENSORS

Dimensioned drawing



Further details can be found in the respective data sheet.

A Reference edge for the measurement (distance zero point)
B 1 green indicator diode / ready
C 3 yellow indicator diodes / switching outputs Q1, Q2, Q3
D Sight for coarse alignment
E Optical axes

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Page 246

ODSL 9
Page 250

ODSL 30
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ODS 96(B)
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HRTU 418
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VRTU 430
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ODSL 30

Optical distance sensors	Measurement range	Page
Optical distance sensors ODSL 30	0.2 … 30m	260

Common technical data

Electrical data	Operating voltage U_B	10 … 30/18 … 30VDC
	Residual ripple	≤ 15% of U_B
	Power consumption	≤ 4W
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Green LED	Ready to operate
	Yellow LEDs	Switching outputs
Mechanical data	Housing	Metal
	Optics cover	Glass
	Weight	650g
Environmental data	Ambient temperature (operation)	-10°C … +45°C
	VDE safety class	II, all-insulated
	Protection class	IP 65
	Standards applied	IEC 60947-5-2, UL 508

Mounting bracket BT 30 included in delivery contents

Features

- **Measurement range up to 30m**
- **Resolution 1mm**
- **High measurement accuracy through internal referencing**
- **LCD display and key pad for configuration and measurement value display**

Optical Sensor ABC

- Optical distance sensors Page 595

OPTICAL DISTANCE SENSORS

Part description Part No.:	Meas. range [m]	Operating voltage	Light source Light spot [1]	Output	Connection	Meas. time [ms]
Optical laser distance sensors						
ODSL 30 / V - 30M - S12 50039447	0.2 … 30 [2]	18 … 30VDC	Red light laser, class 2 Ø 6mm	Analog/mA/V 1 PNP/NPN	M12 connector	≤ 100
ODSL 30 / D 232 - 30M - S12 50041203	0.2 … 30 … 65 [2] [4]	10 … 30VDC	Red light laser, class 2 Ø 6mm	Serial/RS 232 2 PNP/NPN	M12 connector	≤ 100
ODSL 30 / D 485 - 30M - S12 50041204	0.2 … 30 … 65 [2] [4]	10 … 30VDC	Red light laser, class 2 Ø 6mm	Serial/RS 485 2 PNP/NPN	M12 connector	≤ 100
ODSL 30 / 24 - 30M - S12 50040720	0.2 … 30 [2]	10 … 30VDC	Red light laser, class 2 Ø 6mm	3 PNP/NPN	M12 connector	≤ 100

1) At a distance of 10mm
2) Luminosity coefficient 6 … 90%, temperature range 0°C … +45°C, measurement object ≥ 50x50mm², with referencing
3) Same object, identical environmental conditions
4) ODSL 30 / D… up to 65m, luminosity coefficient 50 … 90%
5) Display and output resolution 0.1mm configurable

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104591	K - D M12A - 8P - 2m - PUR	Connection cable 2000mm, M12 axial, 8-pin, PUR
b	50104590	K - D M12A - 8P - 5m - PUR	Connection cable 5000mm, M12 axial, 8-pin, PUR
c	50104599	CTS 100 x 100	Cooperative target, 100mm x 100mm, screw type

We reserve the right to make changes • ODSL30_EN.fm

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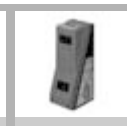
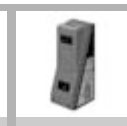
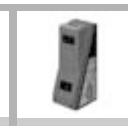

LPS 36 Page 296

LES 36 Page 300

LRS 36 Page 304

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ODSL 30

Optical distance sensors

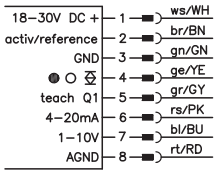
	Abs. meas. accuracy [2]	Repeatability [3]	Resolution [mm] [5]	Option	Accessories	
	± 1 %	± 0.5 %	0.1 / 1	1, 2, 3, 5	a, b, c	
	± 2 mm	± 2 mm	0.1 / 1	1, 2, 3, 4, 5	a, b, c	
	± 2 mm	± 2 mm	0.1 / 1	1, 2, 3, 5	a, b, c	
	± 2 mm	± 2 mm	0.1 / 1	1, 2, 3, 5	a, b, c	

Optical Sensor ABC

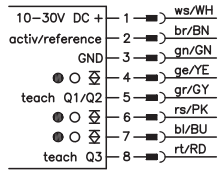
- Optical distance sensors Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection

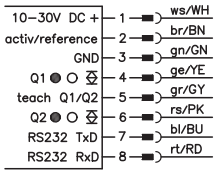
ODSL 30/V–...



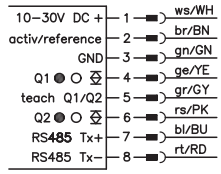
ODSL 30/24–...



ODSL 30/D 232–...



ODSL 30/D 485–...



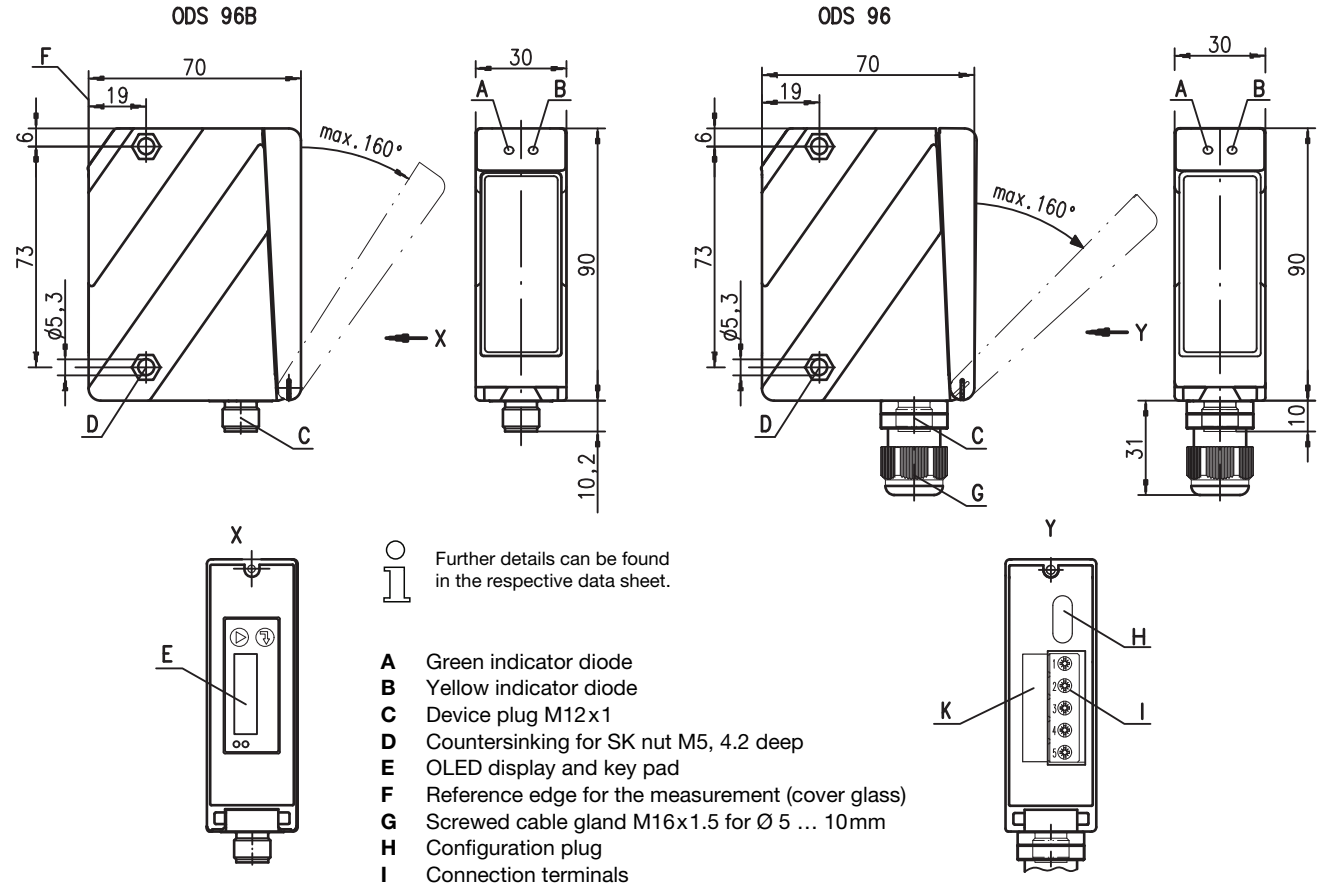
Options

1	Teach-in of the switching points via teach input or keyboard entry
2	Configurable activation/referencing input
3	Menu-driven configuration via LC display and key pad
4	Direct connection to MA 2xx*i* fieldbus gateway possible, see page 569
5	UL approval

OVERVIEW OF OPTICAL DISTANCE SENSORS

Pallet detection

Dimensioned drawing



Further details can be found in the respective data sheet.

A Green indicator diode
B Yellow indicator diode
C Device plug M12x1
D Countersinking for SK nut M5, 4.2 deep
E OLED display and key pad
F Reference edge for the measurement (cover glass)
G Screwed cable gland M16x1.5 for Ø 5 … 10mm
H Configuration plug
I Connection terminals
K Cable entry

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ODS 96(B)

Optical distance sensors	Measurement range	Page
Optical distance sensors ODS… 96(B)	60 … 25000 mm	264

Other 96 Series products:

Throughbeam sensors	LS 96	166
Retro-reflective sensors	RK 96, PRK 96	170
Diffuse reflection scanners	RT 96, HRT 96	176
Protective sensors	SLS 96	512
Ex Sensors	LS 96, SLS 96, PRK 96, HRT 96, ODS 96	522
AS-interface sensors	LS 96, PRK 96, HRT 96	532

Common technical data

Electrical data	Operating voltage U_B	10 … 30/18 … 30 VDC
	Residual ripple	≤ 15 % of U_B
	Open-circuit current	≤ 150 mA
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Green LED	Ready to operate
	Yellow LED	Obj. detected, teach-in
Mechanical data	Housing	Metal or plastic
	Optics cover	Glass or plastic
	Weight (metal/plastic)	380 g/140 g
Environmental data	Ambient temperature (operation)	-20 °C … +50 °C ODSL 96 K…: -20 °C … +40 °C
	VDE safety class	II, all-insulated
	Protection class	IP 67, IP 69K [1]
	Standards applied	IEC 60947-5-2, UL 508

1) IP 69K only with metal housing

Mounting systems for this series can be found from **page 545** onwards

Features

- **Measurement range 60 … 25000 mm**
- **Resolution up to 0.1 mm**
- **High measurement accuracy**
- **OLED display and key pad for configuration (ODS 96B)**
- **PC configuration provides high flexibility**

Optical Sensor ABC

- Optical distance sensors Page 595

OPTICAL DISTANCE SENSORS

Part description Part No.:	Meas. range [mm]	Operating voltage	Light source Light spot [1]	Output	Connection	Meas. time [ms]
Optical distance sensors with visible red light in metal housing						
ODSR 96B M/C6 - 600 - S12 50106730	100 600 [2]	18 … 30VDC	Red light 15 x 15mm²	Analog/mA 1 x push-pull	M12 connector	1 … 5 [2]
ODSR 96B M/V6 - 600 - S12 50106731	100 600 [2]	18 … 30VDC	Red light 15 x 15mm²	Analog/V 1 x push-pull	M12 connector	1 … 5 [2]

1) At measurement distance of 600mm
2) Luminosity coefficient 6 … 90%, complete measurement range, at 20°C, medium range U_B, measurement object ≥ 50x50mm².
With serial interface: depending on the measurement transmission mode and the baud rate

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000mm, M12 axial, 5-pin, PVC
e	50104560	K - D M12W - 5P - 10m - PVC	Connection cable 10000mm, M12 angular, 5-pin, PVC
f	50107223	UPG 10	Configuration adaptor for ODS 96B

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ODS 96B

Optical distance sensors

	Abs. meas. accuracy	Repeatability	Resolution [mm]	Option	Accessories	
	± 1.5% 2)	± 0.5% 3)	0.1 … 0.5 4)	1, 2, 3, 4	a, b, c, d, e, f	
	± 1.5% 2)	± 0.5% 3)	0.1 … 0.5 4)	1, 2, 3, 4	a, b, c, d, e, f	

3) Same object, identical environmental conditions, measurement object ≥ 50x50mm²
4) Minimum and maximum value depend on measurement distance

Configuration software - free download at *www.leuze.com*.

Optical Sensor ABC

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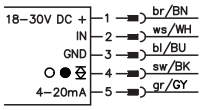
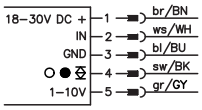
- Connection types Page 598
- Outputs Page 598

Electrical connection

ODSR 96B M/C6-...-S12



ODSR 96B M/V6-...-S12



Options

1 Input for deactivating the laser, triggering, offset correction, reference measurement or teach-in

2 Adjustable measurement range and measurement mode

3 PC/OLED display and key pad for configuration

4 UL approval (class 2 acc. to NEC)

OPTICAL DISTANCE SENSORS

Part description Part No.:	Meas. range [mm]	Operating voltage	Light source Light spot [1]	Output	Connection	Meas. time [ms]
Optical distance sensors with invisible infrared light in metal housing						
ODS 96B M/C6 - 600 - S12 50106720	100 600 [2]	18 … 30VDC	Infrared light 15 x 15mm²	Analog/mA 1 x push-pull	M12 connector	1 … 5 [2]
ODS 96B M/V6 - 600 - S12 50106721	100 600 [2]	18 … 30VDC	Infrared light 15 x 15mm²	Analog/V 1 x push-pull	M12 connector	1 … 5 [2]
ODS 96B M/D26 - 600 - S12 50106722	100 600 [2]	10 … 30VDC	Infrared light 15 x 15mm²	Serial/RS 232 1 push-pull	M12 connector	1 … 5 [2]
ODS 96B M/D36 - 600 - S12 50106723	100 600 [2]	10 … 30VDC	Infrared light 15 x 15mm²	Serial/RS 485 1 push-pull	M12 connector	1 … 5 [2]
ODS 96B M/66 - 600 - S12 50106724	100 600 [2]	10 … 30VDC	Infrared light 15 x 15mm²	2 push-pull	M12 connector	1 … 5 [2]
ODS 96B M/C66.01 - 1400 - S12 50106727	120 1400 [2]	18 … 30VDC	Infrared light 15 x 15mm²	Analog/mA 2 x push-pull	M12 connector	1 … 5 [2]
ODS 96B M/V6 - 1400 - S12 50110231	120 1400 [2]	18 … 30VDC	Infrared light 15 x 15mm²	Analog/V 1 x push-pull	M12 connector	1 … 5 [2]

1) At measurement distance of 600mm
2) Luminosity coefficient 6 … 90%, complete measurement range, at 20°C, medium range U_B, measurement object ≥ 50x50mm².
With serial interface: depending on the measurement transmission mode and the baud rate

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000mm, M12 axial, 5-pin, PVC
e	50104560	K - D M12W - 5P - 10m - PVC	Connection cable 10000mm, M12 angular, 5-pin, PVC
f	50107223	UPG 10	Configuration adaptor for ODS 96B

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ODS 96B

Optical distance sensors

	Abs. meas. accuracy	Repeatability	Resolution [mm]	Option	Accessories	
	± 1.5% 2)	± 0.5% 3)	0.1 … 0.5 4)	1, 2, 4, 6	a, b, c, d, e, f	
	± 1.5% 2)	± 0.5% 3)	0.1 … 0.5 4)	1, 2, 4, 6	a, b, c, d, e, f	
	± 1.5% 2)	± 0.5% 3)	0.1 … 0.5 4)	2, 4, 5, 6	a, b, c, d, e, f	
	± 1.5% 2)	± 0.5% 3)	0.1 … 0.5 4)	2, 4, 6	a, b, c, d, e, f	
	± 1.5% 2)	± 0.5% 3)	0.1 … 0.5 4)	1, 2, 4, 6	a, b, c, d, e, f	
	± 2% 2)	± 1% 3)	0.1 … 0.5 4)	2, 3, 4, 6	a, b, c, d, e, f	
	± 2% 2)	± 1% 3)	0.1 … 0.5 4)	1, 2, 4, 6	a, b, c, d, e, f	

3) Same object, identical environmental conditions, measurement object ≥ 50x50mm²
4) Minimum and maximum value depend on measurement distance

Configuration software - free download at *www.leuze.com*.

Options

1 Input for deactivating the laser, triggering, offset correction, reference measurement or teach-in

2 Adjustable measurement range and measurement mode

3 2 warning outputs (for signaling 4 different device states)

4 PC/OLED display and key pad for configuration

5 Direct connection to MA 2xx*i* fieldbus gateway possible, see page 569

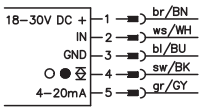
6 UL approval (class 2 acc. to NEC)

Optical Sensor ABC

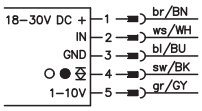
- Optical distance sensors Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection

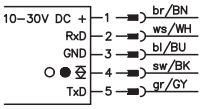
ODS 96B M/C6-...-S12



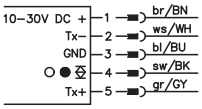
ODS 96B M/V6-...-S12



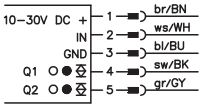
ODS 96B M/D26-...-S12



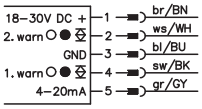
ODS 96B M/D36-...-S12



ODS 96B M/66-...-S12



ODS 96B M/C66.01-...-S12



OPTICAL DISTANCE SENSORS

Part description Part No.:	Meas. range [mm]	Operating voltage	Light source Light spot [1]	Output	Connection	Meas. time [ms]
Optical laser distance sensors with visible red light in metal housing						
ODSL 96B M/C6.S - 800 - S12 50106728	150 800 [2]	18 … 30 VDC	Red light laser class 2 1 x 1 mm²	Analog/mA 1 x push-pull	M12 connector	1 … 5 [2]
ODSL 96B M/V6.S - 800 - S12 50106729	150 800 [2]	18 … 30 VDC	Red light laser class 2 1 x 1 mm²	Analog/V 1 x push-pull	M12 connector	1 … 5 [2]
ODSL 96B M/D26.S - 800 - S12 50111035	150 800 [2]	10 … 30 VDC	Red light laser class 2 1 x 1 mm²	Serial/RS 232 1 push-pull	M12 connector	1 … 5 [2]
ODSL 96B M/D36.S - 800 - S12 50112065	150 800 [2]	10 … 30 VDC	Red light laser class 2 1 x 1 mm²	Serial/RS 485 1 push-pull	M12 connector	1 … 5 [2]
ODSL 96B M/C6 - 1200 - XL - S12 50106736	150 1200 [2]	18 … 30 VDC	Red light laser class 2 15 x 4 mm²	Analog/mA 1 x push-pull	M12 connector	1 … 5 [2]
ODSL 96B M/V6 - 1200 - XL - S12 50106737	150 1200 [2]	18 … 30 VDC	Red light laser class 2 15 x 4 mm²	Analog/V 1 x push-pull	M12 connector	1 … 5 [2]

1) At measurement distance of 800 mm
2) Luminosity coefficient 6 % … 90 %, complete measurement range, at 20 °C, medium range of U_B, measurement object ≥ 50 x 50 mm²

Configuration software - free download at *www.leuze.com*.

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000 mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000 mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC
e	50104560	K - D M12W - 5P - 10m - PVC	Connection cable 10000 mm, M12 angular, 5-pin, PVC
f	50107223	UPG 10	Configuration adaptor for ODS 96B

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ODS 96B

Optical distance sensors

	Abs. meas. accuracy	Repeatability	Resolution [mm]	Option	Accessories	
	± 1.5% 2)	± 0.5% 3)	0.1 … 0.8 4)	1, 2, 3, 5	a, b, c, d, e, f	
	± 1.5% 2)	± 0.5% 3)	0.1 … 0.8 4)	1, 2, 3, 5	a, b, c, d, e, f	
	± 1.5% 2)	± 0.5% 3)	1 … 3 4)	2, 3, 4, 5	a, b, c, d, e, f	
	± 1.5% 2)	± 0.5% 3)	1 … 3 4)	2, 3, 5	a, b, c, d, e, f	
	± 1.5% 2)	± 0.5% 3)	0.1 … 1.5 4)	1, 2, 3, 5	a, b, c, d, e, f	
	± 1.5% 2)	± 0.5% 3)	0.1 … 1.5 4)	1, 2, 3, 5	a, b, c, d, e, f	

3) Same object, identical environmental conditions, measurement object ≥ 50x50mm²
4) Minimum and maximum value depend on measurement distance

Optical Sensor ABC

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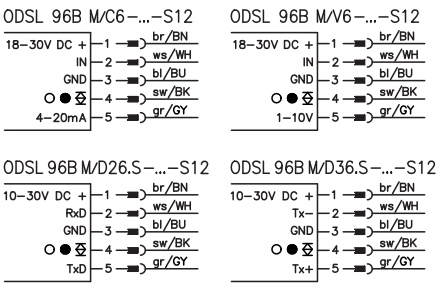
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1 Input for deactivating the laser, triggering, offset correction, reference measurement or teach-in

2 Adjustable measurement range and measurement mode

3 PC/OLED display and key pad for configuration

4 Direct connection to MA 2xx*i* fieldbus gateway possible, see page 569

5 UL approval (class 2 acc. to NEC)

OPTICAL DISTANCE SENSORS

Part description Part No.:	Meas. range [mm]	Operating voltage	Light source Light spot [1]	Output	Connection	Meas. time [ms]
Optical laser distance sensors with visible red light in metal housing						
ODSL 96B M/C6 - 2000 - S12 50106593	150 2000 [2]	18 … 30VDC	Red light laser class 2 2 x 6mm²	Analog/mA 1 x push-pull	M12 connector	1 … 5 [2]
ODSL 96B M/V6 - 2000 - S12 50106594	150 2000 [2]	18 … 30VDC	Red light laser class 2 2 x 6mm²	Analog/V 1 x push-pull	M12 connector	1 … 5 [2]
ODSL 96B M/D26 - 2000 - S12 50106597	150 2000 [2]	10 … 30VDC	Red light laser class 2 2 x 6mm²	Serial/RS 232 1 push-pull	M12 connector	1 … 5 [2]
ODSL 96B M/D36 - 2000 - S12 50106598	150 2000 [2]	10 … 30VDC	Red light laser class 2 2 x 6mm²	Serial/RS 485 1 push-pull	M12 connector	1 … 5 [2]
ODSL 96B M/66 - 2000 - S12 50106599	150 2000 [2]	10 … 30VDC	Red light laser class 2 2 x 6mm²	2 push-pull	M12 connector	1 … 5 [2]
ODSLR 96B M/C6 - 2000 - S12 50106732	60 2000 [2]	18 … 30VDC	Red light, LED+ laser class 2 2 x 6mm²	Analog/mA 1 x push-pull	M12 connector	1 … 5 [2]
ODSLR 96B M/V6 - 2000 - S12 50106733	60 2000 [2]	18 … 30VDC	Red light, LED+ laser class 2 2 x 6mm²	Analog/V 1 x push-pull	M12 connector	1 … 5 [2]

1) At measurement distance of 2000mm
2) Luminosity coefficient 6 … 90%, complete measurement range, at 20°C, medium range U_B, measurement object ≥ 50x50mm².
With serial interface: depending on the measurement transmission mode and the baud rate

Configuration software - free download at *www.leuze.com*.

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000mm, M12 axial, 5-pin, PVC
e	50104560	K - D M12W - 5P - 10m - PVC	Connection cable 10000mm, M12 angular, 5-pin, PVC
f	50107223	UPG 10	Configuration adaptor for ODS 96B

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ODS 96B

Optical distance sensors

	Abs. meas. accuracy	Repeatability	Resolution [mm]	Option	Accessories	
	± 1.5% 2)	± 0.5% 3)	1 … 3 4)	1, 2, 3, 5	a, b, c, d, e, f	
	± 1.5% 2)	± 0.5% 3)	1 … 3 4)	1, 2, 3, 5	a, b, c, d, e, f	
	± 1.5% 2)	± 0.5% 3)	1 … 3 4)	2, 3, 4, 5	a, b, c, d, e, f	
	± 1.5% 2)	± 0.5% 3)	1 … 3 4)	2, 3, 5	a, b, c, d, e, f	
	± 1.5% 2)	± 0.5% 3)	1 … 3 4)	1, 2, 3, 5	a, b, c, d, e, f	
	± 1.5% 2)	± 0.5% 3)	1 … 3 4)	1, 2, 3, 5	a, b, c, d, e, f	
	± 1.5% 2)	± 0.5% 3)	1 … 3 4)	1, 2, 3, 5	a, b, c, d, e, f	

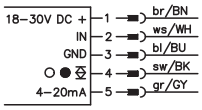
3) Same object, identical environmental conditions, measurement object ≥ 50x50mm²
4) Minimum and maximum value depend on measurement distance

Optical Sensor ABC

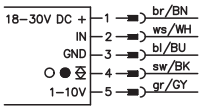
- Optical distance sensors Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection

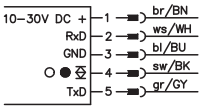
ODSL 96B M/C6-...-S12
ODSLR 96B M/C6-...-S12



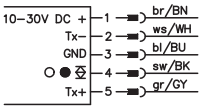
ODSL 96B M/V6-...-S12
ODSLR 96B M/V6-...-S12



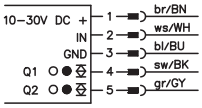
ODSL 96B M/D26-...-S12



ODSL 96B M/D36-...-S12



ODSL 96B M/66-...-S12



Options

1 Input for deactivating the laser, triggering, offset correction, reference measurement or teach-in

2 Adjustable measurement range and measurement mode

3 PC/OLED display and key pad for configuration

4 Direct connection to MA 2xx*i* fieldbus gateway possible, see page 569

5 UL approval (class 2 acc. to NEC)

OPTICAL DISTANCE SENSORS

Part description Part No.:	Meas. range [mm] □	Operating voltage	Light source Light spot [1]	Output	Connection	Meas. time [ms]
Optical laser distance sensors in plastic housing						
ODSL 96 K/V66 - 2300 - S12 50101881	150 2300 [2]	18 … 30VDC	Red light laser, class 2 3x8mm²	Analog/V Push-pull	M12 connector	≤ 7
ODSL 96 K/66 - 2300 - S12 50101882	150 2300 [2]	18 … 30VDC	Red light laser, class 2 3x8mm²	Push-pull	M12 connector	≤ 7

1) At 2300 mm
2) Luminosity coefficient 6 … 90%, at 20°C, measurement object ≥ 50x50mm²
3) Same object, identical environmental conditions, measurement object ≥ 50x50mm²
4) Minimum and maximum value depend on meas. distance/configuration of the analog output

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000mm, M12 axial, 5-pin, PVC
e	50104560	K - D M12W - 5P - 10m - PVC	Connection cable 10000mm, M12 angular, 5-pin, PVC
f	50104559	K - D M12A - 5P - 10m - PVC	Connection cable 10000mm, M12 axial, 5-pin, PVC

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ODS 96

Optical distance sensors

	Abs. meas. accuracy	Repeatability [3]	Resolution [mm]	Option	Accessories	
	± 3% [2]	± 2%	1 … 5 [4]	2	a, b, c, d, e, f	
	± 3% [2]	± 2%	1 … 5 [4]	1, 2	a, b, c, d, e, f	

Configuration software - free download at *www.leuze.com*.

Optical Sensor ABC

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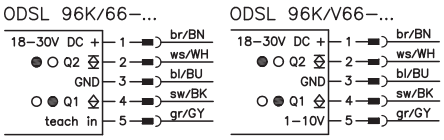
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1	Teach-in of the switching points via teach input
2	Teach-in of the switching points via teach button

OPTICAL DISTANCE SENSORS

Part description Part No.:	Meas. range [mm]	Operating voltage	Light source Light spot [1]	Output	Connection	Meas. time [ms]
Optical laser distance sensors with visible red light in metal housing						
ODSL 96B M/C6 - S12 50109290	300 … 10000 [2]	18 … 30VDC	Red light laser class 2 2 x 6mm²	Analog/mA 1 x push-pull	M12 connector	1.2 … 50 [3]
ODSL 96B M/V6 - S12 50109291	300 … 10000 [2]	18 … 30VDC	Red light laser class 2 2 x 6mm²	Analog/V 1 x push-pull	M12 connector	1.2 … 50 [3]
ODSL 96B M/C66 - S12 50109295	300 … 10000 [2]	18 … 30VDC	Red light laser class 2 2 x 6mm²	Analog/mA 2 x push-pull	M12 connector	1.2 … 50 [3]
ODSL 96B M/D26 - S12 50109292	300 … 10000 [2]	10 … 30VDC	Red light laser class 2 2 x 6mm²	Serial/RS 232 1 push-pull	M12 connector	1.2 … 50 [3]
ODSL 96B M/D36 - S12 50109293	300 … 10000 [2]	10 … 30VDC	Red light laser class 2 2 x 6mm²	Serial/RS 485 1 push-pull	M12 connector	1.2 … 50 [3]
ODSIL 96B M/C6 - S12 50109302	300 … 10000 [2]	18 … 30VDC	Infrared light laser class 1 2 x 6mm²	Analog/mA 1 x push-pull	M12 connector	2.8 … 100 [3]
ODSIL 96B M/V6 - S12 50109303	300 … 10000 [2]	18 … 30VDC	Infrared light laser class 1 2 x 6mm²	Analog/V 1 x push-pull	M12 connector	2.8 … 100 [3]

1) At measurement distance of 5000mm
2) Luminosity coefficient 6 … 90%, entire measurement range, operating mode "precision", sliding window average over 30 measurement values, at 20°C after 20min. warmup time, median range U_B, measurement object ≥ 50x50mm². With serial interface: depending on the measurement transmission mode and the baud rate
3) Dependent on selected operating mode, factory setting: "Precision" = 50ms (ODSL...) or 100ms (ODSIL...)

Configuration software - free download at *www.leuze.com*.

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000mm, M12 axial, 5-pin, PVC
e	50104560	K - D M12W - 5P - 10m - PVC	Connection cable 10000mm, M12 angular, 5-pin, PVC
f	50107223	UPG 10	Configuration adaptor for ODS 96B

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ODS 96B

Optical distance sensors

	Abs. meas. accuracy	Repeatability	Resolution [mm]	Option	Accessories	
	± 0.5% 2)	± 5mm 4)	3	1, 2, 3	a, b, c, d, e, f	
	± 0.5% 2)	± 5mm 4)	3	1, 2, 3	a, b, c, d, e, f	
	± 0.5% 2)	± 5mm 4)	3	2, 3	a, b, c, d, e, f	
	± 0.5% 2)	± 5mm 4)	3	2, 3, 5	a, b, c, d, e, f	
	± 0.5% 2)	± 5mm 4)	3	2, 3	a, b, c, d, e, f	
	± 0.5% 2)	± 5mm 4)	3	1, 2, 3, 4	a, b, c, d, e, f	
	± 0.5% 2)	± 5mm 4)	3	1, 2, 3, 4	a, b, c, d, e, f	

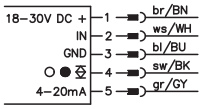
4) Same object, identical environmental conditions, "Precision" operating mode, floating average calculation taking 30 measurement values into account, at 20 °C after 20 min. warmup time, measurement object ≥ 50 x 50 mm²

Optical Sensor ABC

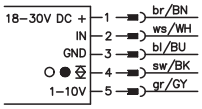
- Optical distance sensors Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection

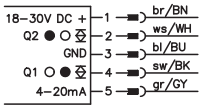
ODSL 96B M/C6–S12
ODSIL 96B M/C6–S12



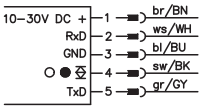
ODSL 96B M/V6–S12
ODSIL 96B M/V6–S12



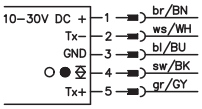
ODSL 96B M/C66–S12



ODSL 96B M/D26–S12



ODSL 96B M/D36–S12



Options

1 Input for deactivating the laser, triggering, offset correction, reference measurement or teach-in

2 Adjustable measurement range and measurement mode

3 PC/OLED display and key pad for configuration

4 Switchable red light laser alignment aid

5 Direct connection to MA 2xx*i* fieldbus gateway possible, see page 569

OPTICAL DISTANCE SENSORS

Part description Part No.:	Meas. range [mm]	Operating voltage	Light source Light spot [1]	Output	Connection	Meas. time [ms]
Optical laser distance sensors with visible red light in metal housing						
ODKL 96B M/C6 - S12 50109297	300 … 25000 [2]	18 … 30VDC	Red light laser class 2 2 x 6mm²	Analog/mA 1 x push-pull	M12 connector	1.2 … 50 [3]
ODKL 96B M/V6 - S12 50109298	300 … 25000 [2]	18 … 30VDC	Red light laser class 2 2 x 6mm²	Analog/V 1 x push-pull	M12 connector	1.2 … 50 [3]
ODKL 96B M/D26 - S12 50109299	300 … 25000 [2]	10 … 30VDC	Red light laser class 2 2 x 6mm²	Serial/RS 232 1 push-pull	M12 connector	1.2 … 50 [3]
ODKL 96B M/D36 - S12 50109300	300 … 25000 [2]	10 … 30VDC	Red light laser class 2 2 x 6mm²	Serial/RS 485 1 push-pull	M12 connector	1.2 … 50 [3]

1) At measurement distance of 5000mm
2) Measurement against high-gain reflective tape, entire measurement range, operating mode "precision", sliding window average over 30 measurement values, at 20°C after 20min. warmup time, median range U_B, measurement object ≥ 50x50mm². With serial interface: depending on the measurement transmission mode and the baud rate
3) Dependent on the selected operating mode, factory setting: "Precision" = 50ms

Configuration software - free download at *www.leuze.com*.

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000mm, M12 axial, 5-pin, PVC
e	50104560	K - D M12W - 5P - 10m - PVC	Connection cable 10000mm, M12 angular, 5-pin, PVC
f	50111527	REF 7 - A - 100 x 100	High-gain reflective tape, width 100 mm, length 100 mm
g	50107223	UPG 10	Configuration adaptor for ODS 96B

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ODS 96B

Optical distance sensors

	Abs. meas. accuracy	Repeatability	Resolution [mm]	Option	Accessories	
	± 0.5% 2)	± 5mm 3)	3	1, 2, 3	a, b, c, d, e, f, g	
	± 0.5% 2)	± 5mm 3)	3	1, 2, 3	a, b, c, d, e, f, g	
	± 0.5% 2)	± 5mm 3)	3	2, 3, 4	a, b, c, d, e, f, g	
	± 0.5% 2)	± 5mm 3)	3	2, 3	a, b, c, d, e, f, g	

3) Same object, identical environmental conditions, "Precision" operating mode, floating average calculation taking 30 measurement values into account, at 20 °C after 20 min. warmup time, measurement object ≥ 50 x 50 mm²

Optical Sensor ABC

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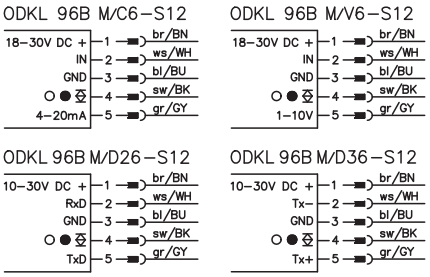
- Outputs Page 598

Electrical connection



Options

1 Input for deactivating the laser, triggering, offset correction, reference measurement or teach-in

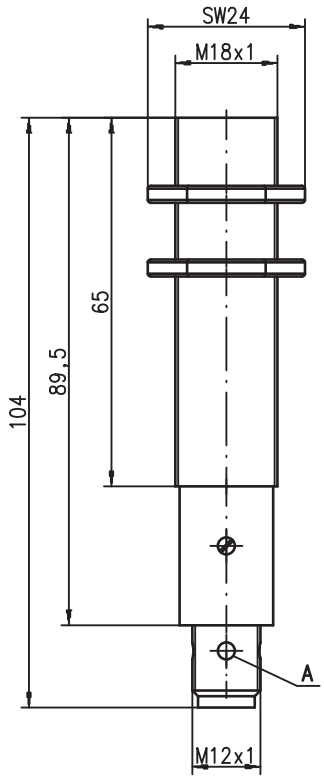
2 Adjustable measurement range and measurement mode

3 PC/OLED display and key pad for configuration

4 Direct connection to MA 2xx*i* fieldbus gateway possible, see page 569

OVERVIEW OF ULTRASONIC DISTANCE SENSORS

Dimensioned drawing



Further details can be found in the respective data sheet.

A Indicator diode Q1

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HRTU 418

Ultrasonic distance sensors	Measurement range	Page
Ultrasonic distance sensors HRTU 418	50 … 1000mm	280

Other 418 Series products:

Switching ultrasonic sensors	HRTU 418	328

Common technical data

Electrical data	Operating voltage U_B	20 … 30VDC
	Residual ripple	≤ 10% of U_B
	Open-circuit current	≤ 60mA
	Characteristic output curve	Ascending
Indicators	Yellow LED	Object detected
Mechanical data	Housing	Metal (CuZn)
	Weight	50g
Environmental data	Ambient temperature (operation)	-25°C … +70°C
	VDE safety class	III
	Protection class	IP 67
	Standards applied	IEC 60947-5-2, UL 508

Features

- **Sensors in M18 cylindrical housing**
- **Measurement range up to 1000mm**
- **Configuration via PC software**
- **Temperature compensation**

Optical Sensor ABC

- Ultrasonic distance sensors Page 595

ULTRASONIC DISTANCE SENSORS

Part description Part No.:	Meas. range [1] [mm] ☐	Ultrasonic frequency	Opening angle	Output	Connection	
Ultrasonic distance sensors						
HRTU 418 M/V - 5010 - 300 - S12 50036259	50 300	400 kHz	6°	Analog/mA	M12 connector	
HRTU 418 M/V - 5310 - 300 - S12 50040616	50 300	400 kHz	6°	Analog/V	M12 connector	
HRTU 418 M/V - 3010 - 1000 - S12 50036260	150 1000	200 kHz	6°	Analog/mA	M12 connector	
HRTU 418 M/V - 3310 - 1000 - S12 50040618	150 1000	200 kHz	6°	Analog/V	M12 connector	

1) Over complete temperature range, measurement object ≥ 10x10mm²
2) Of the measurement range end value

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e	50036559	PGU 01	Programming unit incl. software

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HRTU 418

Ultrasonic sensors

	Abs. meas. accuracy [2]	Repeatability	Resolution [mm]	Option	Accessories	
	± 2.5%	± 1mm	1	1, 2, 3, 4	a, b, c, d, e	
	± 2.5%	± 1mm	1	1, 2, 3, 4	a, b, c, d, e	
	± 2.5%	± 2mm	1	1, 2, 3, 4	a, b, c, d, e	
	± 2.5%	± 2mm	1	1, 2, 3, 4	a, b, c, d, e	

Optical Sensor ABC

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- Connection types Page 598
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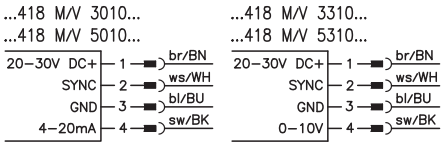
Electrical connection



Options

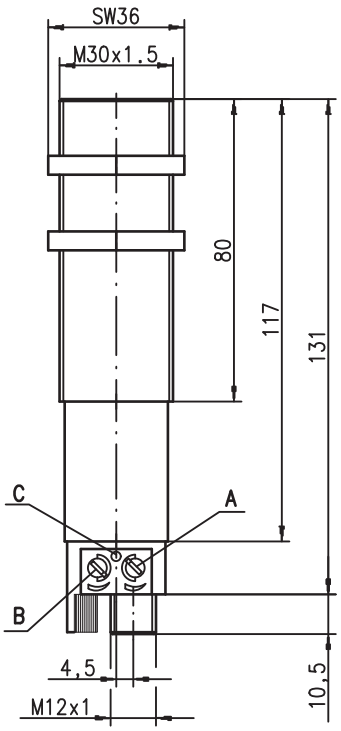
1	Configurable via programming unit and software
2	Sensor synchronization via SYNC input
3	Configurable multiplex operation
4	UL approval

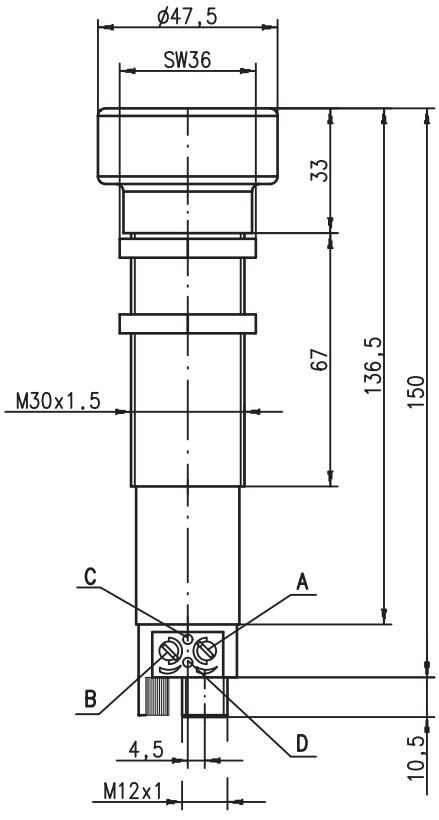
OVERVIEW OF ULTRASONIC DISTANCE SENSORS

Dimensioned drawing

A Adjustment of end of switching range
B Adjustment of start of switching range
C Indicator diode Q1
D Indicator diode Q2 (…430 M/P… only)

Further details can be found in the respective data sheet.





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ODSL 8	ODSL 9	ODSL 30	ODS 96(B)	HRTU 418	VRTU 430	GS 754(B)	ROD 4	LPS 36	LES 36	LRS 36
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VRTU 430

Ultrasonic distance sensors	Measurement range	Page
Ultrasonic distance sensors VRTU 430	60 … 6000mm	284

Other 430 Series products:

Ultrasonic	Switching ultrasonic sensors	VRTU 430	334

Common technical data

Electrical data	Operating voltage U_B	20 … 30VDC
	Residual ripple	≤ 10% of U_B
	Open-circuit current	≤ 60mA
	Characteristic output curve	Ascending
Indicators	Yellow LED	Switching output
	Flashing yellow LED	Programming error
Mechanical data	Housing	Metal (CuZn)
	Weight	210g … 380g
Environmental data	Ambient temperature (operation)	-25°C … +70°C
	VDE safety class	III
	Protection class	IP 65
	Standards applied	IEC 60947-5-2, UL 508

Features

- **Sensors in M30 cylindrical housing**
- **Measurement range up to 6000mm**
- **Configuration via PC software**
- **Temperature compensation**

Optical Sensor ABC

- Ultrasonic distance sensors Page 595

ULTRASONIC DISTANCE SENSORS

Part description Part No.:	Meas. range [mm]	Ultrasonic frequency	Opening angle	Output	Connection
Ultrasonic distance sensors					
VRTU 430 M/V - 5710 - 300 - S12 50036266	60 … 300 [1]	400 kHz	6°	Analog/mA PNP	M12 connector
VRTU 430 M/V - 5510 - 300 - S12 50040771	60 … 300 [1]	400 kHz	6°	Analog/V PNP	M12 connector
VRTU 430 M/V - 3710 - 1300 - S12 50036267	200 … 1300 [1]	200 kHz	6°	Analog/mA PNP	M12 connector
VRTU 430 M/V - 3510 - 1300 - S12 50040772	200 … 1300 [1]	200 kHz	6°	Analog/V PNP	M12 connector
VRTU 430 M/V - 2710 - 3000 - S12 50036268	400 3000 [2]	120 kHz	6°	Analog/mA PNP	M12 connector
VRTU 430 M/V - 2510 - 3000 - S12 50107096	400 3000 [2]	120 kHz	6°	Analog/V PNP	M12 connector
VRTU 430 M/V - 1710 - 6000 - S12 50036269	600 6000 [3]	80 kHz	6°	Analog/mA PNP	M12 connector

1) Over complete temperature range, measurement object ≥ 10x10mm²
2) Over complete temperature range, measurement object ≥ 50x50mm²
3) Over complete temperature range, measurement object ≥ 100x100mm²
4) Of the measurement range end value

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000mm, M12 axial, 5-pin, PVC
e	50104559	K - D M12A - 5P - 10m - PVC	Connection cable 10000mm, M12 axial, 5-pin, PVC
f	50036559	PGU 01	Programming unit incl. software

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VRTU 430

Ultrasonic sensors

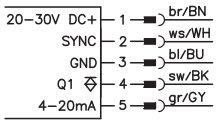
	Abs. meas. accuracy [4]	Repeatability	Resolution [mm]	Option	Accessories	
	± 1.5%	± 0.45mm	≤ 1	1, 2, 3, 4	a, b, c, d, e, f	
	± 1.5%	± 0.45mm	≤ 1	1, 2, 3, 4	a, b, c, d, e, f	
	± 1.5%	± 2mm	≥ 1	1, 2, 3, 4	a, b, c, d, e, f	
	± 1.5%	± 2mm	≥ 1	1, 2, 3, 4	a, b, c, d, e, f	
	± 1.5%	± 5mm	≥ 1	1, 2, 3, 4	a, b, c, d, e, f	
	± 1.5%	± 5mm	≥ 1	1, 2, 3, 4	a, b, c, d, e, f	
	± 1.5%	± 9mm	≥ 1	1, 2, 3, 4	a, b, c, d, e, f	

Optical Sensor ABC

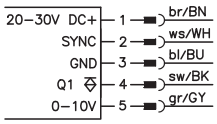
- Ultrasonic distance sensors Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection

...430 M/V 1710...
...430 M/V 2710...
...430 M/V 3710...
...430 M/V 5710...



...430 M/V 3510...
...430 M/V 5510...



Options

1	Configurable via programming unit and software
2	Sensor synchronization via SYNC input
3	Configurable multiplex operation
4	UL approval

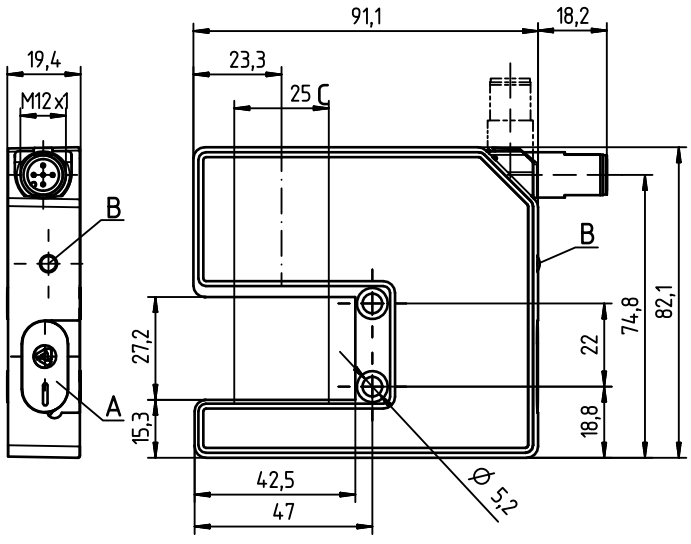
OVERVIEW OF MEASURING CCD FORKED SENSORS

Dimensioned drawing

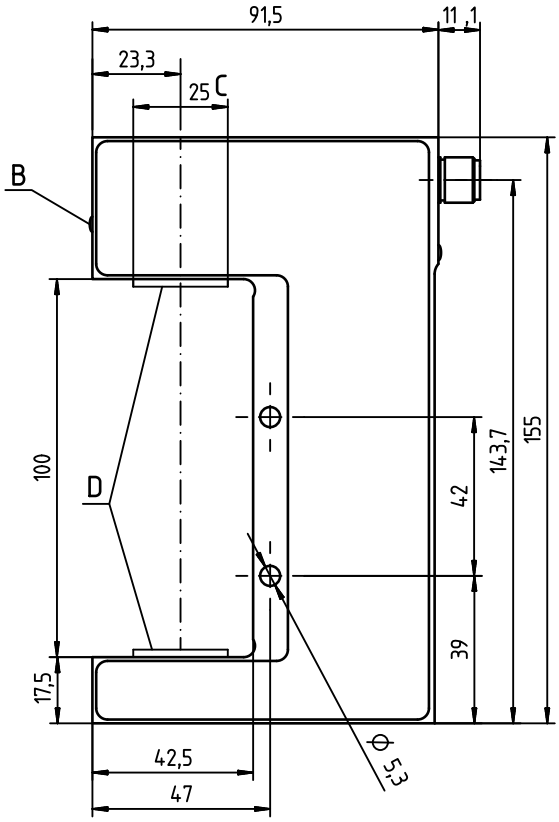
A Interface
B Indicator diode
C Optical detection area
D Protective glass

Further details can be found in the respective data sheet.

GS 754B/...-27-...



GS 754 M/...-100/42-...



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GS 754(B)

Measuring CCD forked sensors	Mouth width	Page
Measuring CCD forked sensors GS 754(B)	27 / 100 mm	288

Additional products - forked sensors:

Optical forked sensors	GS 04, GS 06, GS 21	408
Capacitive forked sensors	GK 14	426
Ultrasonic forked sensors	GSU 06, GSU 14C	430

Common technical data

Electrical data	Operating voltage U_B	10/18 … 30 VDC
	Residual ripple	≤ 15 % of U_B
	Open-circuit current	≤ 150 mA
	Signal voltage high/low	≥ 8 V/≤ 2 V
Measurement data	Measurement field length	25 mm
	Measurement cycle	≥ 12 ms
	Maximum resolution	≥ 14 µm
Indicators	Green LED	Ready to operate
	Flashing green LED	Interference
Mechanical data	Housing	GS 754B: diecast zinc GS 754: aluminum, anodized
	Optics cover	GS 754B: plastic GS 754: glass
	Weight	260 g
Environmental data	Ambient temperature	-20 °C … +50 °C (operation)
	VDE safety class	III
	Protection class	GS 754B: IP 65 GS 754: IP 54
	Standards applied	IEC 60947-5-2

Features

- **Edge and object detection of up to 3 objects in 25 mm wide light band**
- **Resolution 14 µm**
- **Adjustable measurement range and measurement mode**
- **Teach-in function, switching or warning output**
- **Detection of multiple objects**

GS 754B:

- **Detection of transparent media**
- **90° turning connector**

CE

Optical Sensor ABC

MEASURING CCD FORKED SENSORS

Part description Part No.:	Mouth width [mm]	Operating voltage	Light source	Output
Measuring CCD forked sensors				
GS 754 M/V - 100/42 - 604 - S12 50103487	100	18 … 30VDC	Infrared light	2 x analog/mA PNP
GS 754 M/V - 100/42 - 504 - S12 50103488	100	18 … 30VDC	Infrared light	2 x analog/V PNP
GS 754 M/D - 100/42 - 104 - S12 50104283	100	18 … 30VDC	Infrared light	Serial/RS 232 PNP
GS 754B/C4 - 27 - S12 50115803	27	18 … 30VDC	Infrared light	Analog/mA I/O configurable
GS 754B/V4 - 27 - S12 50115809	27	18 … 30VDC	Infrared light	Analog/V I/O configurable
GS 754B/D24 - 27 - S12 50115807	27	10 … 30VDC	Infrared light	Serial/RS 232 I/O configurable
GS 754B/D3 - 27 - S12 50115806	27	10 … 30VDC	Infrared light	Serial / RS 422

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000mm, M12 angular, 5-pin, PVC
b	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000mm, M12 axial, 5-pin, PVC
c	50104591	K - D M12A - 8P - 2m - PUR	Connection cable 2000mm, M12 axial, 8-pin, PUR
d	50104590	K - D M12A - 8P - 5m - PUR	Connection cable 5000mm, M12 axial, 8-pin, PUR
e	50082007	KB - ODS 96 - 1500	Configuration cable to PC, 1500mm

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GS 754(B)

CCD forked sensors

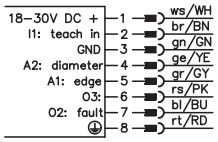
	Connection	Option	Accessories	
	M12 connector, 8-pin	1, 3, 4	c, d, e	
	M12 connector, 8-pin	1, 3, 4	c, d, e	
	M12 connector, 8-pin	1, 4	c, d, e	
	M12 connector, 5-pin	1, 2, 3	a, b, e	
	M12 connector, 5-pin	1, 2, 3	a, b, e	
	M12 connector, 5-pin	1, 2, 3	a, b, e	
	M12 connector, 5-pin	1	a, b, e	

Optical Sensor ABC

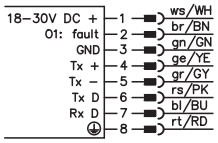
- Connection types Page 598
- Outputs Page 598

Electrical connection

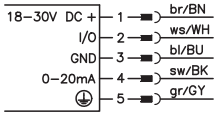
... M/V-100/42-504-S12
... M/V-100/42-604-S12



... M/D-100/42-104-S12



... B/C4-27-S12



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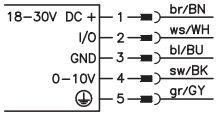
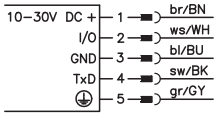
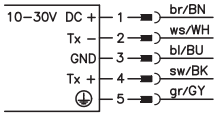


... B/D24-27-S12



... B/D3-27-S12



Options

1	Adjustable measurement range and measurement mode
2	I/O (pin 2) configurable as teach input or switching output
3	Teach-in via teach input
4	Warning output

OVERVIEW OF SURFACE DISTANCE SENSORS

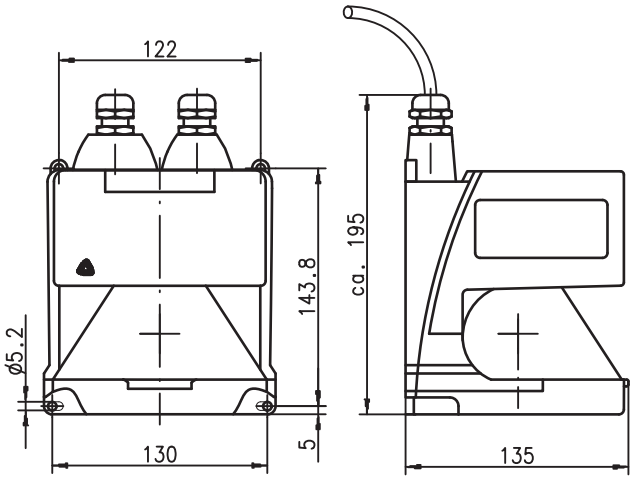
Compartment occupancy monitoring

Object measurement

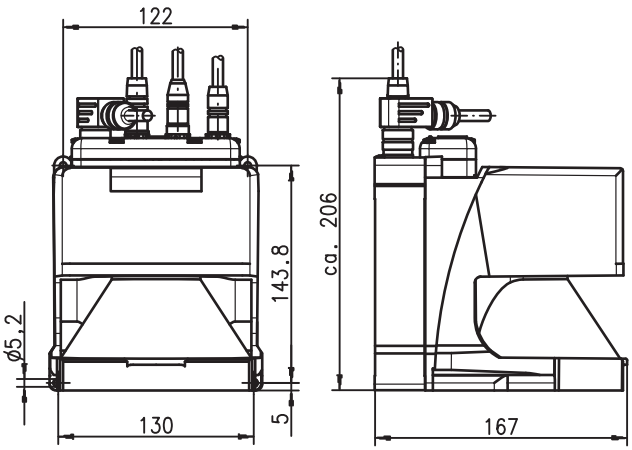
Position measurement

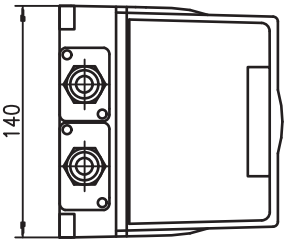
Dimensioned drawing

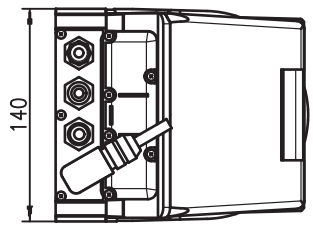
ROD 4 - 3...



ROD 4...plus







Further details can be found in the respective data sheet.

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ROD 4 / ROD 4 plus

Surface distance sensors	Measurement range	Page
Surface distance sensors ROD 4	0 … 65m	292

Common technical data

Electrical data	Operating voltage U_B	+24VDC +20%/-30%
	Current consumption	Approx. 400mA
		Heating: approx. 2A
Measurement data	Detection range	190°
	Angular resolution	0.36°
	Measurement time	20ms/scan (ROD4-5xplus) 40ms/scan (ROD4plus)
Mechanical data	Housing	Aluminum/Plastic
	Optics cover	Plastic
	Weight	ROD4…: 2000g ROD4…plus: 2200g
Environmental data	Ambient temperature (operation)	0°C … +50°C
		Heating: -20°C … +50°C
	VDE safety class	III
	Protection class	IP 65
	Standards applied	IEC 60947-5-2, UL 508

Mounting systems for this series can be found from **page 551** onwards

Features

- **Area scanning distance sensor for object detection and object measurement**
- **Detection fields up to 50m**
- **8 detection field pairs**
- **Config-Plug for device exchange without PC**
- **Fast Ethernet: ROD 4 plus**
- **Laser class 1**

Optical Sensor ABC

- Optical distance sensors Page 595

OPTICAL SURFACE DISTANCE SENSORS

Part description Part No.:	Meas. range [m]	Operating voltage	Light source	Output
Optical surface distance sensors				
ROD 4 - 30 50110238	0 65	24VDC	Infrared laser class 1	Serial/RS 232/RS 422 4 x PNP
ROD 4 - 36 50110666	0 65	24VDC	Infrared laser class 1	Serial/RS 232/RS 422 4 x PNP
ROD 4 - 38 50110667	0 25	24VDC	Infrared laser class 1	Serial/RS 232/RS 422 4 x PNP

Configuration software RODsoft, RODplussoft - free download at *www.leuze.com*.

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50108138	KB - ROD 4 - CP - 5000	Connection cable 5000mm, with configuration memory
b	50108139	KB - ROD 4 - CP - 10000	Connection cable 10000mm, with configuration memory
c	50038069	KB - ROD 4 PC - 3000	Configuration cable to PC, 3000mm
d	50038070	KB - ROD 4 PC - 10000	Configuration cable to PC, 10000mm
e	50038072	KD - ROD4 - X1 - Set	Connector X1 for ROD 4, 15-pin
f	50038073	KD - ROD4 - X2 - Set	Connector X2 for ROD 4, 9-pin
g	50038066	ROD 4 - MS	Mounting system for ROD 4…

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ROD 4

Optical distance sensors

	Connection	Option	Accessories	
	1 SUB-D, 15-pin 1 SUB-D, 9-pin	1, 2, 3, 6	a, b, c, d, e	
	1 SUB-D, 15-pin 1 SUB-D, 9-pin	1, 2, 3, 4, 6	a, b, c, d, e	
	1 SUB-D, 15-pin 1 SUB-D, 9-pin	1, 2, 3, 4, 5, 6	a, b, c, d, e	

Optical Sensor ABC

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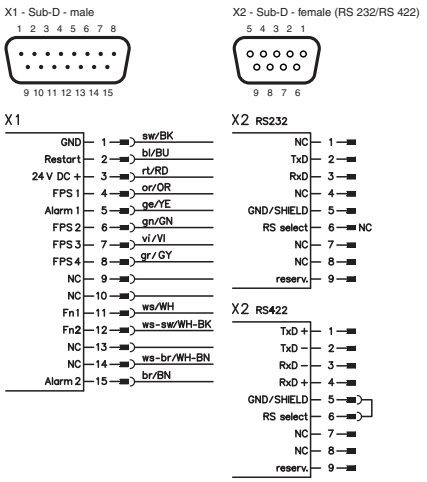
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1	8 detection field pairs
2	Warning and alarm output
3	Restart-disable
4	Internal heating
5	Dust-insensitive version
6	UL approval (class 2 acc. to NEC)

OPTICAL SURFACE DISTANCE SENSORS

Part description Part No.:	Meas. range [m]	Operating voltage	Light source	Output
Optical surface distance sensors				
ROD 4 plus 50106481	0 65	24VDC	Infrared laser class 1	Ethernet Serial/RS 232/RS 422 4 x PNP
ROD 4 - 08 plus 50106480	0 25	24VDC	Infrared laser class 1	Ethernet Serial/RS 232/RS 422 4 x PNP
ROD 4 - 50 plus 50113226	0 65	24VDC	Infrared laser class 1	Ethernet Serial/RS 232/RS 422 4 x PNP
ROD 4 - 58 plus 50113225	0 25	24VDC	Infrared laser class 1	Ethernet Serial/RS 232/RS 422 4 x PNP

Configuration software RODsoft, RODplussoft - free download at *www.leuze.com*.

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50106976	KB - 014S - 5000 - 14	Connection cable, single-sided M16 socket, 14-pin, angular, 5m
b	50109881	KB ET - 5000 - SA - RJ45	Ethernet cable, axial M12 connector - RJ 45 plug, 5m
c	50106881	KB - ROD 4plus - 5000	Configuration cable, M12 connector - 9 pin Sub-D socket, 5m
d	50106906	KB - ROD 4plus - 10000	Configuration cable, M12 connector - 9 pin Sub-D socket, 10m
e	50104590	K-D - M12A - 8P - 5m - PUR	RS 232/422 connection cable, single-sided M12 socket, 8-pin, axial, 5m
f	50038066	ROD 4 - MS	Mounting system for ROD 4…

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ROD 4 plus

Optical distance sensors

	Connection	Option	Accessories	
	1 M16, 14-pin 3 M12, 4/5/8-pin	1, 2, 3, 4, 8	a, b, c, d, e, f	
	1 M16, 14-pin 3 M12, 4/5/8-pin	1, 2, 3, 4, 6, 7, 8	a, b, c, d, e, f	
	1 M16, 14-pin 3 M12, 4/5/8-pin	2, 3, 5, 8	a, b, c, d, e, f	
	1 M16, 14-pin 3 M12, 4/5/8-pin	2, 3, 5, 6, 7, 8	a, b, c, d, e, f	

Optical Sensor ABC

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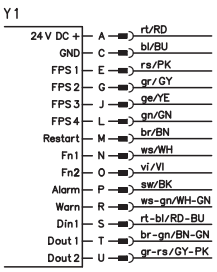
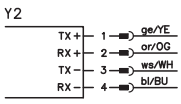
- Connection types Page 598
- Outputs Page 598

Electrical connection

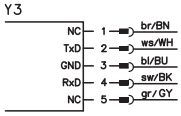
Y1 - M16 / 14-pol. / male (Logic)



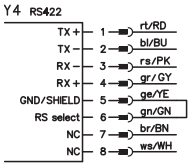
Y2 - M12 / 4-pol. / D-cod. / female (Ethernet)

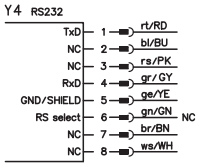


Y3 - M12 / 5-pol. / A-cod. / female (Service)



Y4 - M12 / 8-pol. / male (RS 232 / RS 422)





Options

1 8 detection field pairs

2 Warning and alarm output

3 Restart-disable

4 Scanning rate 25 Hz / measurement time 40 ms/scan, for object detection and object measurement

5 Scanning rate 50 Hz / measurement time 20 ms/scan, for object measurement

6 Internal heating

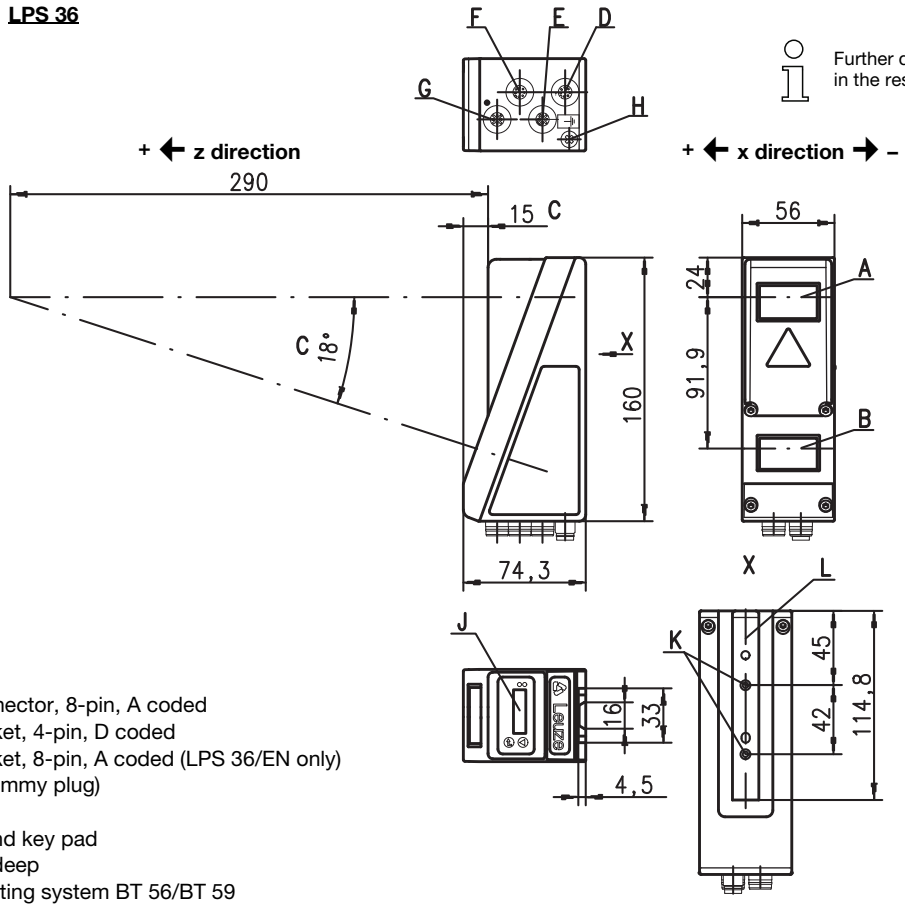
7 Dust-insensitive version

8 UL approval (class 2 acc. to NEC)

OVERVIEW OF LINE PROFILE SENSORS

Dimensioned drawing

LPS 36



Further details can be found in the respective data sheet.

A Transmitter
B Receiver
C Optical axis
D X1: M12x1 connector, 8-pin, A coded
E X2: M12x1 socket, 4-pin, D coded
F X3: M12x1 socket, 8-pin, A coded (LPS 36/EN only)
G X4: not used (dummy plug)
H PE screw
J OLED display and key pad
K M4 thread, 4.5 deep
L Holder for mounting system BT 56/BT 59

ODSL 8	ODSL 9	ODSL 30	ODS 96(B)	HRTU 418	VRTU 430	GS 754(B)	ROD 4	LPS 36	LES 36	LRS 36
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LPS 36

Light section sensors	Measurement range	Page
Line Profile Sensors LPS 36	200 … 800mm	298

Common technical data

Electrical data	Operating voltage U_B	18 … 30VDC
	Residual ripple	≤ 15% of U_B
	Open-circuit current	≤ 200mA
	Switching outputs	2x24V/100mA/push-pull
	Switching inputs	2x24V, Trigger+Enable
	Ethernet interface	UDP
Indicators	Green LED	Ready to operate
	Yellow LED	Ethernet
Mechanical data	Housing	Aluminum/Plastic
	Optics cover	Glass
	Weight	Approx. 620g
Environmental data	Ambient temperature (operation)	-30°C … +50°C
	VDE safety class	III, PELV
	Protection class	IP 67
	Laser class	2M acc. to EN 60825-1
	Standards applied	IEC 60947-5-2, UL 508

Features

- **Light section sensor for object measurement**
- **Calibrated system**
- **Length of laser line: 150 … 600mm**
- **Measurement data transfer via Fast Ethernet (UDP)**
- **Measurement value display in mm on OLED display as alignment aid**
- **Laser class 2M**

Optical Sensor ABC

- Light section sensors Page 595

LIGHT SECTION SENSORS

Part description Part No.:	Meas. range [mm] 1)	Operating voltage	Light source	Output	Connection	Meas. time [ms]
Line Profile Sensors						
LPS 36 50111325	200 … 800	18 … 30VDC	Red light Laser class 2M	Ethernet 2 x push-pull	M12 connector	10
LPS 36/EN 50111324	200 … 800	18 … 30VDC	Red light Laser class 2M	Ethernet 2 x push-pull	M12 connector	10

1) Luminosity coefficient 6 … 90%, entire measurement range, at 20°C after 30minutes warmup time, medium range U_B.
2) In z direction, luminosity coefficient 90%, same object, identical environmental conditions, measurement object ≥ 50x50mm²

Configuration software LPSsoft - free download at *www.leuze.com*.

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50109881	KB ET - 5000 - SA - RJ45	Ethernet cable, axial M12 connector - RJ 45 plug, 5m, for X2
b	50104590	K - D M12A - 8P - 5m - PUR	Connection cable 5000mm, axial M12 socket, 8-pin, for X1
c	50110180	KB M12/8 - 5000 - SA	Connection cable 5000mm, axial M12 connector, 8-pin, for X3
d	50027375	BT 56	Fixing component with dovetail for rod
e	50111224	BT 59	Fixing component with dovetail for ITEM profile

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LPS 36

Line Profile Sensors

	Linearity	Repeatability	Resolution	Option	Accessories	
	≤ ± 1 % 2)	≤ 0.5 % 2)	1 … 1.5 mm 3) 1 … 3 mm 4)	1, 2, 3, 5	a, b, c, d, e	
	≤ ± 1 % 2)	≤ 0.5 % 2)	1 … 1.5 mm 3) 1 … 3 mm 4)	1, 2, 3, 4, 5	a, b, c, d, e	

3) In x direction, minimum and maximum value depend on measurement distance
4) In z direction, minimum and maximum value depend on measurement distance

Optical Sensor ABC

- Light section sensors Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection

X1
M12x1, 8-pole, male, A-cod.

PIN	Signal	Color
1	+24 V DC	WH
2	In1	BR
3	GND	GN
4	Out1	YE
5	In2	GY
6	Out2	PK
7	RS 232 - Tx	BU
8	RS 232 - Rx	RD

X2
M12x1, 4-pole, female, D-cod.

PIN	Signal	Color
1	Tx+	YE
2	Rx+	WH
3	Tx-	OR
4	Rx-	BU

X3
M12x1, 8-pole, female, A-cod.

PIN	Signal	Color
1	Enc. +24 V DC	WH
2	(GND)	BR
3	GND	GN
4	Enc. A+	YE
5	Enc. A-	GY
6	Enc. B+	PK
7	Enc. B-	BU
8	+5 V DC Out	RD

X4
–

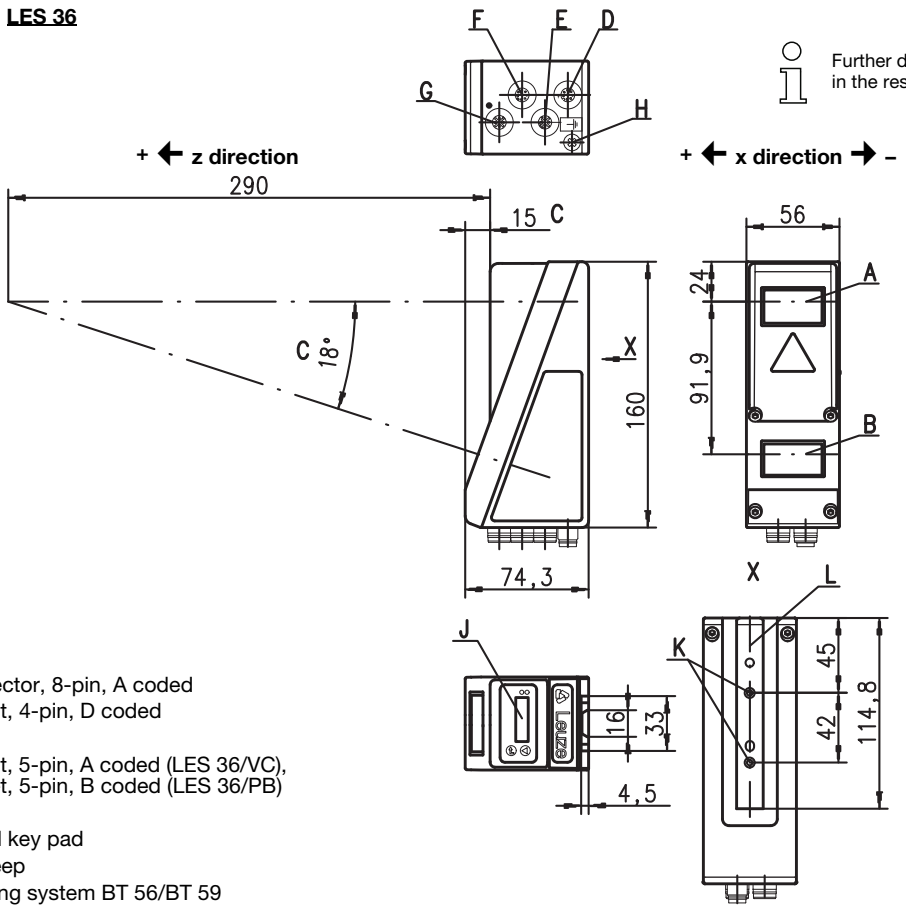
Options

1 Configuration via OLED display and control buttons or via PC
2 Trigger and activation input
3 Cascading of up to 9 sensors
4 Connection for incremental transmitter (encoder)
5 UL approval (class 2 acc. to NEC)

OVERVIEW OF LINE EDGE SENSORS

Dimensioned drawing

LES 36



Further details can be found in the respective data sheet.

A Transmitter
B Receiver
C Optical axis
D X1: M12x1 connector, 8-pin, A coded
E X2: M12x1 socket, 4-pin, D coded
F X3: cap
G X4: M12x1 socket, 5-pin, A coded (LES 36/VC), M12x1 socket, 5-pin, B coded (LES 36/PB)
H PE screw
J OLED display and key pad
K M4 thread, 4.5 deep
L Holder for mounting system BT 56/BT 59

We reserve the right to make changes • LES36_Overview_EN.fm

ODSL 8	ODSL 9	ODSL 30	ODS 96(B)	HRTU 418	VRTU 430	GS 754(B)	ROD 4	LPS 36	LES 36	LRS 36
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LES 36

Light section sensors	Measurement range	Page
Line Edge Sensors LES 36	200 … 800mm	302

Common technical data

Electrical data	Operating voltage U_B	18 … 30VDC
	Residual ripple	≤ 15% of U_B
	Open-circuit current	≤ 200mA
	Switching outputs	2x24V/100mA/push-pull
	Switching inputs	2x24V, Trigger/Enable, selection of the inspection
	Ethernet interface	UDP
	PROFIBUS interface	DP V1 slave (optional)
Indicators	Green LED	Ready to operate
	Yellow LED	Ethernet
Mechanical data	Housing	Aluminum/Plastic
	Optics cover	Glass
	Weight	Approx. 620g
Environmental data	Ambient temperature (operation)	-30°C … +50°C
	VDE safety class	III, PELV
	Protection class	IP 67
	Laser class	2M acc. to EN 60825-1
	Standards applied	IEC 60947-5-2, UL 508

Features

- **Light section sensor for object measurement (width, height, position measurement)**
- **Up to 8 analysis windows with logical linking option**
- **Up to 16 inspection tasks**
- **Length of laser line: 150 … 600mm**
- **Measurement value display in mm on OLED display as alignment aid**
- **Laser class 2M**

Optical Sensor ABC

- Light section sensors Page 595

LIGHT SECTION SENSORS

Part description Part No.:	Meas. range [mm] 1)	Operating voltage	Light source	Output	Connection
Line Edge Sensors					
LES 36/VC 50111326	200 800	18 … 30VDC	Red light Laser class 2M	Ethernet, 2 x analog	M12 connector
LES 36/PB 50111327	200 800	18 … 30VDC	Red light Laser class 2M	Ethernet, PROFIBUS DP	M12 connector

1) Luminosity coefficient 6 … 90%, entire measurement range, at 20°C after 30minutes warmup time, medium range U_B.
2) In z direction, luminosity coefficient 90%, same object, identical environmental conditions, measurement object ≥ 50x50mm²

LESsoft configuration software - free download at *www.leuze.com*.

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50109881	KB ET - 5000 - SA - RJ45	Ethernet cable, axial M12 connector - RJ 45 plug, 5m, for X2
b	50104590	K - D M12A - 8P - 5m - PUR	Connection cable 5000mm, axial M12 socket, 8-pin, for X1
c	50102969	KB 008 - 5000 - A - S	Connection cable 5000mm, axial M12 connector, 5-pin, for X4
d	50104180	KB PB - 5000 - BA	PROFIBUS connection cable 5000mm, axial M12 socket
e	50104187	KB PB - 5000 - SA	PROFIBUS connection cable 5000mm, axial M12 plug
f	50109834	KDS BUS OUT M12-T-5P	PROFIBUS M12 T-connector, for X4
g	50038539	TS 02-4-SA M12	M12 connector with integrated BUS terminating resistor
h	50027375	BT 56	Fixing component with dovetail for rod
j	50111224	BT 59	Fixing component with dovetail for ITEM profile

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ODSL 9 Page 250

ODSL 30 Page 258

ODS 96(B) Page 262

HRTU 418 Page 278

VRTU 430 Page 282

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LES 36

Line Edge Sensors

	Linearity	Repeatability	Resolution	Option	Accessories	
	≤ ± 1 % [2]	≤ 0.5 % [2]	1 … 1.7 mm [3] 1 … 3 mm [4]	1, 2, 3, 5	a, b, c, d, e	
	≤ ± 1 % [2]	≤ 0.5 % [2]	1 … 1.7 mm [3] 1 … 3 mm [4]	1, 2, 3, 4, 5	a, b, c, d, e	

3) In x direction, minimum and maximum value depend on measurement distance
4) In z direction, minimum and maximum value depend on measurement distance

Optical Sensor ABC

- Light section sensors Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection

X1
M12x1, 8-pole, male, A-cod.

PIN	Signal	Color
1	+24 V DC	WH
2	In1	BR
3	GND	GN
4	Out1	YE
5	In2	GY
6	Out2	PK
7	reserved	BU
8	reserved	RD

X2
M12x1, 4-pole, female, D-cod.

PIN	Signal	Color
1	Tx+	YE
2	Rx+	WH
3	Tx-	OR
4	Rx-	BU

X4 (LES 36/VC… only)
M12x1, 5-pole, female, A-cod.

PIN	Signal	Color
1	not connected	BR
2	4-20mA	WH
3	AGND	BU
4	1-10V	BK
5	FE	GY

X4 (LES 36/PB… only)
M12x1, 5-pole, female, B-cod.

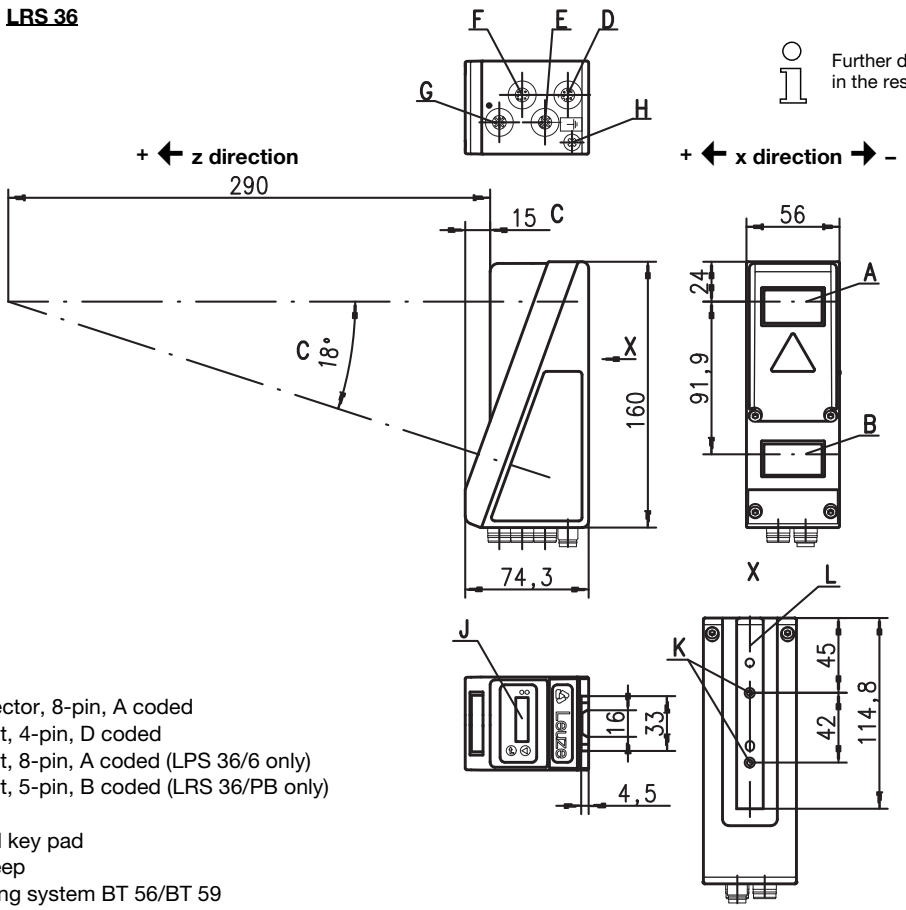
PIN	Signal	Color
1	VP	
2	A	GN
3	DGND	
4	B	RD
5	FE	

Options

1	Configuration via OLED display and control buttons or via PC
2	Trigger and activation input
3	Cascading of up to 9 sensors
4	Up to 8 analysis windows with logical linking option
5	Up to 16 inspection tasks
6	Analog current and voltage output
7	PROFIBUS DP interface
8	UL approval (class 2 acc. to NEC)

OVERVIEW OF LINE RANGE SENSORS

Dimensioned drawing



Further details can be found in the respective data sheet.

A	Transmitter
B	Receiver
C	Optical axis
D	X1: M12x1 connector, 8-pin, A coded
E	X2: M12x1 socket, 4-pin, D coded
F	X3: M12x1 socket, 8-pin, A coded (LPS 36/6 only)
G	X4: M12x1 socket, 5-pin, B coded (LRS 36/PB only)
H	PE screw
J	OLED display and key pad
K	M4 thread, 4.5 deep
L	Holder for mounting system BT 56/BT 59

We reserve the right to make changes • LRS36_Overview_EN.fm

ODSL 8	ODSL 9	ODSL 30	ODS 96(B)	HRTU 418	VRTU 430	GS 754(B)	ROD 4	LPS 36	LES 36	LRS 36
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LRS 36

Light section sensors	Scanning range	Page
Line Range Sensors LRS 36	200 … 800mm	306

Common technical data

Electrical data	Operating voltage U_B	18 … 30VDC
	Residual ripple	≤ 15% of U_B
	Open-circuit current	≤ 200mA
	Switching outputs	2(6)x24V/100mA/push-pull
	Switching inputs	2x24V, Trigger/Enable, selection of the inspection
	Ethernet interface	UDP
	PROFIBUS interface	DP V1 slave (optional)
Indicators	Green LED	Ready to operate
	Yellow LED	Ethernet
Mechanical data	Housing	Aluminum/Plastic
	Optics cover	Glass/Plastic
	Weight	Approx. 620g
Environmental data	Ambient temperature (operation)	-30°C … +50°C
	VDE safety class	III, PELV
	Protection class	IP 67
	Laser class	2M acc. to EN 60825-1
	Standards applied	IEC 60947-5-2, UL 508

Features

- **Light section sensor for object detection**
- **Up to 16 detection fields with logical linking option**
- **Up to 16 inspection tasks**
- **Length of laser line: 150 … 600mm**
- **Measurement value display in mm on OLED display as alignment aid**
- **Laser class 2M**

Optical Sensor ABC

- Light section sensors Page 595

LIGHT SECTION SENSORS

Part description Part No.:	Scanning range [mm] 1) ☐	Operating voltage	Light source	Output	Connection
Line Range Sensors					
LRS 36/6 50111330	200 … 800	18 … 30VDC	Red light Laser class 2M	Ethernet, 6 x push-pull 2)	M12 connector
LRS 36/6.10 50115418	200 … 800	18 … 30VDC	Red light Laser class 2M	Ethernet, 6 x push-pull 2)	M12 connector
LRS 36/PB 50111332	200 … 800	18 … 30VDC	Red light Laser class 2M	Ethernet, PROFIBUS DP	M12 connector

1) Luminosity coefficient 6 … 90%, entire detection range, at 20°C after 30minutes warmup time, medium range U_B.
2) Number of detection fields: up to 16 with logical linking option; number of inspection tasks: up to 16, of which 8 can be activated via inputs

Configuration software LRSsoft - free download at *www.leuze.com*.

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50109881	KB ET - 5000 - SA - RJ45	Ethernet cable, axial M12 connector - RJ 45 plug, 5m, for X2
b	50104590	K - D M12A - 8P - 5m - PUR	Connection cable 5000mm, axial M12 socket, 8-pin, for X1
c	50110180	KB M12/8 - 5000 - SA	Connection cable 5000mm, axial M12 connector, 8-pin, for X3
d	50104180	KB PB - 5000 - BA	PROFIBUS connection cable 5000mm, axial M12 socket
e	50104187	KB PB - 5000 - SA	PROFIBUS connection cable 5000mm, axial M12 plug
f	50109834	KDS BUS OUT M12-T-5P	PROFIBUS M12 T-connector, for X4
g	50038539	TS 02-4-SA M12	M12 connector with integrated BUS terminating resistor
h	50027375	BT 56	Fixing component with dovetail for rod
j	50111224	BT 59	Fixing component with dovetail for ITEM profile

ODSL 8 Page 246 | **ODSL 9** Page 250 | **ODSL 30** Page 258 | **ODS 96(B)** Page 262 | **HRTU 418** Page 278 | **VRTU 430** Page 282 | **GS 754(B)** Page 286 | **ROD 4** Page 290 | **LPS 36** Page 296 | **LES 36** Page 300 | **LRS 36** Page 304

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LRS 36

Line Range Sensors

	Response time [ms]	Minimum object size	Option	Accessories	
	10	2 … 3 mm 3) 2 … 6 mm 4)	1, 2, 3, 4, 5, 8	a, b, c, h, j	
	10	2 … 3 mm 3) 2 … 6 mm 4)	1, 2, 3, 4, 5, 6, 8	a, b, c, h, j	
	10	2 … 3 mm 3) 2 … 6 mm 4)	1, 2, 3, 4, 5, 7, 8	a, b, c, d, e, f, g, h, j	

3) In x direction, minimum and maximum value depend on measurement distance
4) In z direction, minimum and maximum value depend on measurement distance

Optical Sensor ABC

- Light section sensors Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection

X1
M12x1, 8-pole, male, A-cod.

PIN	Signal	Color
1	+24 V DC	WH
2	In1	BR
3	GND	GN
4	Out1	YE
5	In2	GY
6	Out2	PK
7	reserved	BU
8	reserved	RD

X2
M12x1, 4-pole, female, D-cod.

PIN	Signal	Color
1	Tx+	YE
2	Rx+	WH
3	Tx-	OR
4	Rx-	BU

X3 (LRS 36/6… only)
M12x1, 8-pole, female, A-cod.

PIN	Signal	Color
1	Out6	WH
2	Out5	BR
3	GND	GN
4	Out4	YE
5	Out3	GY
6	InSel3	PK
7	InSel2	BU
8	InSel1	RD

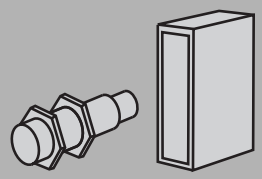
X4 (LRS 36/PB… only)
M12x1, 5-pole, female, B-cod.

PIN	Signal	Color
1	VP	
2	A	GN
3	DGND	
4	B	RD
5	FE	

Options

1	Configuration via OLED display and control buttons or via PC
2	Trigger and activation input
3	Cascading of up to 9 sensors
4	Up to 16 detection fields with logical linking option
5	Up to 16 inspection tasks, of which 8 can be activated via inputs
6	With scratch resistant coated plastic screen instead of glass pane
7	PROFIBUS DP interface
8	UL approval (class 2 acc. to NEC)

SELECTION TABLE

 Series	Dimensions in mm (WxHxD) in mm (ØxL)	Housing material: Plastic	Housing material: Metal	Typ. operating range/scanning range [mm]: 100 / 500 / 1000 / 6000
420	20 x 42 x 15	●		10 – 1000
8	15 x 48 x 38		●	0 – 800
18	15 x 50 x 33		●	0 – 650
412	M12 x 70		●	10 – 400
418	M18 x 50 M18 x 70 M18 x 90		●	25 – 700
430	M30 x 131 48 x 150		●	60 – 6000

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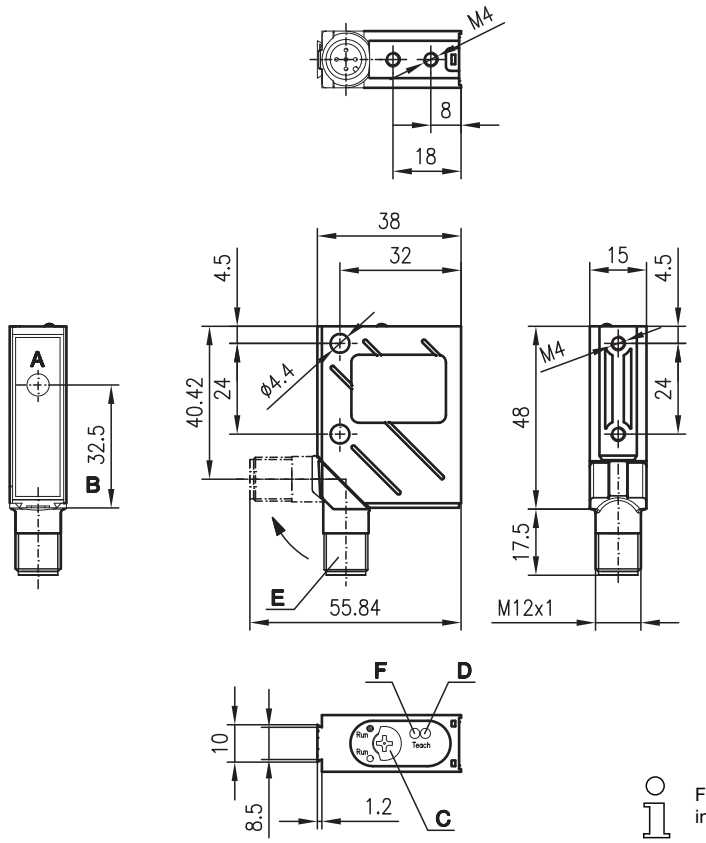
ULTRASONIC SENSORS

Operating principle			Operating voltage			Output		Input		Connection		
Ultrasonic throughbeam sensor	Ultrasonic retro-reflective sensor	Ultrasonic scanners	10 … 30VDC	12 … 30VDC	20 … 30VDC	PNP switching outputs	NPN switching outputs	Teach input	Synchronization input	M8 connector	M12 connector	Page
		●		●		●	●	●		●		318
●	●	●			●	●	●		●		●	310
●			●			●	●				●	314
		●		●		●	●	●			●	324
		●			●	●		●			●	328
		●			●	●			●		●	334

OVERVIEW OF SWITCHING ULTRASONIC SENSORS

Dimensioned drawing



A Active surface
B Ultrasonic axis
C Operational control
D Green LED
E 90° turning connector
F Yellow LED

Further details can be found in the respective data sheet.

8 Page 310

18 Page 314

420 Page 318

412 Page 324

418 Page 328

430 Page 334

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8 SERIES

Ultrasonic Sensors	Operating range	Page
Ultrasonic throughbeam sensor	0 800 mm	312
Ultrasonic retro-reflective sensor	0 400 mm	312
Ultrasonic scanner	0 400 mm	312

Other 8 Series products:

Optical sensors		LSR(L) 8, PRK(L) 8, (V/H)RTR 8	64
Optical distance sensors		LSU 8, RKU 8, HRTU 8	246
Luminescence scanners		LRT 8	472

Common technical data

Electrical data	Operating voltage U_B	20 … 30 VDC
	Residual ripple	≤ 10 % of U_B
	Open-circuit current	≤ 35 mA
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Green LED	Ready/Teach-in
	Yellow LED	Switching output/error
Mechanical data	Housing	Metal
	Weight	70 g
Environmental data	Ambient temperature (operation/storage)	-25 °C … +70 °C / -40 °C … +85 °C
	VDE safety class	III
	Protection class	IP 67
	Standards applied	IEC 60947-5-2

Mounting systems for this series can be found from **page 536** onwards

Features

- **Color and transmission independent detection of objects, even in wet and foggy environment**
- **Switching behavior largely independent of surface properties**
- **Teach function for adjustment**
- **M12 turning connector**

CE

Optical Sensor ABC

- Ultrasonic sensors Page 595

SWITCHING ULTRASONIC SENSORS

Part description Part No.:	Operating range [mm] □ 1)	Operating voltage	Ultrasonic frequency	Switching frequency	Output	Switching	
Ultrasonic throughbeam sensors		▶ = Transmitter ◀ = Receiver					
▶LSSU 8 - S12 50038914 **◀LSEU 8 / 24 - S12** 50038915	0 800	20 … 30VDC	300kHz	250Hz	1 PNP 1 NPN	Object detected	
Ultrasonic retro-reflective sensors							
RKU 8 / 24 - 400 - S12 50038913	0 400	20 … 30VDC	300kHz	8Hz	1 PNP 1 NPN	Object detected/ not detected reversible	
Ultrasonic scanners with background suppression							
HRTU 8 / 24 - 400 - S12 50038912	50 400	20 … 30VDC	300kHz	8Hz	1 PNP 1 NPN	Object detected/ not detected reversible	

1) Over complete temperature range, measurement object ≥ 20x20mm²

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000mm, M12 angular, 5-pin, PVC
f	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000mm, M12 axial, 5-pin, PVC

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	Connection	Repeatability	Option	Accessories	
	M12 connector		1, 4	a, b, c, d	
	M12 connector	± 1 mm	2, 3	e, f	
	M12 connector	± 1 mm	2, 3	e, f	

Optical Sensor ABC

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- Connection types Page 598
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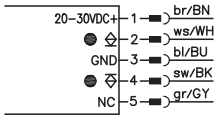
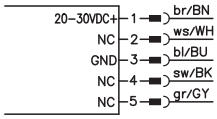
Electrical connection

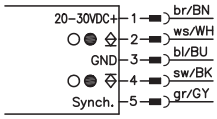
LSEU 8/24–S12



LSSU 8–S12



RKU 8/24–400–S12
HRTU 8/24–400–S12

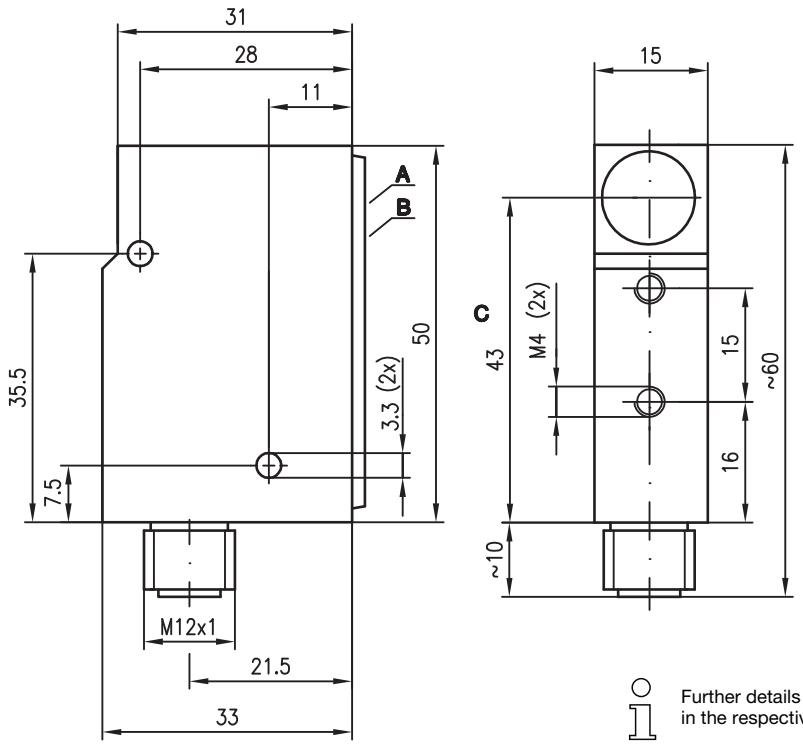


Options

1	Sensitivity adjustment via step switch
2	Teach-in via step switch
3	Synchronization input
4	UL approval

OVERVIEW OF SWITCHING ULTRASONIC SENSORS

Dimensioned drawing



Further details can be found in the respective data sheet.

A Indicator diodes
B Sensitivity adjustment
C Center of ultrasonic transducer

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18 SERIES

Ultrasonic Sensors	Operating range	Page
Ultrasonic throughbeam sensor	0 650 mm	316

Other 18 Series products:

Retro-reflective sensors	RK(R) 18, (I)PRK 18	78
AS-interface sensors	IPRK 18	532

Common technical data

Electrical data	Operating voltage U_B	10 … 30VDC
	Residual ripple	≤ 10% of U_B
	Open-circuit current	≤ 35mA
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Green LED	Ready to operate
	Yellow LED	Switching output
Mechanical data	Housing	Metal
	Weight	70g each
Environmental data	Ambient temperature (operation/storage)	0°C … +70°C
		-40°C … +85°C
	VDE safety class	III
	Protection class	IP 65
	Standards applied	IEC 60947-5-2, UL 508

Mounting systems for this series can be found from **page 540** onwards

Features

- **Color and transmission independent detection of objects, even in humid and foggy environment**
- **Optimized for air transport systems**
- **Metal housing**
- **Insensitive to dust**
- **Detection of narrow gaps**

Optical Sensor ABC

- Ultrasonic sensors Page 595

SWITCHING ULTRASONIC SENSORS

Part description Part No.:	Operating range [mm] □ 1)	Operating voltage	Ultrasonic frequency	Switching frequency	Output	Switching	
Ultrasonic throughbeam sensors		▶ = Transmitter ◀ = Receiver					
LSSU 18 - S12 50103365 **LSEU 18 / 24 - S12** 50103364	0 650	10 … 30 VDC	300 kHz	100 Hz	1 PNP 1 NPN	Object detected	

1) Over complete temperature range, measurement object ≥ 20x20 mm²

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000 mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000 mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC
e	50104560	K - D M12W - 5P - 10m - PVC	Connection cable 10000 mm, M12 angular, 5-pin, PVC
f	50104559	K - D M12A - 5P - 10m - PVC	Connection cable 10000 mm, M12 axial, 5-pin, PVC

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	Connection	Repeatability	Option	Accessories	
	M12 connector		1, 2, 3, 4	a, b, c, d, e, f	

Optical Sensor ABC

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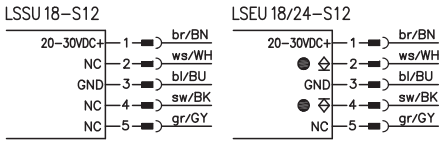
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1 Sensitivity adjustment via step switch

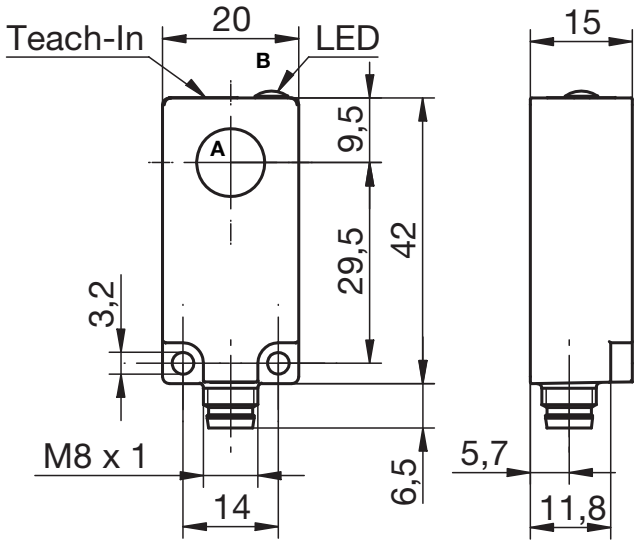
2 IP 65 metal housing

3 Bottle counting in the air conveyor

4 UL approval

OVERVIEW OF SWITCHING ULTRASONIC SENSORS

Dimensioned drawing



Further details can be found in the respective data sheet.

A Active surface
B Green indicator diode

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HRTU 420

Ultrasonic Sensors	Operating range	Page
Ultrasonic scanner HRTU 420	10 1000 mm	320

Common technical data

Electrical data	Operating voltage U_B	12 … 30VDC
	Residual ripple	≤ 10% of U_B
	Open-circuit current	≤ 35mA
	Output current	≤ 200mA
Indicators	Green LED	Switching/teach state
Mechanical data	Housing	Plastic (PE)
	Weight	Approx. 10g
Environmental data	Ambient temperature (operation/storage)	-10°C … +60°C / -40°C … +85°C
	VDE safety class	III
	Protection class	IP 67
	Standards applied	IEC 60947-5-2, UL 508

Features

- **Sensors in cubic plastic housing with protection class IP 67**
- **Measurement range up to 1000mm**
- **Various opening angles and sound cone geometries**
- **Switching behavior largely independent of surface properties**
- **Precise switching point adjustment through teach button or via a cable**
- **Protection against erroneous operation by self-locking teach button**

Optical Sensor ABC

- Ultrasonic sensors Page 595

SWITCHING ULTRASONIC SENSORS

Part description Part No.:	Scanning range [mm]	Operating voltage	Ultrasonic frequency	Switching frequency	Output	Switching
Ultrasonic scanners with background suppression						
HRTU 420 / 4NO.2 - S - S8 50113992	10 200	12 … 30VDC	380kHz	50Hz	1 PNP	NO (normally open)
HRTU 420 / 4NC.2 - S - S8 50113989	10 200	12 … 30VDC	380kHz	50Hz	1 PNP	NC (normally closed)
HRTU 420 / 2NO.2 - S - S8 50113986	10 200	12 … 30VDC	380kHz	50Hz	1 NPN	NO (normally open)
HRTU 420 / 2NC.2 - S - S8 50113983	10 200	12 … 30VDC	380kHz	50Hz	1 NPN	NC (normally closed)
HRTU 420 / 4NO.2 - S8 50113991	40 400	12 … 30VDC	290kHz	20Hz	1 PNP	NO (normally open)
HRTU 420 / 4NC.2 - S8 50113988	40 400	12 … 30VDC	290kHz	20Hz	1 PNP	NC (normally closed)
HRTU 420 / 2NO.2 - S8 50113985	40 400	12 … 30VDC	290kHz	20Hz	1 NPN	NO (normally open)
HRTU 420 / 2NC.2 - S8 50113982	40 400	12 … 30VDC	290kHz	20Hz	1 NPN	NC (normally closed)

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000mm, M8 axial, 4-pin, PVC
e	50104529	K - D M8W - 4P - 10m - PVC	Connection cable 10000mm, M8 angular, 4-pin, PVC
f	50104528	K - D M8A - 4P - 10m - PVC	Connection cable 10000mm, M8 axial, 4-pin, PVC

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HRTU 420

Ultrasonic sensors

	Connection	Repeatability	Option	Accessories	
	M8 connector	≤ 0.5 mm	1, 2, 3, 4	a, b, c, d, e, f	
	M8 connector	≤ 0.5 mm	1, 2, 3, 4	a, b, c, d, e, f	
	M8 connector	≤ 0.5 mm	1, 2, 3, 4	a, b, c, d, e, f	
	M8 connector	≤ 0.5 mm	1, 2, 3, 4	a, b, c, d, e, f	
	M8 connector	≤ 0.5 mm	1, 2, 4	a, b, c, d, e, f	
	M8 connector	≤ 0.5 mm	1, 2, 4	a, b, c, d, e, f	
	M8 connector	≤ 0.5 mm	1, 2, 4	a, b, c, d, e, f	
	M8 connector	≤ 0.5 mm	1, 2, 4	a, b, c, d, e, f	

Optical Sensor ABC

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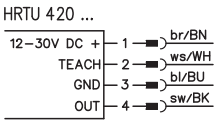
- Outputs Page 598

Electrical connection



Options

1 Teach-in via teach input or teach button

2 Automatic locking of the teach button

3 Especially narrow sound cone

4 UL approval

SWITCHING ULTRASONIC SENSORS

Part description Part No.:	Scanning range [mm]	Operating voltage	Ultrasonic frequency	Switching frequency	Output	Switching
Ultrasonic scanners with background suppression						
HRTU 420 / 4NO.2 - L - S8 50113990	100 1000	12 … 30VDC	240kHz	10Hz	1 PNP	NO (normally open)
HRTU 420 / 4NC.2 - L - S8 50113987	100 1000	12 … 30VDC	240kHz	10Hz	1 PNP	NC (normally closed)
HRTU 420 / 2NO.2 - L - S8 50113984	100 1000	12 … 30VDC	240kHz	10Hz	1 NPN	NO (normally open)
HRTU 420 / 2NC.2 - L - S8 50113981	100 1000	12 … 30VDC	240kHz	10Hz	1 NPN	NC (normally closed)

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000mm, M8 axial, 4-pin, PVC
e	50104529	K - D M8W - 4P - 10m - PVC	Connection cable 10000mm, M8 angular, 4-pin, PVC
f	50104528	K - D M8A - 4P - 10m - PVC	Connection cable 10000mm, M8 axial, 4-pin, PVC

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420 Series

Ultrasonic sensors

	Connection	Repeatability	Option	Accessories	
	M8 connector	≤ 0.5 mm	1, 2, 3, 4	a, b, c, d, e, f	
	M8 connector	≤ 0.5 mm	1, 2, 3, 4	a, b, c, d, e, f	
	M8 connector	≤ 0.5 mm	1, 2, 3, 4	a, b, c, d, e, f	
	M8 connector	≤ 0.5 mm	1, 2, 3, 4	a, b, c, d, e, f	

Optical Sensor ABC

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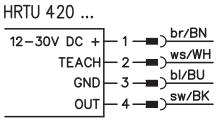
Electrical connection



Options

1 Teach-in via teach input or teach button

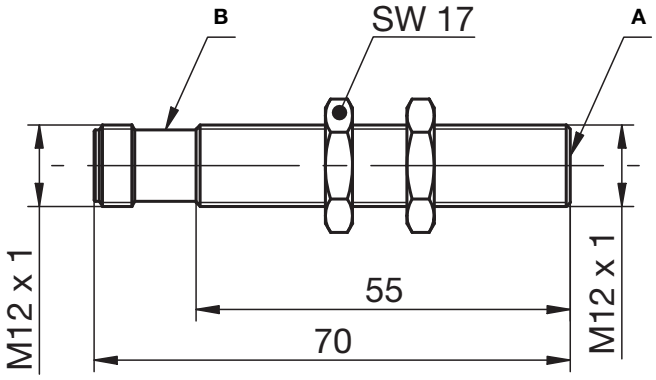
2 Automatic locking of the teach button

3 Particularly wide sound cone

4 UL approval

OVERVIEW OF SWITCHING ULTRASONIC SENSORS

Dimensioned drawing



Further details can be found in the respective data sheet.

A Active surface
B Green indicator diode

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HRTU 412

Ultrasonic Sensors	Operating range	Page
Ultrasonic scanner HRTU 412	0 400 mm	326

Common technical data

Electrical data	Operating voltage U_B	12 … 30VDC
	Residual ripple	≤ 10% of U_B
	Open-circuit current	≤ 35mA
	Output current	≤ 200mA
Indicators	Green LED	Switching/teach state
Mechanical data	Housing	Nickel-faced brass
	Weight	Approx. 30g
Environmental data	Ambient temperature (operation/storage)	-10°C … +60°C / -40°C … +85°C
	VDE safety class	III
	Protection class	IP 67
	Standards applied	IEC 60947-5-2, UL 508

Features

- **Sensors in M12 cylindrical housing**
- **Operating ranges up to 400mm**
- **Various opening angles and sound cone geometries**
- **Switching behavior largely independent of surface properties**
- **Precise switching point adjustment through teach-in via a cable**

Optical Sensor ABC

- Ultrasonic sensors Page 595

SWITCHING ULTRASONIC SENSORS

Part description Part No.:	Scanning range [mm]	Operating voltage	Ultrasonic frequency	Switching frequency	Output	Switching
Ultrasonic scanners with background suppression						
HRTU 412 / 4NO.2 - S - S12 50113993	10 200	12 … 30VDC	380kHz	50Hz	1 PNP	NO (normally open)
HRTU 412 / 4NC.2 - S - S12 50113995	10 200	12 … 30VDC	380kHz	50Hz	1 PNP	NC (normally closed)
HRTU 412 / 2NO.2 - S - S12 50113997	10 200	12 … 30VDC	380kHz	50Hz	1 NPN	NO (normally open)
HRTU 412 / 2NC.2 - S - S12 50113999	10 200	12 … 30VDC	380kHz	50Hz	1 NPN	NC (normally closed)
HRTU 412 / 4NO.2 - S12 50113994	40 400	12 … 30VDC	290kHz	20Hz	1 PNP	NO (normally open)
HRTU 412 / 4NC.2 - S12 50113996	40 400	12 … 30VDC	290kHz	20Hz	1 PNP	NC (normally closed)
HRTU 412 / 2NO.2 - S12 50113998	40 400	12 … 30VDC	290kHz	20Hz	1 NPN	NO (normally open)
HRTU 412 / 2NC.2 - S12 50114000	40 400	12 … 30VDC	290kHz	20Hz	1 NPN	NC (normally closed)

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000mm, M12 axial, 4-pin, PVC

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	Connection	Repeatability	Option	Accessories	
	M12 connector	≤ 0.5 mm	1, 2, 3	a, b, c, d, e, f	
	M12 connector	≤ 0.5 mm	1, 2, 3	a, b, c, d, e, f	
	M12 connector	≤ 0.5 mm	1, 2, 3	a, b, c, d, e, f	
	M12 connector	≤ 0.5 mm	1, 2, 3	a, b, c, d, e, f	
	M12 connector	≤ 0.5 mm	1, 3	a, b, c, d, e, f	
	M12 connector	≤ 0.5 mm	1, 3	a, b, c, d, e, f	
	M12 connector	≤ 0.5 mm	1, 3	a, b, c, d, e, f	
	M12 connector	≤ 0.5 mm	1, 3	a, b, c, d, e, f	

Optical Sensor ABC

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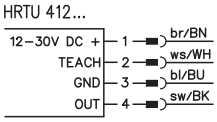
Electrical connection



Options

1 Teach-in via teach input

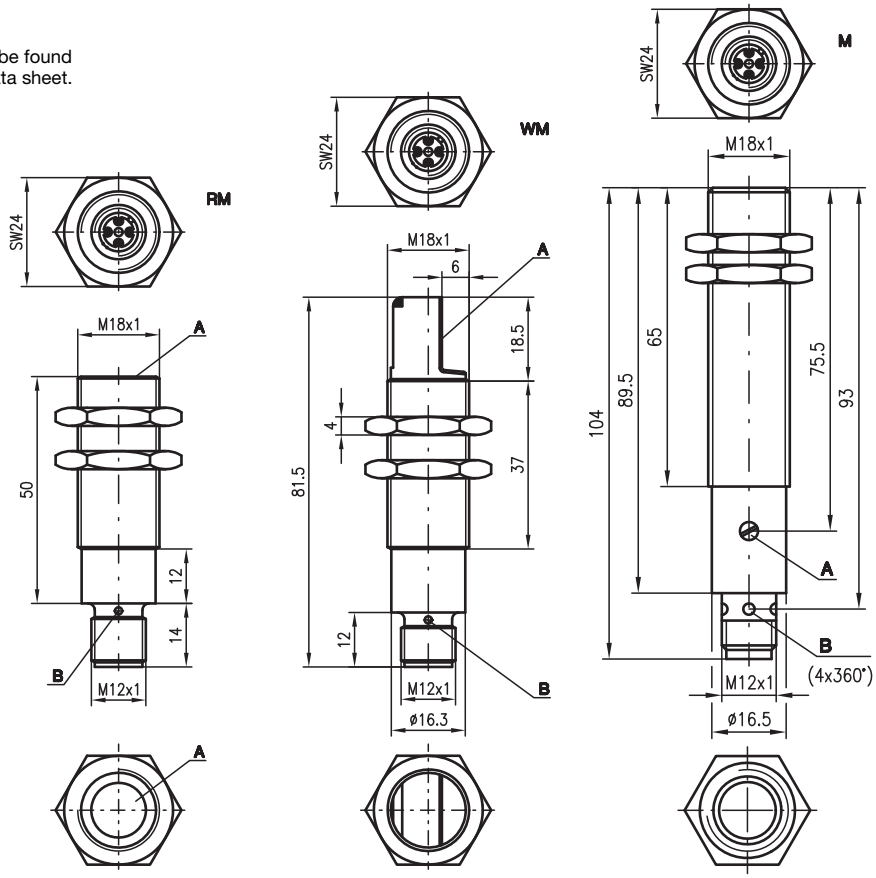
2 Especially narrow sound cone

3 UL approval

OVERVIEW OF SWITCHING ULTRASONIC SENSORS

Dimensioned drawing

Further details can be found in the respective data sheet.



A Active surface
B Indicator diode

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HRTU 418

Ultrasonic Sensors	Operating range	Page
Ultrasonic scanner HRTU 418	30 … 1000 mm	330

Other 418 Series products:

Ultrasonic distance sensors	HRTU 418	278

Common technical data

Electrical data	Operating voltage U_B	20 … 30VDC
	Residual ripple	≤ 10% of U_B
	Open-circuit current	≤ 60mA
	Output current	≤ 150mA
Indicators	Yellow LED	Switching state/teach-in
Mechanical data	Housing	Nickel-faced brass
	Weight	50g
Environmental data	Ambient temperature (operation/storage)	-25°C … +70°C / -40°C … +85°C
	VDE safety class	III
	Protection class	IP 67
	Standards applied	IEC 60947-5-2, UL 508

Features

- **Color and transmission independent detection of objects**
- **Switching behavior largely independent of surface properties**
- **Distance teachable**
- **Small construction**

Optical Sensor ABC

- Ultrasonic sensors Page 595

SWITCHING ULTRASONIC SENSORS

Part description Part No.:	Operating range [1] [mm] □	Operating voltage	Ultrasonic frequency	Switching frequency	Output	Switching
Ultrasonic scanners with background suppression, short construction						
HRTU 418 RM/P - 5020 - 200 - S12 50038635	□ 30 … 200	20 … 30VDC	400kHz	10Hz	1 PNP	Object detected
HRTU 418 WM/P - 5020 - 200 - S12 50038636	□ 30 … 200	20 … 30VDC	400kHz	10Hz	1 PNP	Object detected
HRTU 418 RM/P - 5220 - 400 - S12 50109016	25 400	20 … 30VDC	300kHz	10Hz	2 PNP	Object detected
HRTU 418 RM/P - 3020 - 700 - S12 50038639	100 700	20 … 30VDC	200kHz	5Hz	1 PNP	Object detected
HRTU 418 WM/P - 3020 - 700 - S12 50038640	100 700	20 … 30VDC	200kHz	5Hz	1 PNP	Object detected
HRTU 418 RM/P - 5220 - 700 - S12 50109018	50 700	20 … 30VDC	200kHz	5Hz	2 PNP	Object detected

1) Over complete temperature range, measurement object ≥ 20x20mm²

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000mm, M12 angular, 5-pin, PVC
f	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000mm, M12 axial, 5-pin, PVC

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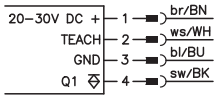
	Connection	Repeatability	Option	Accessories	
	M12 connector	± 1 mm	1, 3	a, b, c, d	
	M12 connector	± 1 mm	1, 2, 3	a, b, c, d	
	M12 connector	± 1 mm	1, 3	e, f	
	M12 connector	± 1 mm	1, 3	a, b, c, d	
	M12 connector	± 1 mm	1, 2, 3	a, b, c, d	
	M12 connector	± 1 mm	1, 3	e, f	

Optical Sensor ABC

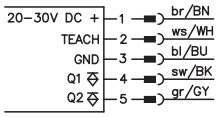
- Ultrasonic sensors Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection

HRTU 418 RM/P...
HRTU 418 WM/P...



HRTU 418 RM/P–5220...
HRTU 418 WM/P–5220...



Options

1 Teach-in via teach input

2 90° ultrasonic head (radial sound emission)

3 UL approval

SWITCHING ULTRASONIC SENSORS

Part description Part No.:	Operating range [mm]	Operating voltage	Ultrasonic frequency	Switching frequency	Output	Switching	
Ultrasonic scanners with background suppression, long construction							
HRTU 418 M/P - 5010 - 300 - S12 50036257	50 … 300 [1]	20 … 30VDC	400kHz	5Hz	1 PNP	Object detected	
HRTU 418 M/P - 3010 - 1000 - S12 50036258	150 1000 [1]	20 … 30VDC	200kHz	4Hz	1 PNP	Object detected	

1) Over complete temperature range, measurement object ≥ 10x10mm²

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000mm, M12 axial, 4-pin, PVC

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418 Series

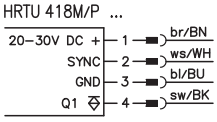
Ultrasonic sensors

	Connection	Repeatability	Option	Accessories	
	M12 connector	± 1 mm	1, 2, 3, 4	a, b, c, d, e, f	
	M12 connector	± 2 mm	1, 2, 3, 4	a, b, c, d, e, f	

Optical Sensor ABC

- Ultrasonic sensors Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1 Configurable via programming unit and software

2 Sensor synchronization via SYNC input

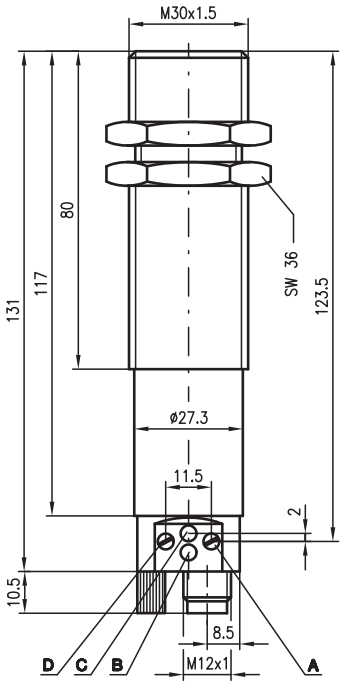
3 Configurable multiplex operation

4 UL approval

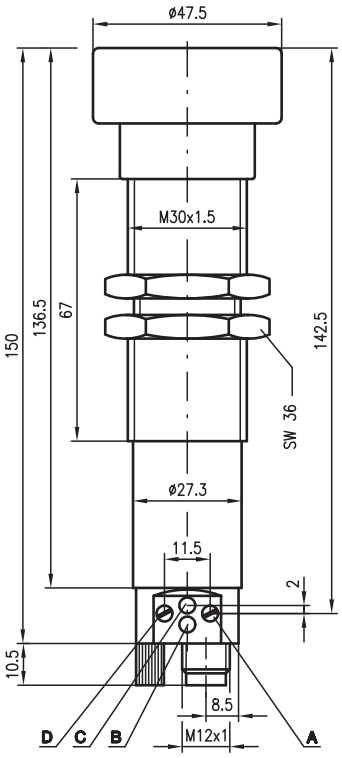
OVERVIEW OF SWITCHING ULTRASONIC SENSORS

Dimensioned drawing

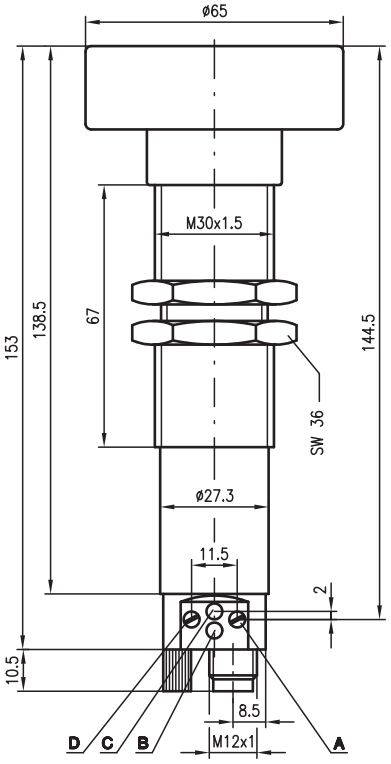
VRTU 430…-300-S12
VRTU 430…-1300-S12



VRTU 430…-3000-S12



VRTU 430…-6000-S12



A Setting of cut-out point Q1
B Indicator diode Q2
C Indicator diode Q1
D Setting of cut-in point Q1/cut-out point Q2

Further details can be found in the respective data sheet.

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VRTU 430

Ultrasonic Sensors	Operating range	Page
Ultrasonic scanner VRTU 430	60 … 6000 mm	336

Other 430 Series products:

Ultrasonic distance sensors	VRTU 430	282

Common technical data

Electrical data	Operating voltage U_B	20 … 30 VDC
	Residual ripple	≤ 10 % of U_B
	Open-circuit current	≤ 50 mA
	Output current	≤ 300 mA
Indicators	Yellow LED	Switching output
	Flashing yellow LED	Programming error
Mechanical data	Housing	Metal (CuZn)
	Weight	210 g … 380 g
Environmental data	Ambient temperature (operation/storage)	-25 °C … +70 °C / -40 °C … +85 °C
	VDE safety class	III
	Protection class	IP 65
	Standards applied	IEC 60947-5-2

Features

- **Ideal for detection of levels of liquids, bulk materials, transparent media, …**
- **Distance information largely independent of surface properties**
- **PC-configuration software for configuring sensor and switching output**
- **Up to 10 devices can be synchronized via the SYNC input**
- **Separate adjustment of start and end of switching range (Q1) via potentiometer and PC**

CE

Optical Sensor ABC

- Ultrasonic distance sensors Page 595

SWITCHING ULTRASONIC SENSORS

Part description Part No.:	Operating range [mm]	Operating voltage	Ultrasonic frequency	Switching frequency	Output	Switching	
Ultrasonic scanners							
VRTU 430 M/P - 5110 - 300 - S12 50036261	60 … 300 [1]	20 … 30 VDC	400 kHz	8 Hz	2 PNP	Object detected	
VRTU 430 M/P - 3110 - 1300 - S12 50036262	200 … 1300 [1]	20 … 30 VDC	200 kHz	4 Hz	2 PNP	Object detected	
VRTU 430 M/P - 2110 - 3000 - S12 50036263	400 3000 [2]	20 … 30 VDC	120 kHz	2 Hz	2 PNP	Object detected	
VRTU 430 M/P - 1110 - 6000 - S12 50036264	600 6000 [3]	20 … 30 VDC	80 kHz	1 Hz	2 PNP	Object detected	

1) Over complete temperature range, measurement object ≥ 10 x 10 mm²
2) Over complete temperature range, measurement object ≥ 50 x 50 mm²
3) Over complete temperature range, measurement object ≥ 100 x 100 mm²

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000 mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000 mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC
e	50104560	K - D M12W - 5P - 10m - PVC	Connection cable 10000 mm, M12 angular, 5-pin, PVC
f	50104559	K - D M12A - 5P - 10m - PVC	Connection cable 10000 mm, M12 axial, 5-pin, PVC

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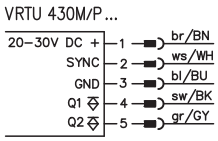
	Connection	Repeatability	Option	Accessories	
	M12 connector	± 0.45 mm	1, 2, 3, 4	a, b, c, d, e, f	
	M12 connector	± 2 mm	1, 2, 3, 4	a, b, c, d, e, f	
	M12 connector	± 5 mm	1, 2, 3, 4	a, b, c, d, e, f	
	M12 connector	± 9 mm	1, 2, 3, 4	a, b, c, d, e, f	

Optical Sensor ABC

- Ultrasonic sensors Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1 Configurable via programming unit and software

2 Sensor synchronization via SYNC input

3 Configurable multiplex operation

4 UL approval

SERIES SELECTION TABLE

Series	Dimensions in mm (HxWxL)	Typ. scan range limit S_n in mm	Installation		Switching output / function			
			Embedded	Non-embedded	PNP	NPN	NO - normally open	NC - normally closed
IS 255	5 x 5 x 25	1.5	●		●	●	●	○
IS 288	8 x 8 x 50	1.5	●		●	●	●	○
		2.0	●		●	○	●	●
		3.0	●		●	○	●	○
IS 240	40 x 12 x 26	4.0	●		●	●	●	●
		8.0		●	●	●	●	●
IS 244	40 x 40 x 67 40 x 40 x 120	20.0	●		●	●	●	●
		40.0		●	●	●	●	●

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INDUCTIVE SWITCHES

Max. switching frequency	Operating voltage	Connection			Housing material		Protection class		Page
		M8 connector	M12 connector	Cable, 2 m, PVC	Chromium-plated brass	Plastic (PA)	IP 67	IP 69K	
3000 Hz	10 … 30 VDC	○		●	●		●		350
5000 Hz	10 … 30 VDC	●		●	●		●		354
3000 Hz	10 … 30 VDC	●		●	●		●		
1000 Hz	10 … 30 VDC	●		●	●		●		
1400 Hz	10 … 30 VDC	●		●		●	●		342
1400 Hz	10 … 30 VDC	●		●		●	●		
150 Hz	10 … 30 VDC		●	●		●	●		346
150 Hz	10 … 30 VDC		●	●		●	●		

○ = on request

SERIES SELECTION TABLE

Series	Dimensions in mm (Ø x L)	Typ. scan range limit S_n in mm	Installation: Embedded	Installation: Non-embedded	Switching output / function: PNP	Switching output / function: NPN	Switching output / function: NO - normally open	Switching output / function: NC - normally closed
IS 204	Ø 4 x 25	1.5	●		●	○	●	○
IS 205	M5 x 38	1.5	●		●	○	●	○
IS 206	Ø 6.5 x 35	2.0	●		●	○	●	○
		3.0	●		●	○	●	○
IS 208	M8 x 45	1.5	●		●	○	●	
		2.0	●		●	●	●	●
		2.5		●	●	○	●	
		4.0		●	●	○	●	○
IS 212	M12 x 50	2.0	●		●	○	●	
		4.0	●		●	●	●	●
		4.0		●	●	○	●	
		6.0 [1]	●		●	○	●	
		6.0	●		●	●	●	○
		8.0		●	●	●	●	○
		10.0 [1]		●	●	○	●	
		10.0		●	●	○	●	○
IS 218	M18 x 50	5.0	●		●	○	●	
		8.0	●		●	●	●	●
		8.0		●	●	○	●	
		10.0 [1]	●		●	○	●	
		12.0	●		●	●	●	○
		20.0 [1]		●	●	○	●	
		20.0		●	●	○	●	○
IS 230	M30 x 60	10.0	●		●	○	●	
		15.0		●	●	○	●	
		20.0 [1]	●		●	○	●	
		22.0	●		●	●	●	●
		40.0 [1]		●	●	○	●	
		40.0		●	●	●	●	○

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INDUCTIVE SWITCHES

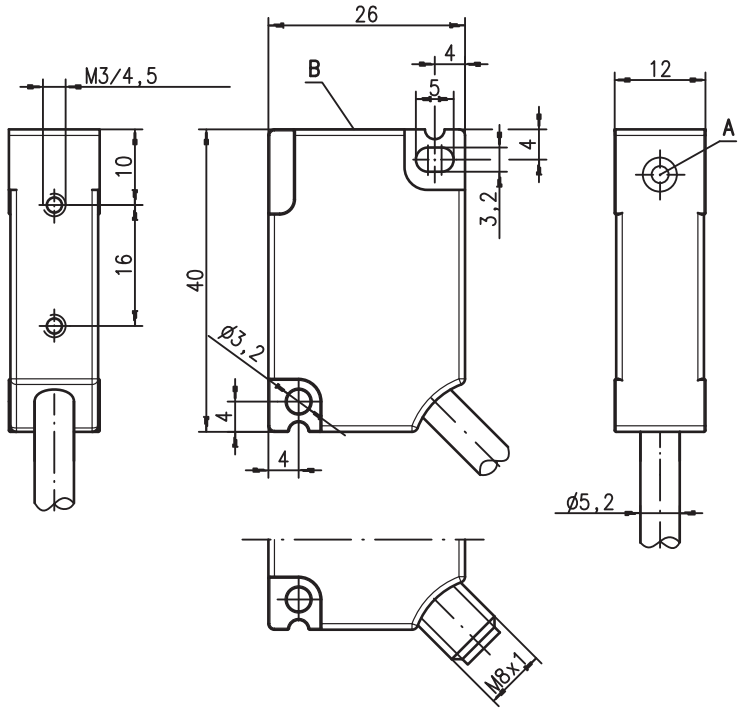
Max. switching frequency	Operating voltage	Connection			Housing material		Protection class		Page
		M8 connector	M12 connector	Cable, 2 m, PVC	Chromium-plated brass	Stainless steel	IP 67	IP 69K	
3000 Hz	10 … 30 VDC	○		●		●	●		358
3000 Hz	10 … 30 VDC	●		●		●	●		362
5000 Hz	10 … 30 VDC	●		●		●	●		366
1000 Hz	10 … 30 VDC			●		●	●		
5000 Hz	10 … 30 VDC	●	●	●		●	●		370
5000 Hz	10 … 30 VDC	●		●		●	●		
5000 Hz	10 … 30 VDC	●	●	●		●	●		
3500 Hz	10 … 30 VDC	●		●		●	●		
3000 Hz	10 … 30 VDC		●	●	●		●		380
2000 Hz	10 … 30 VDC		●	●	●		●		
2000 Hz	10 … 30 VDC		●	●	●		●		
800 Hz	10 … 30 VDC		●			●	●	●	
600 Hz	10 … 30 VDC		●	●	●		●		
1500 Hz	10 … 30 VDC		●	●	●		●		
400 Hz	10 … 30 VDC		●			●	●	●	
400 Hz	10 … 30 VDC		●	●	●		●		
2000 Hz	10 … 30 VDC		●	●	●		●		390
1500 Hz	10 … 30 VDC		●	●	●		●		
2000 Hz	10 … 30 VDC		●	●	●		●		
200 Hz	10 … 30 VDC		●			●	●	●	
500 Hz	10 … 30 VDC		●	●	●		●		
200 Hz	10 … 30 VDC		●			●	●	●	
200 Hz	10 … 30 VDC		●	●	●		●		
1200 Hz	10 … 30 VDC		●	●	●		●		400
700 Hz	10 … 30 VDC		●	●	●		●		
100 Hz	10 … 30 VDC		●			●	●	●	
200 Hz	10 … 30 VDC		●	●	●		●		
100 Hz	10 … 30 VDC		●			●	●	●	
90 Hz	10 … 30 VDC		●	●	●		●		

1) Food+Beverage version

○ = on request

OVERVIEW

Dimensioned drawing



A Active surface
B Yellow indicator diode

Further details can be found in the respective data sheet.

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IS 244 Page 346

IS 255 Page 350

IS 288 Page 354

IS 204 Page 358

IS 205 Page 362

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IS 240 SERIES

Installation	Typ. scan range limit S_n	Page
Embedded	0 … 4 mm	344
Non-embedded	0 … 8 mm	344

Common technical data

Electrical data	Operating voltage U_B	10 … 30VDC
	Residual ripple σ	≤ 20% of U_B
	Output current I_L	≤ 250mA
	Residual current I_r	≤ 10µA
	Voltage drop U_d	≤ 2.5V
	Hysteresis H of S_r	≤ 5%
	Repeatability	≤ 10%
Indicators	Yellow LED	Switching state
Mechanical data	Standard target (Fe360)	12 x 12mm² (24 x 24mm²)
	Weight (connector/cable)	Approx. 18g/108g
Environmental data	Ambient temperature	-25°C … +70°C
	Protective circuit	Polarity reversal protection, short circuit protection
	Standards applied	IEC 60947-5-2, UL 508
	Electromagnetic compatibility	IEC 61000-4-2 air 8kV IEC 61000-4-3 10V/m IEC 61000-4-4 2kV

Mounting systems for this series can be found from **page 549** onwards

Features

- **Slim construction 40 x 12mm**
- **Plastic housing**
- **Integrated short circuit and polarity reversal protection**
- **LED for switching state**

Inductive Switch

- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] ☐ Typ. scan range limit S_n [mm] ▣	Switching frequency	Installation	Output	Switching
Inductive switches 40 x 12, embedded installation					
IS 240 PP/44 - 4E0 50114207	0 3.2 0 4	1400 Hz	Embedded	2x PNP	NO / NC complementary (make-contact/break-contact)
IS 240 PP/44 - 4E0 - S8.4 50114208	0 3.2 0 4	1400 Hz	Embedded	2x PNP	NO / NC complementary (make-contact/break-contact)
IS 240 PP/22 - 4E0 50114203	0 3.2 0 4	1400 Hz	Embedded	2xNPN	NO / NC complementary (make-contact/break-contact)
IS 240 PP/22 - 4E0 - S8.4 50114204	0 3.2 0 4	1400 Hz	Embedded	2xNPN	NO / NC complementary (make-contact/break-contact)
Inductive switches 40 x 12, non-embedded installation					
IS 240 PP/44 - 8N0 50114209	0 6.4 0 8	1400 Hz	Non-embedded	2x PNP	NO / NC complementary (make-contact/break-contact)
IS 240 PP/44 - 8N0 - S8.4 50114210	0 6.4 0 8	1400 Hz	Non-embedded	2x PNP	NO / NC complementary (make-contact/break-contact)
IS 240 PP/22 - 8N0 50114205	0 6.4 0 8	1400 Hz	Non-embedded	2xNPN	NO / NC complementary (make-contact/break-contact)
IS 240 PP/22 - 8N0 - S8.4 50114206	0 6.4 0 8	1400 Hz	Non-embedded	2xNPN	NO / NC complementary (make-contact/break-contact)

Accessories / connection cables

More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000 mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000 mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104583	D M8A - 4P - SK	Cable socket, M8 axial, 4-pin, user-configurable

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IS 240 SERIES

Inductive switches

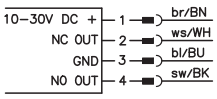
	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2m, PVC	PA / PA	IP 67		
	M8 connector	PA / PA	IP 67	a, b, c, d, e	
	Cable, 2m, PVC	PA / PA	IP 67		
	M8 connector	PA / PA	IP 67	a, b, c, d, e	
	Cable, 2m, PVC	PA / PA	IP 67		
	M8 connector	PA / PA	IP 67	a, b, c, d, e	
	Cable, 2m, PVC	PA / PA	IP 67		
	M8 connector	PA / PA	IP 67	a, b, c, d, e	

Inductive Switch

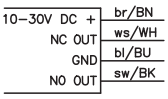
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

M8 connector



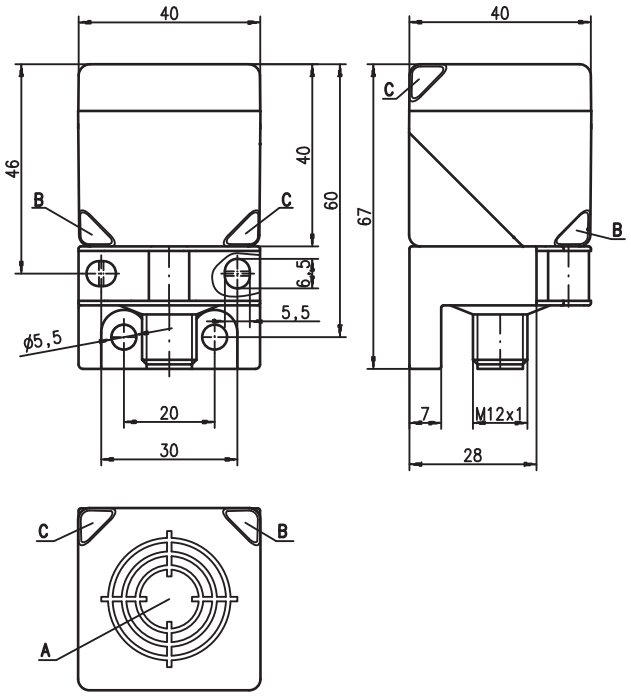
Cable



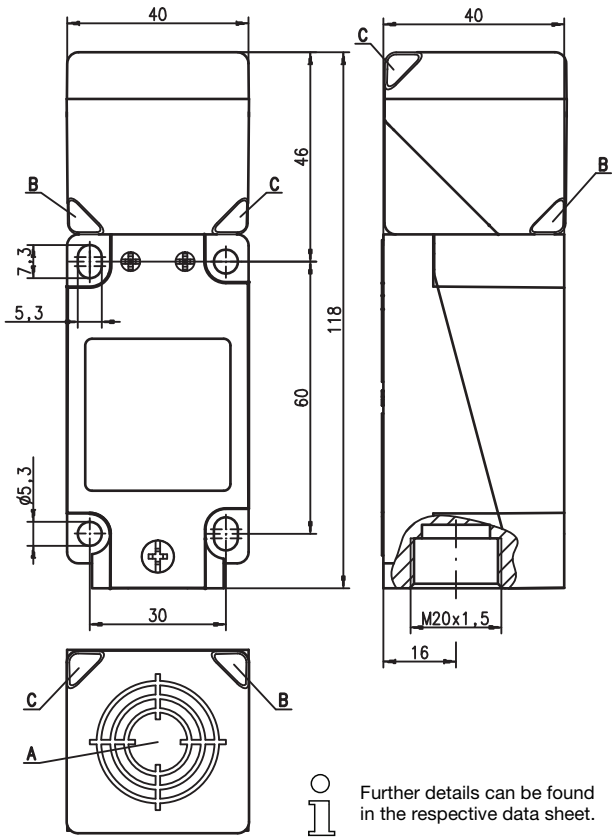
OVERVIEW

Dimensioned drawing

Types with M12 connector



Types with terminals



A Active surface
B Yellow indicator diode
C Green indicator diode

Further details can be found in the respective data sheet.

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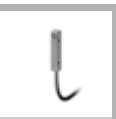
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IS 244 SERIES

Installation	Typ. scan range limit S_n	Page
Embedded	0 20 mm	348
Non-embedded	0 40 mm	348

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple σ	≤ 20 % of U_B
	Output current I_L	≤ 200 mA
	Residual current I_r	≤ 500 µA
	Voltage drop U_d	≤ 2.0 V
	Hysteresis H of S_r	≤ 5 %
	Repeatability	≤ 10 %
Indicators	2x green LED	Ready to operate
	2x yellow LED	Switching state
Mechanical data	Standard target (Fe360)	60 x 60 mm² (120 x 120 mm²)
	Weight (connector/cable)	Approx. 130 g/225 g
Environmental data	Ambient temperature	-25 °C … +85 °C
	Protective circuit	Polarity reversal protection, short circuit protection
	Standards applied	IEC 60947-5-2, UL 508
	Electromagnetic compatibility	IEC 61000-4-2 air 8 kV IEC 61000-4-3 10 V/m IEC 61000-4-4 2 kV

Mounting systems for this series can be found from **page 549** onwards

Features

- **Classic construction 40 x 40 mm**
- **Plastic housing**
- **Connection via M12 connector or terminals**
- **Integrated short circuit and polarity reversal protection**
- **LED for switching state**

Inductive Switch

- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches 40 x 40, embedded installation					
IS 244 PP/44 - 20E - TB.4 50114213	0 16 0 20	150 Hz	Embedded	2x PNP	NO / NC complementary (make-contact/break-contact)
ISS 244 PP/44 - 20E - S12 50114217	0 16 0 20	150 Hz	Embedded	2x PNP	NO / NC complementary (make-contact/break-contact)
IS 244 PP/22 - 20E - TB.4 50114211	0 16 0 20	150 Hz	Embedded	2xNPN	NO / NC complementary (make-contact/break-contact)
ISS 244 PP/22 - 20E - S12 50114215	0 16 0 20	150 Hz	Embedded	2xNPN	NO / NC complementary (make-contact/break-contact)
Inductive switches 40 x 40, non-embedded installation					
IS 244 PP/44 - 40N - TB.4 50114214	0 32 0 40	150 Hz	Non-embedded	2x PNP	NO / NC complementary (make-contact/break-contact)
ISS 244 PP/44 - 40N - S12 50114218	0 32 0 40	150 Hz	Non-embedded	2x PNP	NO / NC complementary (make-contact/break-contact)
IS 244 PP/22 - 40N - TB.4 50114212	0 32 0 40	150 Hz	Non-embedded	2xNPN	NO / NC complementary (make-contact/break-contact)
ISS 244 PP/22 - 40N - S12 50114216	0 32 0 40	150 Hz	Non-embedded	2xNPN	NO / NC complementary (make-contact/break-contact)

Accessories / connection cables

More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000 mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000 mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable

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IS 244 SERIES

Inductive switches

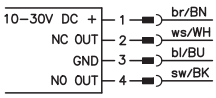
	Connection	Material housing / active surface	Protection class	Accessories	
	Terminals	PA / PA	IP 67 IP 69K		
	M12 connector	PA / PA	IP 67 IP 69K	a, b, c, d, e	
	Terminals	PA / PA	IP 67 IP 69K		
	M12 connector	PA / PA	IP 67 IP 69K	a, b, c, d, e	
	Terminals	PA / PA	IP 67 IP 69K		
	M12 connector	PA / PA	IP 67 IP 69K	a, b, c, d, e	
	Terminals	PA / PA	IP 67 IP 69K		
	M12 connector	PA / PA	IP 67 IP 69K	a, b, c, d, e	

Inductive Switch

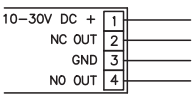
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

M12 connector

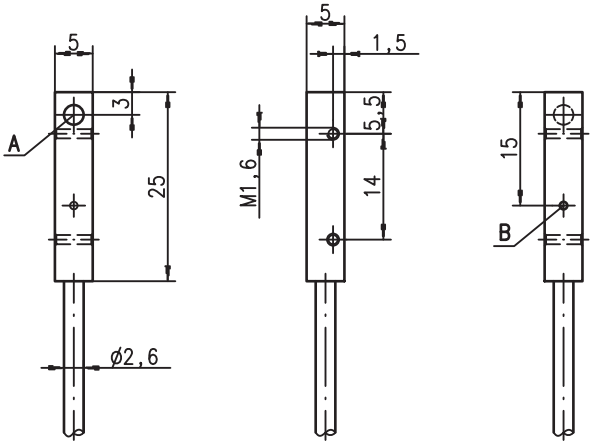


Terminals



OVERVIEW

Dimensioned drawing



A Active surface
B Yellow indicator diode

Further details can be found in the respective data sheet.

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IS 255 SERIES

Installation	Typ. scan range limit S_n	Page
Embedded	0 1.5 mm	352

Common technical data

Electrical data	Operating voltage U_B	10 … 30VDC
	Residual ripple σ	≤ 20% of U_B
	Output current I_L	≤ 200mA
	Residual current I_r	≤ 100µA
	Voltage drop U_d	≤ 2.0V
	Hysteresis H of S_r	≤ 10%
	Temperature drift of s_r	≤ 10% (entire temp. range)
	Repeatability	≤ 2%
Indicators	Yellow LED	Switching state
Mechanical data	Standard target (Fe360)	5 x 5mm²
	Weight	Approx. 34g
Environmental data	Ambient temperature	-25°C … +70°C
	Protective circuit	Polarity reversal protection, short circuit prot., inductive prot.
	Standards applied	IEC 60947-5-2, UL 508
	Electromagnetic compatibility	IEC 60255-5 1kV IEC 61000-4-2 Level 2 IEC 61000-4-3 Level 3 IEC 61000-4-4 Level 3

Mounting systems for this series can be found from **page 549** onwards

Features

- **Slim and short 5 x 5mm cubical metal housing**
- **Chromium-plated brass housing**
- **Built-in short circuit protection, inductive protection, polarity reversal protection**
- **LED for switching state**

Inductive Switch

- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching	
Inductive switches 5 x 5, embedded installation						
IS 255 MP/4NO - 1E5 50113209	0 1.2 0 1.5	3000 Hz	Embedded	1 x PNP	NO (normally open)	
IS 255 MP/2NO - 1E5 50113210	0 1.2 0 1.5	3000 Hz	Embedded	1 x NPN	NO (normally open)	

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IS 255 SERIES

Inductive switches

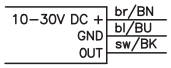
	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2m, PUR	Brass, chromium-plated / PA66	IP 67		
	Cable, 2m, PUR	Brass, chromium-plated / PA66	IP 67		

Inductive Switch

- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

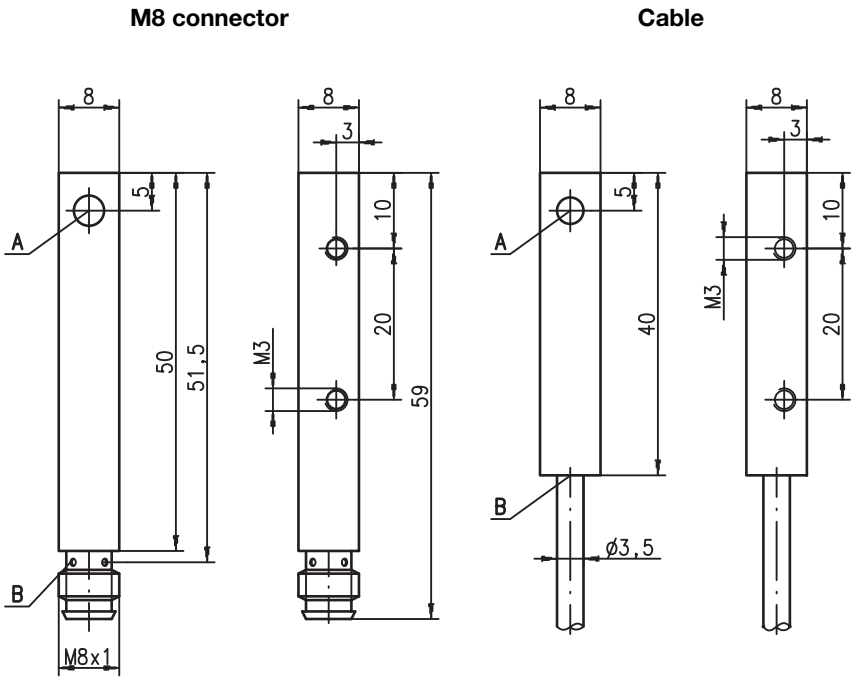
Electrical connection

Cable



OVERVIEW

Dimensioned drawing



A Active surface
B Yellow indicator diode

Further details can be found in the respective data sheet.

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IS 288 SERIES

Installation	Typ. scan range limit S_n	Page
Embedded	0 3 mm	356

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple σ	≤ 20 % of U_B
	Output current I_L	≤ 200 mA
	Residual current I_r	≤ 100 µA
	Voltage drop U_d	≤ 2.0 V
	Hysteresis H of S_r	≤ 5 %/≤ 10 %
	Temperature drift of s_r	≤ 10 % (entire temp. range)
	Repeatability	≤ 2 %/5 %
Indicators	Yellow LED	Switching state
Mechanical data	Standard target (Fe360)	8 x 8 (9 x 9) mm²
	Weight (connector/cable)	Approx. 15 g/45 g
Environmental data	Ambient temperature	-25 °C … +70 °C
	Protective circuit	Polarity reversal protection, short circuit prot., inductive prot.
	Standards applied	IEC 60947-5-2, UL 508
	Electromagnetic compatibility	IEC 60255-5 1 kV IEC 61000-4-2 Level 3 IEC 61000-4-3 Level 3 IEC 61000-4-4 Level 3

Mounting systems for this series can be found from **page 549** onwards

Features

- **Slim and short 8 x 8 mm cubical metal housing**
- **Nickel-plated brass housing**
- **Built-in short circuit protection, inductive protection, polarity reversal protection**
- **LED for switching state**

Inductive Switch

- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches 8 x 8, embedded installation					
IS 288 MP/4NO - 1E5 - S8.3 50112886	0 1.2 0 1.5	5000 Hz	Embedded	1 x PNP	NO (normally open)
IS 288 MP/4NO - 1E5 50112885	0 1.2 0 1.5	5000 Hz	Embedded	1 x PNP	NO (normally open)
IS 288 MP/2NO - 1E5 50113208	0 1.2 0 1.5	5000 Hz	Embedded	1 x NPN	NO (normally open)
IS 288 MP/4NO - 2E0 - S8.3 50112888	0 1.6 0 2	3000 Hz	Embedded	1 x PNP	NO (normally open)
IS 288 MP/4NO - 2E0 50112887	0 1.6 0 2	3000 Hz	Embedded	1 x PNP	NO (normally open)
IS 288 MP/4NC - 2E0 50113783	0 1.6 0 2	3000 Hz	Embedded	1 x PNP	NC (normally closed)
IS 288 MP/4NO - 3E0 - S8.3 50112890	0 2.4 0 3	1000 Hz	Embedded	1 x PNP	NO (normally open)
IS 288 MP/4NO - 3E0 50112889	0 2.4 0 3	1000 Hz	Embedded	1 x PNP	NO (normally open)

Accessories / connection cables

More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50106692	K - D M8W - 3P - 5m - PUR	Connection cable 5000 mm, M8 angular, 3-pin, PUR
d	50106691	K - D M8A - 3P - 5m - PUR	Connection cable 5000 mm, M8 axial, 3-pin, PUR
e	50104582	D M8A - 3P - SK	Cable socket, M8 axial, 3-pin, user-configurable

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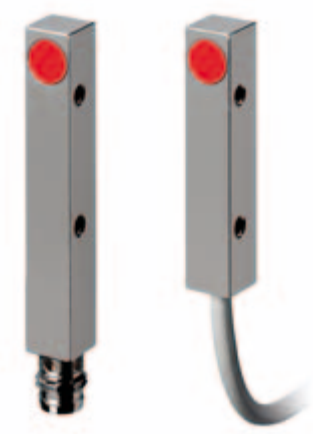
IS 288 SERIES

Inductive switches

	Connection	Material housing / active surface	Protection class	Accessories	
	M8 connector	Brass, nickel-plated / PBTP	IP 67	a, b, c, d, e	
	Cable, 2 m, PVC	Brass, nickel-plated / PBTP	IP 67		
	Cable, 2 m, PVC	Brass, nickel-plated / PBTP	IP 67		
	M8 connector	Brass, nickel-plated / PBTP	IP 67	a, b, c, d, e	
	Cable, 2 m, PVC	Brass, nickel-plated / PBTP	IP 67		
	Cable, 2 m, PVC	Brass, nickel-plated / PBTP	IP 67		
	M8 connector	Brass, nickel-plated / PBTP	IP 67	a, b, c, d, e	
	Cable, 2 m, PVC	Brass, nickel-plated / PBTP	IP 67		

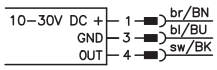


Inductive Switch

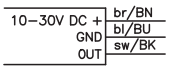
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

M8 connector

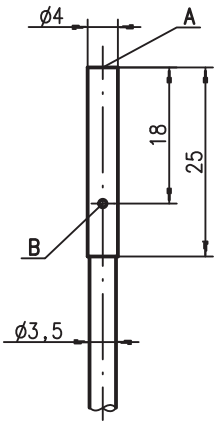


Cable



OVERVIEW

Dimensioned drawing



A Active surface
B Yellow indicator diode

Further details can be found in the respective data sheet.

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IS 204 SERIES

Installation	Typ. scan range limit S_n	Page
Embedded	0 1.5 mm	360

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple σ	≤ 20 % of U_B
	Output current I_L	≤ 200 mA
	Residual current I_r	≤ 100 µA
	Voltage drop U_d	≤ 2.0 V
	Hysteresis H of S_r	≤ 10 %
	Temperature drift of s_r	≤ 10 % (entire temp. range)
	Repeatability	≤ 2 %
Indicators	Yellow LED	Switching state
Mechanical data	Standard target (Fe360)	4.5 x 4.5 mm²
	Weight	Approx. 32 g
Environmental data	Ambient temperature	-25 °C … +70 °C
	Protective circuit	Polarity reversal protection, short circuit prot., inductive prot.
	Standards applied	IEC 60947-5-2
	Electromagnetic compatibility	IEC 60255-5 1 kV IEC 61000-4-2 Level 2 IEC 61000-4-3 Level 3 IEC 61000-4-4 Level 3

Mounting systems for this series can be found from **page 549** onwards

Features

- **Slim and short cylindrical metal housing Ø 4 mm**
- **Stainless steel housing**
- **Built-in short circuit protection, inductive protection, polarity reversal protection**
- **LED for switching state**

CE

Inductive Switch

- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching	
Inductive switches Ø 4, embedded installation						
IS 204 MP/4NO - 1E5 50113478	0 1.2 0 1.5	3000 Hz	Embedded	1 x PNP	NO (normally open)	

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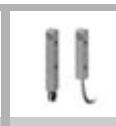
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IS 204 SERIES

Inductive switches

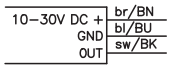
	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2 m, PVC	Stainless steel / PA66	IP 67		

Inductive Switch

- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

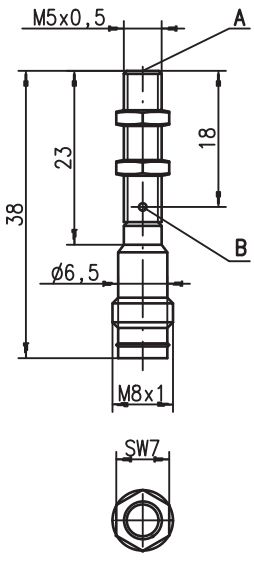
Cable



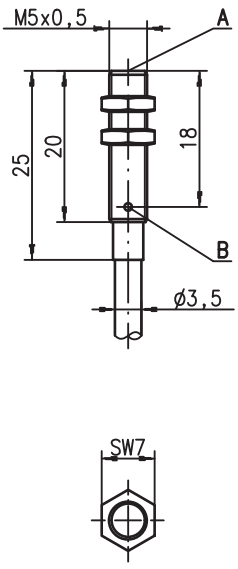
OVERVIEW

Dimensioned drawing

IS 205...-1E5-S8.3



IS 205...-1E5



A Active surface
B Yellow indicator diode

Further details can be found in the respective data sheet.

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IS 205 SERIES

Installation	Typ. scan range limit S_n	Page
Embedded	0 1.5 mm	364

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple σ	≤ 20 % of U_B
	Output current I_L	≤ 200 mA
	Residual current I_r	≤ 100 µA
	Voltage drop U_d	≤ 2.0 V
	Hysteresis H of S_r	≤ 10 %
	Temperature drift of s_r	≤ 10 % (entire temp. range)
	Repeatability	≤ 2 %
Indicators	Yellow LED	Switching state
Mechanical data	Standard target (Fe360)	5 x 5 mm²
	Weight (connector/cable)	Approx. 5 g/approx. 35 g
Environmental data	Ambient temperature	-25 °C … +70 °C
	Protective circuit	Polarity reversal protection, short circuit prot., inductive prot.
	Standards applied	IEC 60947-5-2, UL 508
	Electromagnetic compatibility	IEC 60255-5 1 kV IEC 61000-4-2 Level 2 IEC 61000-4-3 Level 3 IEC 61000-4-4 Level 3

Mounting systems for this series can be found from **page 549** onwards

Features

- **Slim and short cylindrical metal housing M5**
- **Stainless steel housing**
- **Built-in short circuit protection, inductive protection, polarity reversal protection**
- **LED for switching state**

Inductive Switch

- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M5, embedded installation					
IS 205 MM/4NO - 1E5 50113213	0 1.2 0 1.5	3000 Hz	Embedded	1 x PNP	NO (normally open)
IS 205 MM/4NO - 1E5 - S8.3 50113212	0 1.2 0 1.5	3000 Hz	Embedded	1 x PNP	NO (normally open)

Accessories / connection cables More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50106692	K - D M8W - 3P - 5m - PUR	Connection cable 5000 mm, M8 angular, 3-pin, PUR
d	50106691	K - D M8A - 3P - 5m - PUR	Connection cable 5000 mm, M8 axial, 3-pin, PUR
e	50104582	D M8A - 3P - SK	Cable socket, M8 axial, 3-pin, user-configurable

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IS 205 SERIES

Inductive switches

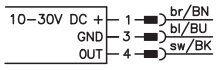
	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2 m, PVC	Stainless steel / PA66	IP 67		
	M8 connector	Stainless steel / PA66	IP 67	a, b, c, d, e	

Inductive Switch

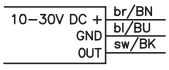
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

M8 connector



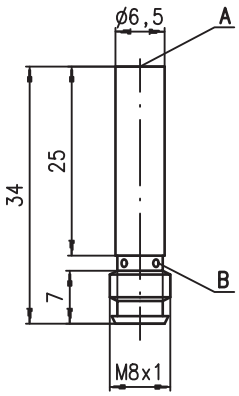
Cable



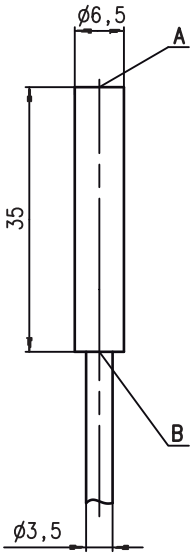
OVERVIEW

Dimensioned drawing

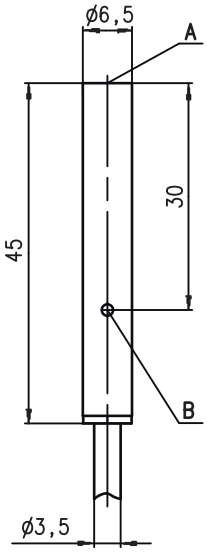
ISS 206…-S8.3



IS 206…-2E0



IS 206…-3E0



Further details can be found in the respective data sheet.

A Active surface
B Yellow indicator diode

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IS 206 SERIES

Installation	Typ. scan range limit S_n	Page
Embedded	0 3 mm	368

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple σ	≤ 20 % of U_B
	Output current I_L	≤ 200 mA
	Residual current I_r	≤ 100 µA
	Voltage drop U_d	≤ 2.0 V
	Hysteresis H of S_r	≤ 10 %
	Temperature drift of s_r	≤ 10 % (entire temp. range)
	Repeatability	≤ 2 %/5 %
Indicators	Yellow LED (360° visible)	Switching state
Mechanical data	Standard target (Fe360)	6.5 x 6.5 (9 x 9) mm²
	Weight (connector/cable)	Approx. 4 g/61 g
Environmental data	Ambient temperature	-25 °C … +70 °C
	Protective circuit	Polarity reversal protection, short circuit prot., inductive prot.
	Standards applied	IEC 60947-5-2, UL 508
	Electromagnetic compatibility	IEC 60255-5 1 kV IEC 61000-4-2 Level 3 IEC 61000-4-3 Level 3 IEC 61000-4-4 Level 3

Mounting systems for this series can be found from **page 549** onwards

Features

- **Slim and short cylindrical metal housing Ø 6.5 mm**
- **Chromium-plated brass or stainless steel housing**
- **Built-in short circuit protection, inductive protection, polarity reversal protection**
- **LED for switching state visible from 360°**

Inductive Switch

- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches Ø 6.5, embedded installation					
IS 206 MP/4NO - 2E0 50111437	0 1.6 0 2	5000 Hz	Embedded	1 x PNP	NO (normally open)
ISS 206 MP/4NO - 2E0 - S8.3 [1] 50111438	0 1.6 0 2	5000 Hz	Embedded	1 x PNP	NO (normally open)
IS 206 MP/4NO - 3E0 50109686	0 2.4 0 3	1000 Hz	Embedded	1 x PNP	NO (normally open)

1) short construction

Accessories / connection cables

More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50106692	K - D M8W - 3P - 5m - PUR	Connection cable 5000 mm, M8 angular, 3-pin, PUR
d	50106691	K - D M8A - 3P - 5m - PUR	Connection cable 5000 mm, M8 axial, 3-pin, PUR
e	50104582	D M8A - 3P - SK	Cable socket, M8 axial, 3-pin, user-configurable

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IS 206 SERIES

Inductive switches

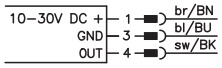
	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2m, PVC	Stainless steel / PA12	IP 67		
	M8 connector	Stainless steel / PA12	IP 67	a, b, c, d, e	
	Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67		

Inductive Switch

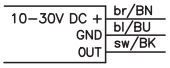
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

M8 connector

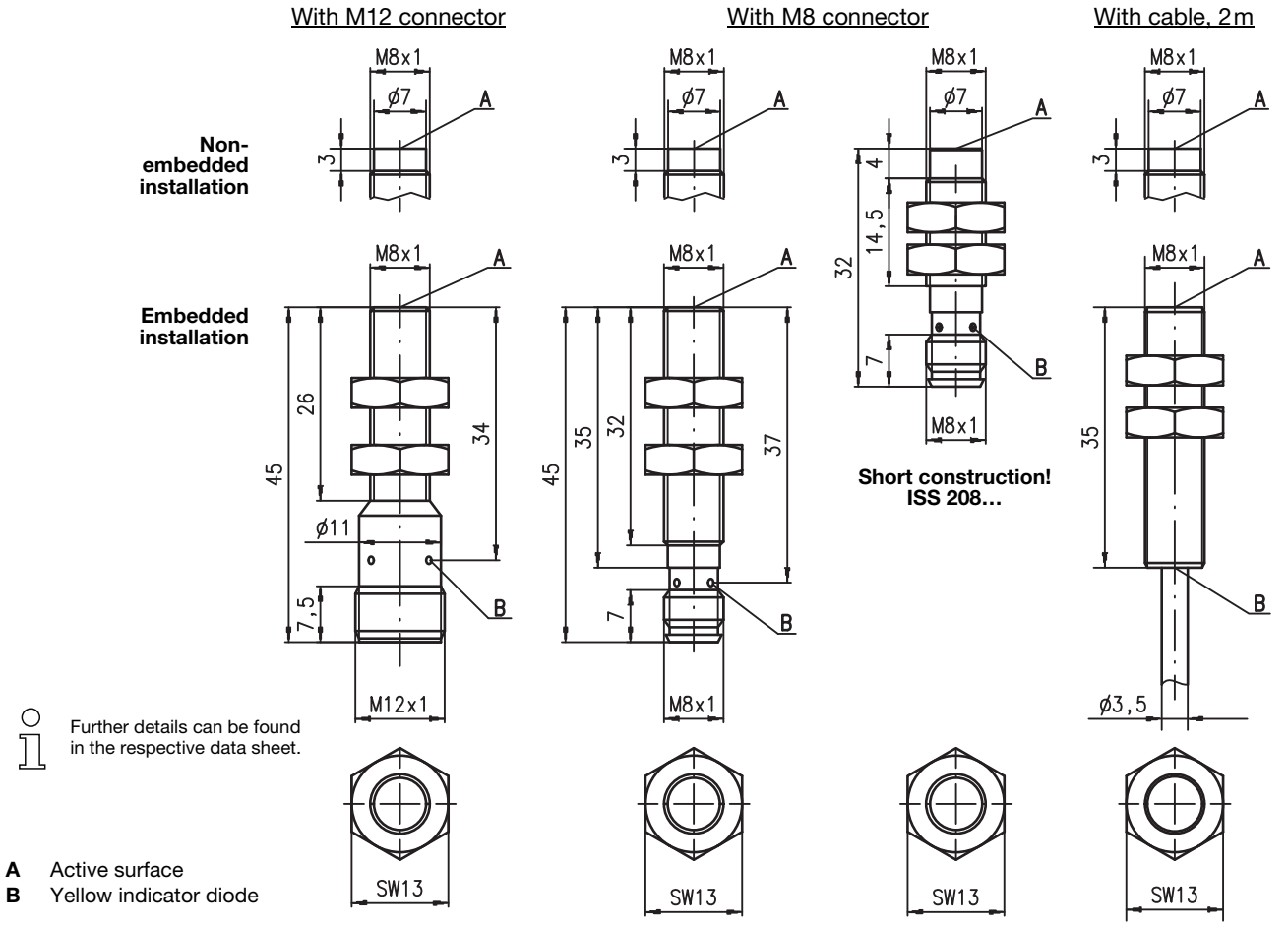


Cable



OVERVIEW

Dimensioned drawing



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IS 208 SERIES

Installation	Typ. scan range limit S_n	Page
Embedded	0 2 mm	372
Non-embedded	0 4 mm	376

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple σ	≤ 20 % of U_B
	Output current I_L	≤ 200 mA
	Residual current I_r	≤ 100 µA
	Voltage drop U_d	≤ 2.0 V
	Hysteresis H of S_r	5 … 20 %
	Temperature drift of s_r	≤ 10 % (entire temp. range)
	Repeatability	≤ 5 %
Indicators	Yellow LED (360° visible)	Switching state
Mechanical data	Standard target (Fe360)	8 x 8 (12 x 12) mm²
	Weight (connector/cable)	Approx. 12 g/70 g
Environmental data	Ambient temperature	-25 °C … +70 °C
	Protective circuit	Polarity reversal protection, short circuit prot., inductive prot.
	Standards applied	IEC 60947-5-2, UL 508
	Electromagnetic compatibility	IEC 60255-5 1 kV IEC 61000-4-2 Level 3 IEC 61000-4-3 Level 3 IEC 61000-4-4 Level 3

Mounting systems for this series can be found from **page 549** onwards

Features

- **Slim and short cylindrical metal housing M8 x 1**
- **Stainless steel housing**
- **Built-in short circuit protection, inductive protection, polarity reversal protection**
- **LED for switching state visible from 360°**

Inductive Switch

- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M8, embedded installation					
IS 208 MM/4NO - 1E5 50109639	0 1.2 0 1.5	5000 Hz	Embedded	1 x PNP	NO (normally open)
IS 208 MM/4NO - 1E5 - S8.3 50109640	0 1.2 0 1.5	5000 Hz	Embedded	1 x PNP	NO (normally open)
IS 208 MM/4NO - 1E5 - S12 50109641	0 1.2 0 1.5	5000 Hz	Embedded	1 x PNP	NO (normally open)
IS 208 MM/4NC - 1E5 50112444	0 1.2 0 1.5	5000 Hz	Embedded	1 x PNP	NC (normally closed)
IS 208 MM/2NO - 1E5 50109642	0 1.2 0 1.5	5000 Hz	Embedded	1 x NPN	NO (normally open)
IS 208 MM/2NC - 1E5 50113207	0 1.2 0 1.5	5000 Hz	Embedded	1 x NPN	NC (normally closed)

Accessories / connection cables

More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000 mm, M12 angular, 3-pin, PVC
d	50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000 mm, M12 axial, 3-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
g	50104582	D M8A - 3P - SK	Cable socket, M8 axial, 3-pin, user-configurable

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IS 208 SERIES

Inductive switches

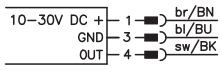
	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2m, PVC	Stainless steel / PA12	IP 67		
	M8 connector	Stainless steel / PA12	IP 67	a, b, g	
	M12 connector	Stainless steel / PA12	IP 67	c, d, e, f	
	Cable, 2m, PVC	Stainless steel / PA12	IP 67		
	Cable, 2m, PVC	Stainless steel / PA12	IP 67		
	Cable, 2m, PVC	Stainless steel / PA12	IP 67		

Inductive Switch

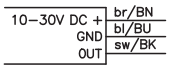
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

M8 connector

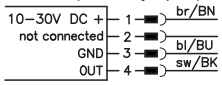


Cable

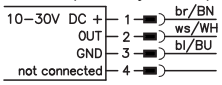


M12 connector

…NO… (normally open)



…NC… (normally closed)



…NO…-S12 (normally open):
3-pin **or** 4-pin M12 connection cables can be used.

…NC…-S12 (normally closed):
only 4-pin M12 connection cables can be used.

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M8, embedded installation					
IS 208 MM/4NO - 2E0 50109652	0 1.6 0 2	5000 Hz	Embedded	1 x PNP	NO (normally open)
IS 208 MM/4NO - 2E0 - S8.3 50109653	0 1.6 0 2	5000 Hz	Embedded	1 x PNP	NO (normally open)
IS 208 MM/4NO - 2E0, 200 - S8.3 50114051	0 1.6 0 2	5000 Hz	Embedded	1 x PNP	NO (normally open)
IS 208 MM/4NC - 2E0 50113211	0 1.6 0 2	5000 Hz	Embedded	1 x PNP	NC (normally closed)
IS 208 MM/4NC - 2E0 - S8.3 50109654	0 1.6 0 2	5000 Hz	Embedded	1 x PNP	NC (normally closed)
IS 208 MM/2NO - 2E0 50109655	0 1.6 0 2	5000 Hz	Embedded	1 x NPN	NO (normally open)
IS 208 MM/2NO - 2E0 - S8.3 50109656	0 1.6 0 2	5000 Hz	Embedded	1 x NPN	NO (normally open)

Accessories / connection cables

More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104521	K - D M8W - 3P - 2m - PVC	Connection cable 2000 mm, M8 angular, 3-pin, PVC
b	50104520	K - D M8A - 3P - 2m - PVC	Connection cable 2000 mm, M8 axial, 3-pin, PVC
c	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
d	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
e	50104582	D M8A - 3P - SK	Cable socket, M8 axial, 3-pin, user-configurable

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IS 208 SERIES

Inductive switches

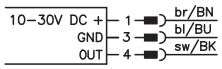
	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2m, PVC	Stainless steel / PA12	IP 67		
	M8 connector	Stainless steel / PA12	IP 67	a, b, c, d, e	
	Cable, 0.2m, with M8 connector	Stainless steel / PA12	IP 67	a, b, c, d, e	
	Cable, 2m, PVC	Stainless steel / PA12	IP 67		
	M8 connector	Stainless steel / PA12	IP 67	a, b, c, d, e	
	Cable, 2m, PVC	Stainless steel / PA12	IP 67		
	M8 connector	Stainless steel / PA12	IP 67	a, b, c, d, e	

Inductive Switch

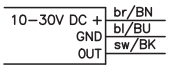
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

M8 connector



Cable



INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M8, non-embedded installation					
IS 208 MM/4NO - 2N5 50109645	0 2 0 2.5	5000 Hz	Non-embedded	1 x PNP	NO (normally open)
IS 208 MM/4NO - 2N5 - S8.3 50109646	0 2 0 2.5	5000 Hz	Non-embedded	1 x PNP	NO (normally open)
ISS 208 MM/4NO - 2N5 - S8.3 [1] 50114490	0 2 0 2.5	5000 Hz	Non-embedded	1 x PNP	NO (normally open)
IS 208 MM/4NO - 2N5 - S12 50109647	0 2 0 2.5	5000 Hz	Non-embedded	1 x PNP	NO (normally open)
IS 208 MM/2NO - 2N5 50109649	0 2 0 2.5	5000 Hz	Non-embedded	1 x NPN	NO (normally open)

1) Short construction

Accessories / connection cables

More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000 mm, M12 angular, 3-pin, PVC
d	50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000 mm, M12 axial, 3-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
g	50104582	D M8A - 3P - SK	Cable socket, M8 axial, 3-pin, user-configurable

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IS 208 SERIES

Inductive switches

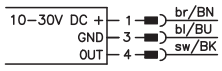
	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2m, PVC	Stainless steel / PBTP	IP 67		
	M8 connector	Stainless steel / PBTP	IP 67	a, b, g	
	M8 connector	Stainless steel / PBTP	IP 67	a, b, g	
	M12 connector	Stainless steel / PBTP	IP 67	c, d, e, f	
	Cable, 2m, PVC	Stainless steel / PBTP	IP 67		

Inductive Switch

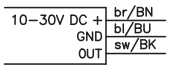
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

M8 connector

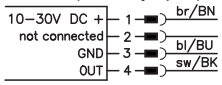


Cable

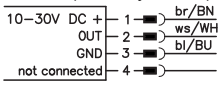


M12 connector

…NO… (normally open)



…NC… (normally closed)



…NO…-S12 (normally open):
3-pin **or** 4-pin M12 connection cables can be used.

…NC…-S12 (normally closed):
only 4-pin M12 connection cables can be used.

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M8, non-embedded installation					
IS 208 MM/4NO - 4NO 50109658	0 3.2 0 4	3500 Hz	Non-embedded	1 x PNP	NO (normally open)
IS 208 MM/4NO - 4NO - S8.3 50109659	0 3.2 0 4	3500 Hz	Non-embedded	1 x PNP	NO (normally open)
IS 208 MM/4NC - 4NO - S8.3 50109660	0 3.2 0 4	3500 Hz	Non-embedded	1 x PNP	NC (normally closed)
IS 208 MM/2NO - 4NO 50109661	0 3.2 0 4	3500 Hz	Non-embedded	1 x NPN	NO (normally open)
IS 208 MM/2NO - 4NO - S8.3 50109662	0 3.2 0 4	3500 Hz	Non-embedded	1 x NPN	NO (normally open)

Accessories / connection cables

More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000 mm, M12 angular, 3-pin, PVC
d	50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000 mm, M12 axial, 3-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
g	50104582	D M8A - 3P - SK	Cable socket, M8 axial, 3-pin, user-configurable

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IS 208 SERIES

Inductive switches

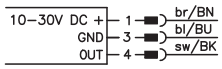
	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2 m, PVC	Stainless steel / PBTP	IP 67		
	M8 connector	Stainless steel / PBTP	IP 67	a, b, g	
	M8 connector	Stainless steel / PBTP	IP 67	a, b, g	
	Cable, 2 m, PVC	Stainless steel / PBTP	IP 67		
	M8 connector	Stainless steel / PBTP	IP 67	a, b, g	

Inductive Switch

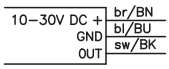
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

M8 connector

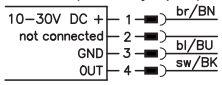


Cable

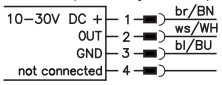


M12 connector

…NO… (normally open)



…NC… (normally closed)

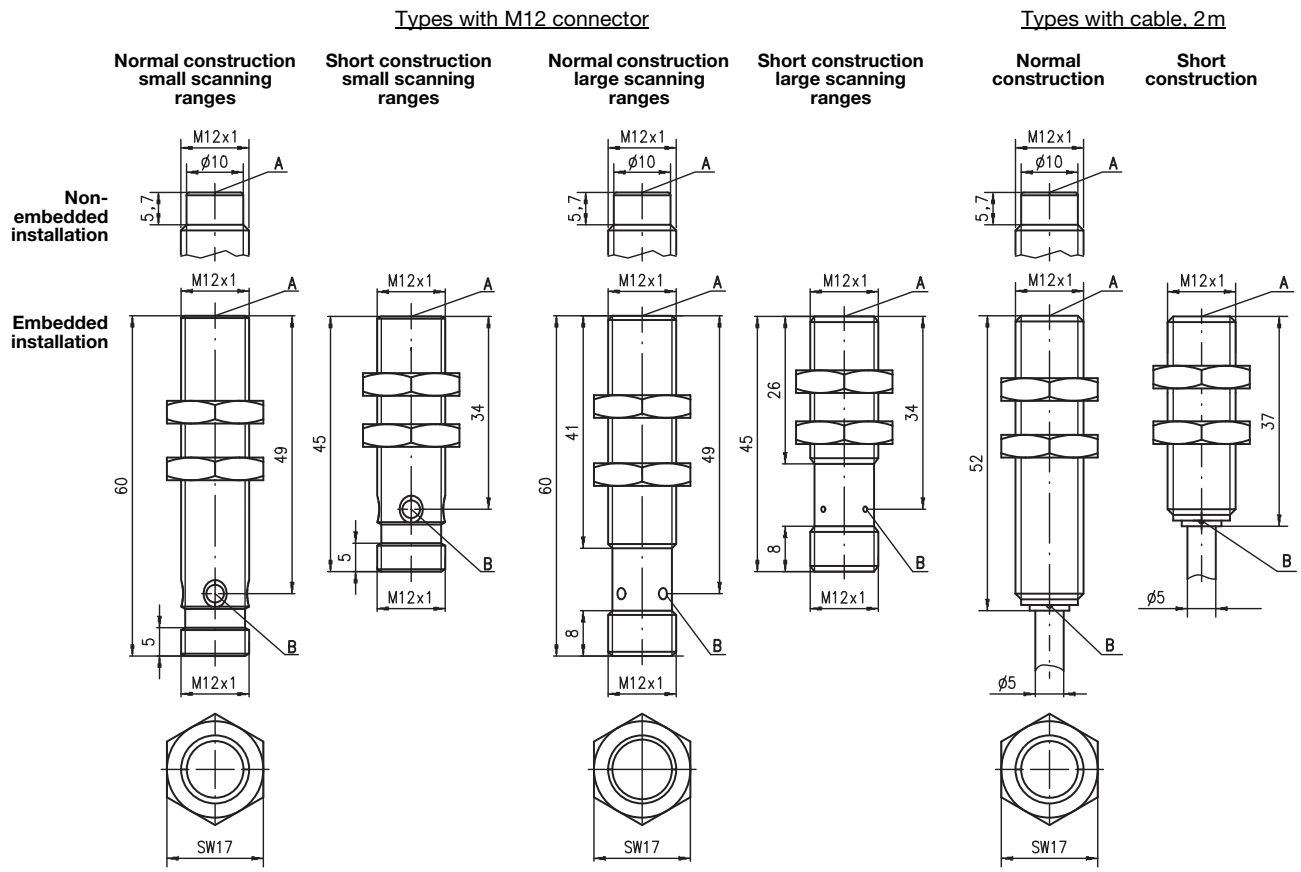


…NO…-S12 (normally open):
3-pin **or** 4-pin M12 connection cables can be used.

…NC…-S12 (normally closed):
only 4-pin M12 connection cables can be used.

OVERVIEW

Dimensioned drawing



A Active surface
B Yellow indicator diode

Further details can be found in the respective data sheet.

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IS 212 SERIES

Installation	Typ. scan range limit S_n	Page
Embedded	0 … 6 mm	382
Non-embedded	0 … 10 mm	388

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple σ	≤ 20 % of U_B
	Output current I_L	≤ 200 mA
	Residual current I_r	≤ 100 µA
	Voltage drop U_d	≤ 2.0 V
	Hysteresis H of S_r	0 … 15 %
	Temperature drift of s_r	≤ 10 % (entire temp. range)
	Repeatability	≤ 5 %
Indicators	Yellow LED (360° visible)	Switching state
Mechanical data	Standard target (Fe360)	12 x 12 (30 x 30) mm²
	Weight (connector/cable)	Approx. 30 g/95 g
Environmental data	Ambient temperature	-25 °C … +70 °C (+85 °C)
	Protective circuit	Polarity reversal protection, short circuit prot., inductive prot.
	Standards applied	IEC 60947-5-2, UL 508
	Electromagnetic compatibility	IEC 60255-5 1 kV IEC 61000-4-2 Level 3 IEC 61000-4-3 Level 3 IEC 61000-4-4 Level 3

Mounting systems for this series can be found from **page 549** onwards

Features

- **Slim and short cylindrical metal housing M12 x 1**
- **Chromium-plated brass housing**
- **Food+Beverage version in stainless steel AISI 316L (DIN 1.4404) up to +85 °C**
- **Extra short construction available**
- **Built-in short circuit protection, inductive protection, polarity reversal protection**
- **LED for switching state visible from 360°**

Inductive Switch

- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M12, embedded installation					
IS 212 MM/4NO - 2E0 50109664	0 1.6 0 2	3000 Hz	Embedded	1 x PNP	NO (normally open)
IS 212 MM/4NO - 2E0 - S12 50109665	0 1.6 0 2	3000 Hz	Embedded	1 x PNP	NO (normally open)
IS 212 MM/4NC - 2E0 - S12 50111870	0 1.6 0 2	3000 Hz	Embedded	1 x PNP	NC (normally closed)
IS 212 MM/2NO - 2E0 50109666	0 1.6 0 2	3000 Hz	Embedded	1 x NPN	NO (normally open)
IS 212 MM/4NO - 4E0 50109672	0 3.2 0 4	2000 Hz	Embedded	1 x PNP	NO (normally open)
IS 212 MM/4NO - 4E0 - S12 50109673	0 3.2 0 4	2000 Hz	Embedded	1 x PNP	NO (normally open)
ISS 212 MM/4NO - 4E0 [1] 50109684	0 3.2 0 4	2000 Hz	Embedded	1 x PNP	NO (normally open)
ISS 212 MM/4NO - 4E0 - S12 [1] 50109685	0 3.2 0 4	2000 Hz	Embedded	1 x PNP	NO (normally open)
IS 212 MM/4NC - 4E0 - S12 50109674	0 3.2 0 4	2000 Hz	Embedded	1 x PNP	NC (normally closed)
ISS 212 MM/4NC - 4E0 - S12 [1] 50109676	0 3.2 0 4	2000 Hz	Embedded	1 x PNP	NC (normally closed)

Accessories / connection cables

More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000 mm, M12 angular, 3-pin, PVC
b	50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000 mm, M12 axial, 3-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50031324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable
f	50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable

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IS 212 SERIES

Inductive switches

	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f	
	M12 connector	Brass, chromium-plated / PBTP	IP 67	c, d, e, f	
	Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67		
	Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f	
	Cable, 2m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f	
	M12 connector	Brass, chromium-plated / PBTP	IP 67	c, d, e, f	
	M12 connector	Brass, chromium-plated / PBTP	IP 67	c, d, e, f	

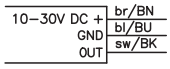
1) Short construction

Inductive Switch

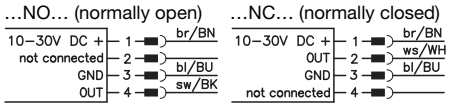
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

Cable



M12 connector



...NO...-S12 (normally open):
3-pin **or** 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):
only 4-pin M12 connection cables can be used.

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M12, embedded installation					
IS 212 MM/2NO - 4E0 50109675	0 3.2 0 4	2000 Hz	Embedded	1 x NPN	NO (normally open)
ISS 212 MM/2NO - 4E0 - S12 [1] 50109687	0 3.2 0 4	2000 Hz	Embedded	1 x NPN	NO (normally open)
IS 212 MM/2NC - 4E0 50114380	0 3.2 0 4	2000 Hz	Embedded	1 x NPN	NC (normally closed)
IS 212 MM/4NO - 6E0 50109678	0 4.8 0 6	800 Hz	Embedded	1 x PNP	NO (normally open)
ISS 212 MM/4NO - 6E0 - S12 [1] 50109679	0 4.8 0 6	800 Hz	Embedded	1 x PNP	NO (normally open)
IS 212 MM/2NO - 6E0 50109682	0 4.8 0 6	800 Hz	Embedded	1 x NPN	NO (normally open)
ISS 212 MM/2NO - 6E0 - S12 [1] 50109688	0 4.8 0 6	800 Hz	Embedded	1 x NPN	NO (normally open)
IS 212 FM/4NO.5F - 6E0 - S12 [2] 50109736	0 4.8 0 6	600 Hz	Embedded	1 x PNP	NO (normally open)

Accessories / connection cables

More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000 mm, M12 angular, 3-pin, PVC
b	50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000 mm, M12 axial, 3-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104573	K - D M12W - 4P - 5m - FAB	Connection cable 5000 mm, M12 angular, 4-pin, Food+Bev.
f	50104572	K - D M12A - 4P - 5m - FAB	Connection cable 5000 mm, M12 axial, 4-pin, Food+Bev.
g	50031324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable
h	50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable

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IS 212 SERIES

Inductive switches

	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, g, h	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, g, h	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, g, h	
	M12 connector	Stainless steel AISI 316L (DIN 1.4404) / stainless steel AISI 316L (DIN 1.4404)	IP 67, IP 69K	e, f	

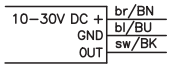
1) Short construction
2) Food + Beverage version for the food and beverage industries

Inductive Switch

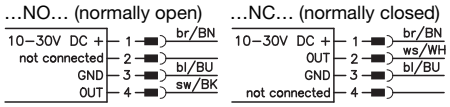
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

Cable



M12 connector



...NO...-S12 (normally open):
3-pin **or** 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):
only 4-pin M12 connection cables can be used.

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M12, non-embedded installation					
IS 212 MM/4NO - 4NO 50109668	0 3.2 0 4	2000 Hz	Non-embedded	1 x PNP	NO (normally open)
IS 212 MM/4NO - 4NO - S12 50109669	0 3.2 0 4	2000 Hz	Non-embedded	1 x PNP	NO (normally open)
ISS 212 MM/4NO - 4NO - S12 [1)] 50111963	0 3.2 0 4	2000 Hz	Non-embedded	1 x PNP	NO (normally open)
IS 212 MM/4NC - 4NO - S12 50112914	0 3.2 0 4	2000 Hz	Non-embedded	1 x PNP	NC (normally closed)
IS 212 MM/2NO - 4NO 50109670	0 3.2 0 4	2000 Hz	Non-embedded	1 x NPN	NO (normally open)
ISS 212 MM/2NO - 4NO [1)] 50112209	0 3.2 0 4	2000 Hz	Non-embedded	1 x NPN	NO (normally open)
IS 212 MM/4NO - 8NO 50112807	0 6.4 0 8	1500 Hz	Non-embedded	1 x PNP	NO (normally open)
IS 212 MM/4NO - 8NO - S12 50112808	0 6.4 0 8	1500 Hz	Non-embedded	1 x PNP	NO (normally open)
IS 212 MM/2NO - 8NO 50112806	0 6.4 0 8	1500 Hz	Non-embedded	1 x NPN	NO (normally open)

Accessories / connection cables

More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000 mm, M12 angular, 3-pin, PVC
b	50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000 mm, M12 axial, 3-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50031324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable
f	50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable

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	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f	
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f	
	M12 connector	Brass, chromium-plated / PBTP	IP 67	c, d, e, f	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		

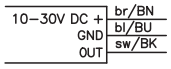
1) Short construction

Inductive Switch

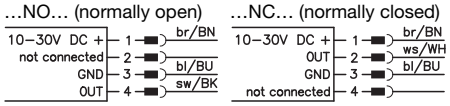
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

Cable



M12 connector



...NO...-S12 (normally open):
3-pin **or** 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):
only 4-pin M12 connection cables can be used.

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M12, non-embedded installation					
IS 212 MM/4NO - 10N 50109689	0 8.1 0 10	400 Hz	Non-embedded	1 x PNP	NO (normally open)
ISS 212 MM/4NO - 10N - S12 [1] 50109680	0 8.1 0 10	400 Hz	Non-embedded	1 x PNP	NO (normally open)
IS 212 MM/4NC - 10N - S12 50114052	0 8.1 0 10	400 Hz	Non-embedded	1 x PNP	NC (normally closed)
IS 212 MM/2NO - 10N 50111952	0 8.1 0 10	400 Hz	Non-embedded	1 x NPN	NO (normally open)
IS 212 FM/4NO.5F - 10N - S12 [2] 50109738	0 8.1 0 10	400 Hz	Non-embedded	1 x PNP	NO (normally open)

Accessories / connection cables

More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000 mm, M12 angular, 3-pin, PVC
b	50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000 mm, M12 axial, 3-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104573	K - D M12W - 4P - 5m - FAB	Connection cable 5000 mm, M12 angular, 4-pin, Food+Bev.
f	50104572	K - D M12A - 4P - 5m - FAB	Connection cable 5000 mm, M12 axial, 4-pin, Food+Bev.
g	50031324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable
h	50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable

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IS 212 SERIES

Inductive switches

	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, g, h	
	M12 connector	Brass, chromium-plated / PBTP	IP 67	c, d, g, h	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Stainless steel AISI 316L (DIN 1.4404) / stainless steel AISI 316L (DIN 1.4404)	IP 67, IP 69K	e, f	

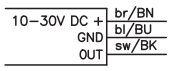
1) Short construction
2) Food + Beverage version for the food and beverage industries

Inductive Switch

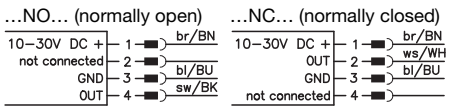
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

Cable



M12 connector

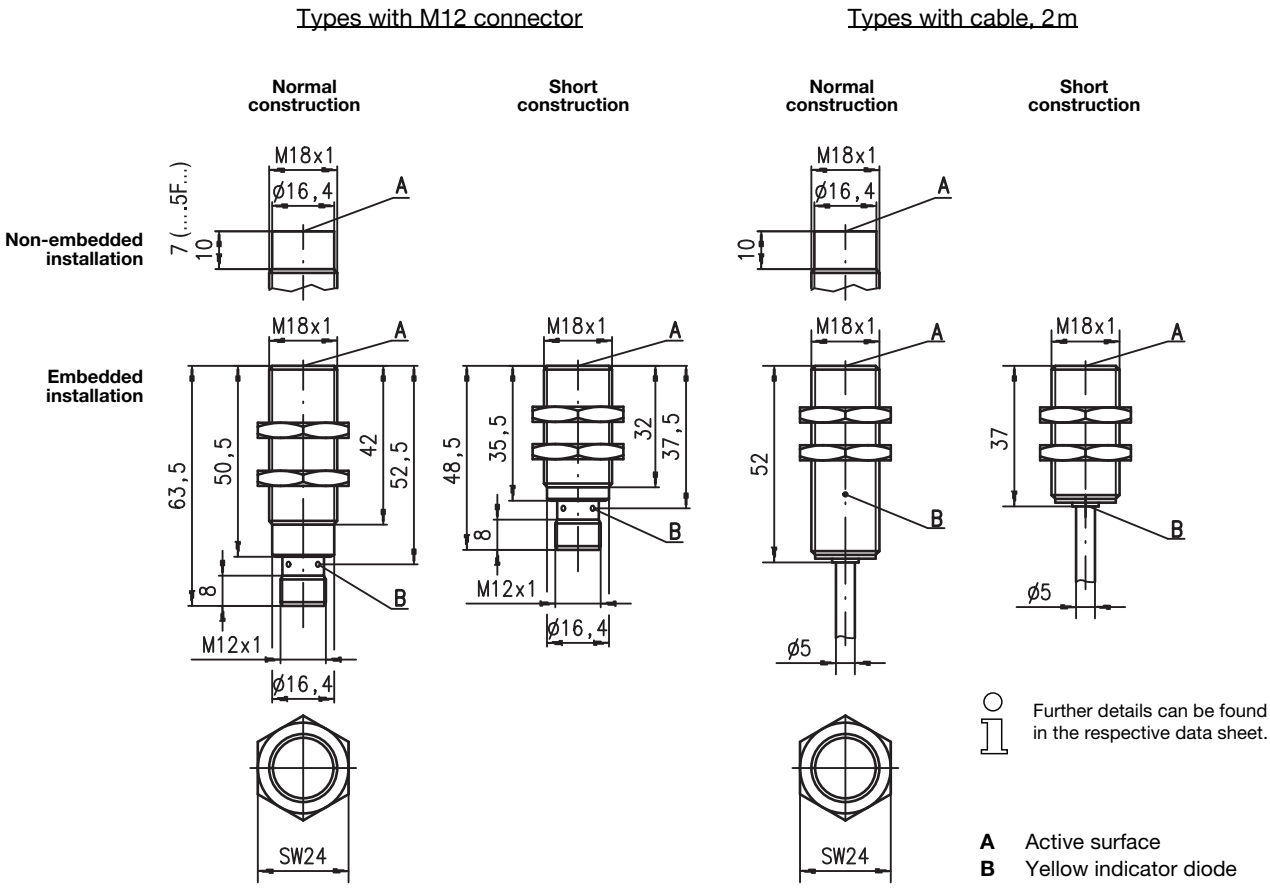


...NO...-S12 (normally open):
3-pin **or** 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):
only 4-pin M12 connection cables can be used.

OVERVIEW

Dimensioned drawing



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IS 218 SERIES

Installation	Typ. scan range limit S_n	Page
Embedded	0 … 12 mm	392
Non-embedded	0 … 20 mm	398

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple σ	≤ 20 % of U_B
	Output current I_L	≤ 200 mA
	Residual current I_r	≤ 100 µA
	Voltage drop U_d	≤ 2.0 V
	Hysteresis H of S_r	0 … 15 %
	Temperature drift of s_r	≤ 10 % (entire temp. range)
	Repeatability	≤ 5 %
Indicators	Yellow LED (360° visible)	Switching state
Mechanical data	Standard target (Fe360)	18 x 18 (60 x 60) mm²
	Weight (connector/cable)	Approx. 50 g/165 g
Environmental data	Ambient temperature	-25 °C … +70 °C (+85 °C)
	Protective circuit	Polarity reversal protection, short circuit prot., inductive prot.
	Standards applied	IEC 60947-5-2, UL 508
	Electromagnetic compatibility	IEC 60255-5 1 kV IEC 61000-4-2 Level 3 IEC 61000-4-3 Level 3 IEC 61000-4-4 Level 3

Mounting systems for this series can be found from **page 549** onwards

Features

- **Slim and short cylindrical metal housing M18 x 1**
- **Chromium-plated brass housing**
- **Food+Beverage version in stainless steel AISI 316L (DIN 1.4404) up to +85 °C**
- **Extra short construction available**
- **Built-in short circuit protection, inductive protection, polarity reversal protection**
- **LED for switching state visible from 360°**

Inductive Switch

- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M18, embedded installation					
IS 218 MM/4NO - 5E0 50109692	0 4 0 5	2000 Hz	Embedded	1 x PNP	NO (normally open)
IS 218 MM/4NO - 5E0 - S12 50109693	0 4 0 5	2000 Hz	Embedded	1 x PNP	NO (normally open)
ISS 218 MM/4NO - 5E0 [1)] 50112915	0 4 0 5	2000 Hz	Embedded	1 x PNP	NO (normally open)
ISS 218 MM/4NO - 5E0 - S12 [1)] 50112293	0 4 0 5	2000 Hz	Embedded	1 x PNP	NO (normally open)
IS 218 MM/2NO - 5E0 50109694	0 4 0 5	2000 Hz	Embedded	1 x NPN	NO (normally open)

Accessories / connection cables

More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000 mm, M12 angular, 3-pin, PVC
b	50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000 mm, M12 axial, 3-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50031324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable
f	50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable

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IS 218 SERIES

Inductive switches

	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, c, d, e, f	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, c, d, e, f	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		

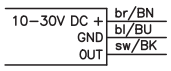
1) Short construction

Inductive Switch

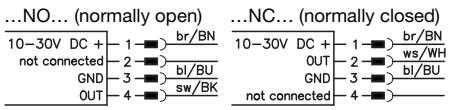
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

Cable



M12 connector



...NO...-S12 (normally open):
3-pin **or** 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):
only 4-pin M12 connection cables can be used.

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M18, embedded installation					
IS 218 MM/4NO - 8E0 50109700	0 6.5 0 8	1500 Hz	Embedded	1 x PNP	NO (normally open)
IS 218 MM/4NO - 8E0 - S12 50109701	0 6.5 0 8	1500 Hz	Embedded	1 x PNP	NO (normally open)
ISS 218 MM/4NO - 8E0 - S12 [1)] 50111743	0 6.5 0 8	1500 Hz	Embedded	1 x PNP	NO (normally open)
IS 218 MM/4NC - 8E0 - S12 50109702	0 6.5 0 8	1500 Hz	Embedded	1 x PNP	NC (normally closed)
IS 218 MM/2NO - 8E0 50112104	0 6.5 0 8	1500 Hz	Embedded	1 x NPN	NO (normally open)
IS 218 MM/2NO - 8E0 - S12 50109704	0 6.5 0 8	1500 Hz	Embedded	1 x NPN	NO (normally open)
ISS 218 MM/2NO - 8E0 - S12 [1)] 50109703	0 6.5 0 8	1500 Hz	Embedded	1 x NPN	NO (normally open)

Accessories / connection cables

More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000 mm, M12 angular, 3-pin, PVC
b	50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000 mm, M12 axial, 3-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50031324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable
f	50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable

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	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, c, d, e, f	
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, c, d, e, f	
	M12 connector	Brass, chromium-plated / PBTP	IP 67	c, d, e, f,	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, c, d, e, f	
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, c, d, e, f	

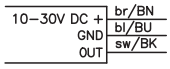
1) Short construction

Inductive Switch

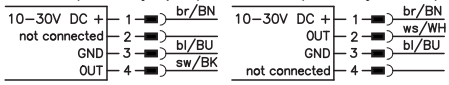
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

Cable



M12 connector



...NO...-S12 (normally open):
3-pin **or** 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):
only 4-pin M12 connection cables can be used.

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M18, embedded installation					
IS 218 MM/4NO - 12E 50109706	0 9.7 0 12	500 Hz	Embedded	1 x PNP	NO (normally open)
ISS 218 MM/4NO - 12E - S12 1) 50109707	0 9.7 0 12	500 Hz	Embedded	1 x PNP	NO (normally open)
IS 218 MM/2NO - 12E 50111954	0 9.7 0 12	500 Hz	Embedded	1 x NPN	NO (normally open)
ISS 218 MM/2NO - 12E - S12 1) 50109708	0 9.7 0 12	500 Hz	Embedded	1 x NPN	NO (normally open)
IS 218 FM/4NO.5F - 10E - S12 2) 50109732	0 8.1 0 10	300 Hz	Embedded	1 x PNP	NO (normally open)

Accessories / connection cables

More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000 mm, M12 angular, 3-pin, PVC
b	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
c	50104573	K - D M12W - 4P - 5m - FAB	Connection cable 5000 mm, M12 angular, 4-pin, Food+Bev.
d	50104572	K - D M12A - 4P - 5m - FAB	Connection cable 5000 mm, M12 axial, 4-pin, Food+Bev.
e	50031324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable
f	50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable

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IS 218 SERIES

Inductive switches

	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f	
	M12 connector	Stainless steel AISI 316L (DIN 1.4404) / stainless steel AISI 316L (DIN 1.4404)	IP 67, IP 69K	c, d	

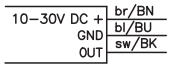
1) Short construction
2) Food + Beverage version for the food and beverage industries

Inductive Switch

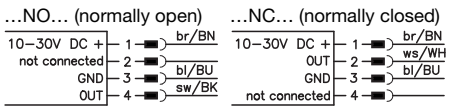
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

Cable



M12 connector



...NO...-S12 (normally open):
3-pin **or** 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):
only 4-pin M12 connection cables can be used.

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M18, non-embedded installation					
IS 218 MM/4NO - 8NO 50109696	0 6.5 0 8	2000 Hz	Non-embedded	1 x PNP	NO (normally open)
IS 218 MM/4NO - 8NO - S12 50109697	0 6.5 0 8	2000 Hz	Non-embedded	1 x PNP	NO (normally open)
IS 218 MM/2NO - 8NO 50109698	0 6.5 0 8	2000 Hz	Non-embedded	1 x NPN	NO (normally open)
IS 218 MM/4NO - 20N 50109709	0 16.2 0 20	200 Hz	Non-embedded	1 x PNP	NO (normally open)
ISS 218 MM/4NO - 20N - S12 1) 50109710	0 16.2 0 20	200 Hz	Non-embedded	1 x PNP	NO (normally open)
IS 218 MM/2NO - 20N 50111953	0 16.2 0 20	200 Hz	Non-embedded	1 x NPN	NO (normally open)
IS 218 FM/4NO.5F - 20N - S12 2) 50109734	0 16.2 0 20	200 Hz	Non-embedded	1 x PNP	NO (normally open)

1) Short construction
2) Food + Beverage version for the food and beverage industries

Accessories / connection cables

More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000 mm, M12 angular, 3-pin, PVC
b	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
c	50104573	K - D M12W - 4P - 5m - FAB	Connection cable 5000 mm, M12 angular, 4-pin, Food+Bev.
d	50104572	K - D M12A - 4P - 5m - FAB	Connection cable 5000 mm, M12 axial, 4-pin, Food+Bev.
e	50031324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable
f	50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable

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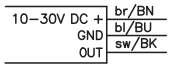
	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Stainless steel AISI 316L (DIN 1.4404) / stainless steel AISI 316L (DIN 1.4404)	IP 67, IP 69K	c, d	

Inductive Switch

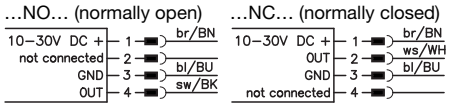
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

Cable



M12 connector

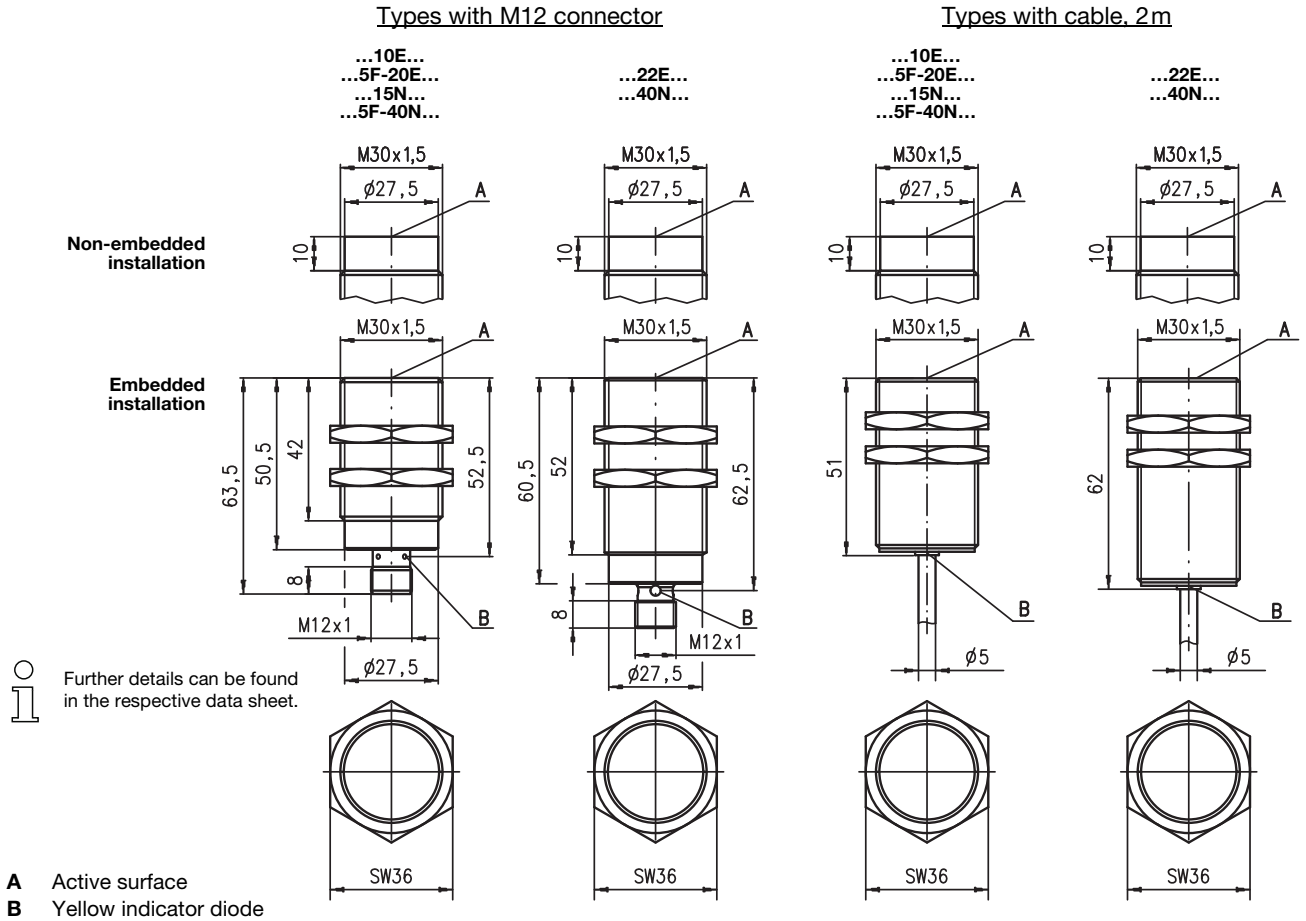


...NO...-S12 (normally open):
3-pin **or** 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):
only 4-pin M12 connection cables can be used.

OVERVIEW

Dimensioned drawing



Further details can be found in the respective data sheet.

A Active surface
B Yellow indicator diode

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IS 230 SERIES

Installation	Typ. scan range limit S_n	Page
Embedded	0 … 22 mm	402
Non-embedded	0 … 40 mm	404

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple σ	≤ 20 % of U_B
	Output current I_L	≤ 200 mA
	Residual current I_r	≤ 100 µA
	Voltage drop U_d	≤ 2.0 V
	Hysteresis H of S_r	0 … 15 %
	Temperature drift of s_r	≤ 10 % (entire temp. range)
	Repeatability	≤ 5 %
Indicators	Yellow LED (360° visible)	Switching state
Mechanical data	Standard target (Fe360)	30x30 (120x120) mm²
	Weight (connector/cable)	Approx. 155 g/210 g
Environmental data	Ambient temperature	-25 °C … +70 °C (+85 °C)
	Protective circuit	Polarity reversal protection, short circuit prot., inductive prot.
	Standards applied	IEC 60947-5-2, UL 508
	Electromagnetic compatibility	IEC 60255-5 1 kV IEC 61000-4-2 Level 3 IEC 61000-4-3 Level 3 IEC 61000-4-4 Level 3

Mounting systems for this series can be found from **page 549** onwards

Features

- **Slim and short cylindrical metal housing M30 x 1**
- **Chromium-plated brass housing**
- **Food+Beverage version in stainless steel AISI 316L (DIN 1.4404) up to +85 °C**
- **Built-in short circuit protection, inductive protection, polarity reversal protection**
- **LED for switching state visible from 360°**

Inductive Switch

- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M30, embedded installation					
IS 230 MM/4NO - 10E 50109712	0 8.1 0 10	1200 Hz	Embedded	1 x PNP	NO (normally open)
IS 230 MM/4NO - 10E - S12 50109713	0 8.1 0 10	1200 Hz	Embedded	1 x PNP	NO (normally open)
IS 230 MM/4NC - 10E - S12 50111871	0 8.1 0 10	1200 Hz	Embedded	1 x PNP	NC (normally closed)
IS 230 MM/2NO - 10E 50109714	0 8.1 0 10	1200 Hz	Embedded	1 x NPN	NO (normally open)
IS 230 MM/4NO - 22E 50109720	0 17.8 0 22	200 Hz	Embedded	1 x PNP	NO (normally open)
IS 230 MM/4NO - 22E - S12 50109721	0 17.8 0 22	200 Hz	Embedded	1 x PNP	NO (normally open)
IS 230 MM/4NC - 22E - S12 50109722	0 17.8 0 22	200 Hz	Embedded	1 x PNP	NC (normally closed)
IS 230 MM/2NO - 22E 50109723	0 17.8 0 22	200 Hz	Embedded	1 x NPN	NO (normally open)
IS 230 FM/4NO.5F - 20E - S12 [1] 50111435	0 16.2 0 20	100 Hz	Embedded	1 x PNP	NO (normally open)

1) Food + Beverage version for the food and beverage industries

Accessories / connection cables

More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000 mm, M12 angular, 3-pin, PVC
b	50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000 mm, M12 axial, 3-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000 mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000 mm, M12 axial, 4-pin, PVC
e	50104573	K - D M12W - 4P - 5m - FAB	Connection cable 5000 mm, M12 angular, 4-pin, Food+Bev.
f	50104572	K - D M12A - 4P - 5m - FAB	Connection cable 5000 mm, M12 axial, 4-pin, Food+Bev.

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IS 230 SERIES

Inductive switches

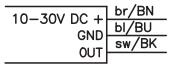
	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, c, d	
	M12 connector	Brass, chromium-plated / PBTP	IP 67	c, d	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, c, d	
	M12 connector	Brass, chromium-plated / PBTP	IP 67	c, d	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Stainless steel AISI 316L (DIN 1.4404) / stainless steel AISI 316L (DIN 1.4404)	IP 67, IP 69K	e, f	

Inductive Switch

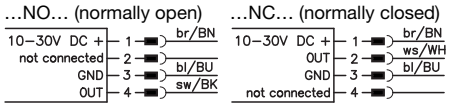
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

Cable



M12 connector



...NO...-S12 (normally open):
3-pin **or** 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):
only 4-pin M12 connection cables can be used.

INDUCTIVE SWITCHES

Part description Part No.:	Scanning range S_a [mm] Typ. scan range limit S_n [mm]	Switching frequency	Installation	Output	Switching
Inductive switches M30, non-embedded installation					
IS 230 MM/4NO - 15N 50109716	0 12.1 0 15	700 Hz	Non-embedded	1 x PNP	NO (normally open)
IS 230 MM/4NO - 15N - S12 50109717	0 12.1 0 15	700 Hz	Non-embedded	1 x PNP	NO (normally open)
IS 230 MM/2NO - 15N 50109718	0 12.1 0 15	700 Hz	Non-embedded	1 x NPN	NO (normally open)
IS 230 MM/4NO - 40N 50109726	0 32.4 0 40	100 Hz	Non-embedded	1 x PNP	NO (normally open)
IS 230 MM/4NO - 40N - S12 50109727	0 32.4 0 40	100 Hz	Non-embedded	1 x PNP	NO (normally open)
IS 230 MM/2NO - 40N 50109728	0 32.4 0 40	100 Hz	Non-embedded	1 x NPN	NO (normally open)
IS 230 FM/4NO.5F - 40N - S12 [1] 50111436	0 32.4 0 40	90 Hz	Non-embedded	1 x PNP	NO (normally open)

1) Food + Beverage version for the food and beverage industries

Accessories / connection cables

More accessories can be found from **page 549** onwards

	Part No.	Designation	Features
a	50104541	K - D M12W - 3P - 5m - PVC	Connection cable 5000 mm, M12 angular, 3-pin, PVC
b	50104540	K - D M12A - 3P - 5m - PVC	Connection cable 5000 mm, M12 axial, 3-pin, PVC
c	50104573	K - D M12W - 4P - 5m - FAB	Connection cable 5000 mm, M12 angular, 4-pin, Food+Bev.
d	50104572	K - D M12A - 4P - 5m - FAB	Connection cable 5000 mm, M12 axial, 4-pin, Food+Bev.
e	50031324	KD 095 - 4	Cable socket, M12 angular, 4-pin, user-configurable
f	50031323	KD 095 - 4A	Cable socket, M12 axial, 4-pin, user-configurable

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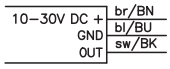
	Connection	Material housing / active surface	Protection class	Accessories	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Brass, chromium-plated / PBTP	IP 67	a, b, e, f	
	Cable, 2 m, PVC	Brass, chromium-plated / PBTP	IP 67		
	M12 connector	Stainless steel AISI 316L (DIN 1.4404) / stainless steel AISI 316L (DIN 1.4404)	IP 67, IP 69K	c, d	

Inductive Switch

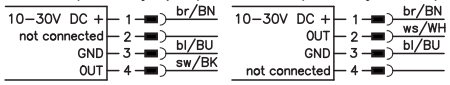
- Functionality P. 604
- Outputs / Switching functions P. 605
- Mounting / Installation P. 606
- Characteristic values P. 607

Electrical connection

Cable



M12 connector



...NO...-S12 (normally open):
3-pin **or** 4-pin M12 connection cables can be used.

...NC...-S12 (normally closed):
only 4-pin M12 connection cables can be used.

SELECTION GUIDE

Forked sensors for detecting small parts

Application	Products and mouth widths [mm]
Detection of small parts in a feed system	**GS 04** from **page 408** onwards Mouth widths: **20** / **30** / **50** / **80** / **120** / **220** **GSL 04** from **page 408** onwards Mouth widths: **30** / **50** / **80** **GS 21** from **page 408** onwards Mouth widths: **8**

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FORKED SENSORS

Forked sensors for detecting labels

Application

Detection of paper, transparent or metallized labels

Products and mouth widths [mm]

GS 61/(I)GS 63 from **page 414** onwards
Mouth widths: **3**

GK 14 from **page 426** onwards
Mouth widths: **0.9**

GSU 06 from **page 430** onwards
Mouth widths: **2.5**

GSU 14C from **page 430** onwards
Mouth widths: **4**

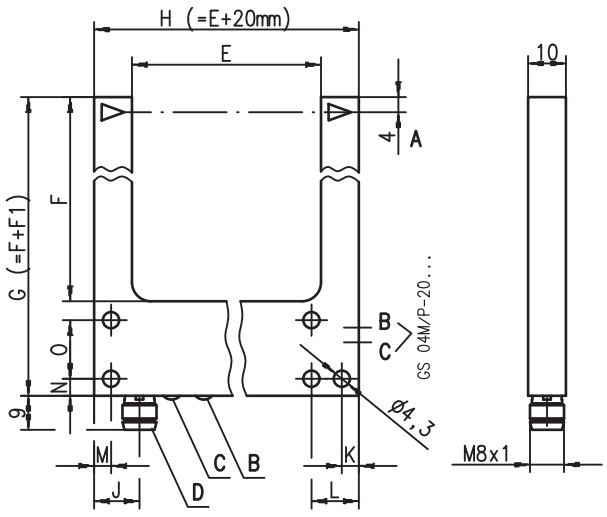
Using the sensors with different label materials

Sensors	Base material	Label material: PAPER	Label material: TRANSPARENT	Label material: METALLIZED
Optical forked sensors **GS 61, (I)GS 63**	PAPER	●		
	TRANSPARENT	●		
Capacitive forked sensors **GK 14**	PAPER	●	●	
	TRANSPARENT	●	●	
Ultrasonic forked sensors **GSU 06**, **GSU 14C**	PAPER	●	●	●
	TRANSPARENT	●	●	●

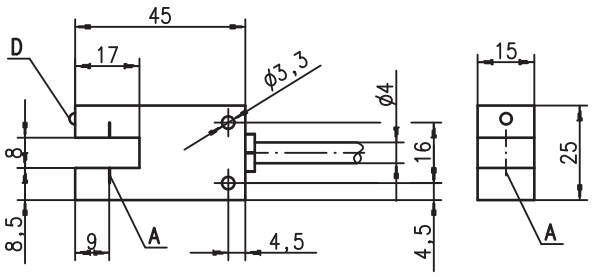
OVERVIEW OF OPTICAL FORKED SENSORS

Dimensioned drawing

GS(L) 04 ...



GS 21 ...



Further details can be found in the respective data sheet.

	E Mw	F Mt	F1	G	H	J	K	L	M	N	O
GS 04M/P-20...	20	24	25	49	40	6	4.5	12.5	–	4.5	–
GS(L) 04M/P-30...	30	34	25	59	50	12	4.5	12.5	4.5	4.5	–
GS(L) 04M/P-50...	50	54	25	79	70	12	4.5	12.5	4.5	4.5	–
GS(L) 04M/P-80...	80	54	25	79	100	12	4.5	12.5	4.5	4.5	–
GS 04M/P-120...	120	54	30	84	140	37	–	18	22	5	20
GS 04M/P-220...	220	114	30	144	240	37	–	18	22	5	20

A Optical axis
B Sensitivity adjustment
C Light/dark switching
D Indicator diode

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GS(L) 04 / GS 21

Optical forked sensors	Mouth widths	Page
Optical forked sensors GS 04	20 / 30 / 50 / 80 / 120 / 220 mm	410
Optical laser forked sensors GSL 04	30 / 50 / 80 / 120 mm	412
Optical forked sensors GS 21	8 mm	412

Additional products - forked sensors:

Optical forked sensors	GS 61, (l)GS 63	414
Capacitive forked sensors	GK 14	426
Ultrasonic forked sensors	GSU 06, GSU 14C	430

Common technical data

Electrical data	Operating voltage U_B	GS(L) 04: 10 … 30 VDC
		GS 21: 24 VDC
	Residual ripple	≤ 15 % of U_B
	Open-circuit current	≤ 35 mA/≤ 90 mA
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Red LED	Switching output
Mechanical data	Housing GS(L) 04	Diecast zinc
	Housing GS 21	Aluminum, anodized
	Optics cover	Glass
	Weight	28 g … 220 g
Environmental data	Ambient temperature (operation)	GS 04: -10 °C … +60 °C
		GS 21: -20 °C … +60 °C
	VDE safety class	III
	Protection class	IP 67
	Standards applied	IEC 60947-5-2

Features

- **Sensitivity adjustment and light/dark switching on rear side of fork**
- **Visible red light and laser**
- **All common mouth widths**

Optical Sensor ABC

- Throughbeam sensors Page 593

OPTICAL FORKED SENSORS

Part description Part No.:	Mouth width [mm]	Switching frequency	Light source	Output	Switching	Response time
Optical forked sensors						
GS 04 M/P - 20 - S8 50110792	20	1500 Hz	Red light	PNP	Light/dark reversible	0.33 ms
GS 04 M/P - 30 - S8 50110782	30	1500 Hz	Red light	PNP	Light/dark reversible	0.33 ms
GS 04 M/N - 30 - S8 50110791	30	1500 Hz	Red light	NPN	Light/dark reversible	0.33 ms
GS 04 M/P - 50 - S8 50110783	50	1500 Hz	Red light	PNP	Light/dark reversible	0.33 ms
GS 04 M/N - 50 - S8 50110789	50	1500 Hz	Red light	NPN	Light/dark reversible	0.33 ms
GS 04 M/P - 80 - S8 50110784	80	1500 Hz	Red light	PNP	Light/dark reversible	0.33 ms
GS 04 M/N - 80 - S8 50110790	80	1500 Hz	Red light	NPN	Light/dark reversible	0.33 ms
GS 04 M/P - 120 - S8 50110785	120	1500 Hz	Red light	PNP	Light/dark reversible	0.33 ms
GS 04 M/N - 120 - S8 50110787	120	1500 Hz	Red light	NPN	Light/dark reversible	0.33 ms
GS 04 M/P - 220 - S8 50110786	220	1500 Hz	Red light	PNP	Light/dark reversible	0.33 ms
GS 04 M/N - 220 - S8 50110788	220	1500 Hz	Red light	NPN	Light/dark reversible	0.33 ms

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104521	K - D M8W - 3P - 2m - PVC	Connection cable 2000 mm, M8 angular, 3-pin, PVC
b	50104520	K - D M8A - 3P - 2m - PVC	Connection cable 2000 mm, M8 axial, 3-pin, PVC
c	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
d	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC

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GS 04

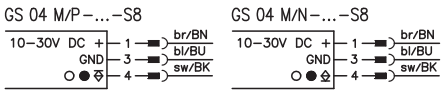
Optical forked sensors

	Repeatability	Connection	Option	Accessories	
	0.02mm	M8 connector	1, 2	a, b, c, d	
	0.02mm	M8 connector	1, 2	a, b, c, d	
	0.02mm	M8 connector	1, 2	a, b, c, d	
	0.04mm	M8 connector	1, 2	a, b, c, d	
	0.04mm	M8 connector	1, 2	a, b, c, d	
	0.06mm	M8 connector	1, 2	a, b, c, d	
	0.06mm	M8 connector	1, 2	a, b, c, d	
	0.08mm	M8 connector	1, 2	a, b, c, d	
	0.08mm	M8 connector	1, 2	a, b, c, d	
	0.08mm	M8 connector	1, 2	a, b, c, d	
	0.08mm	M8 connector	1, 2	a, b, c, d	

Optical Sensor ABC

- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1 Sensitivity adjustment via potentiometer

2 UL approval (class 2 acc. to NEC)

OPTICAL FORKED SENSORS

Part description Part No.:	Mouth width [mm]	Switching frequency	Light source	Output	Switching	Response time	
Optical forked sensors							
GSL 04 M/P - 30 - S8 50110793	30	5000 Hz	Red light laser class 2	PNP	Light/dark reversible	0.1 ms	
GSL 04 M/P - 50 - S8 50110794	50	5000 Hz	Red light laser class 2	PNP	Light/dark reversible	0.1 ms	
GSL 04 M/P - 80 - S8 50110795	80	5000 Hz	Red light laser class 2	PNP	Light/dark reversible	0.1 ms	
GSL 04 M/P - 80.4 - S8 50111362	80	5000 Hz	Red light laser class 2	PNP	Light/dark reversible	0.1 ms	
GS 21 / 4 G, 5000 50013967	8	1000 Hz	Infrared light	PNP	Light	0.5 ms	

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104521	K - D M8W - 3P - 2m - PVC	Connection cable 2000 mm, M8 angular, 3-pin, PVC
b	50104520	K - D M8A - 3P - 2m - PVC	Connection cable 2000 mm, M8 axial, 3-pin, PVC
c	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
d	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC

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GSL 04 / GS 21

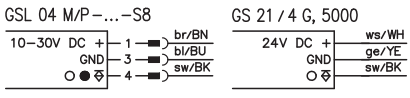
Optical forked sensors

	Repeatability	Connection	Option	Accessories	
	0.010mm	M8 connector	1	a, b, c, d	
	0.010mm	M8 connector	1	a, b, c, d	
	0.010mm	M8 connector	1	a, b, c, d	
	0.010mm	M8 connector	1, 2	a, b, c, d	
		Cable, 5m			

Optical Sensor ABC

- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598
- Sensors w. laser transmitter Page 599

Electrical connection



Options

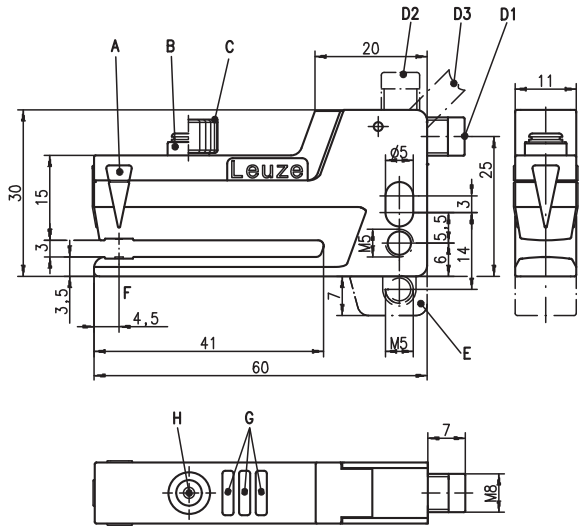
1 Sensitivity adjustment via potentiometer

2 Transparent objects

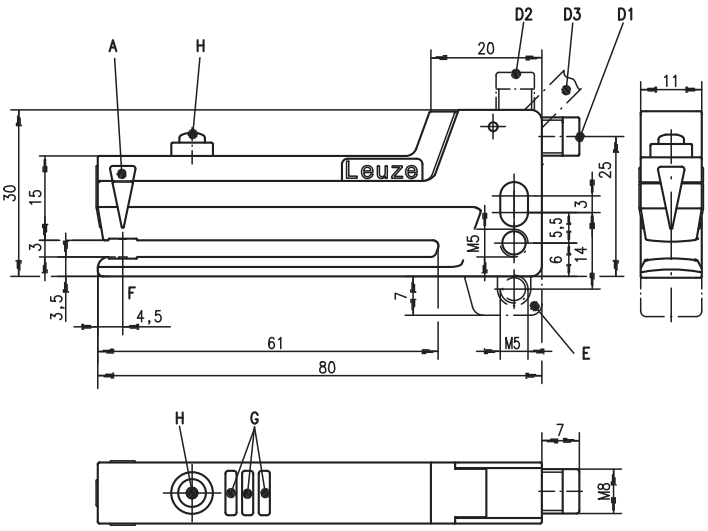
OVERVIEW OF OPTICAL FORKED SENSORS

Dimensioned drawing

GS 61 ...



GS 63 ...



A Label center position
B Control element
C Knurled knob (removable)
D D1: horizontal connector, D2: vertical connector, D3: cable
E Mounting device BT-GS6X
F Optical axis
G Indicator diodes
H Teach button

Further details can be found in the respective data sheet.

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GS 61 / (I)GS 63

Optical forked sensors	Mouth width / mouth depth	Page
Optical forked sensors GS 61	3mm / 40mm	416
Optical forked sensors (I)GS 63	3mm / 60mm	422

Additional products - forked sensors:

Optical forked sensors	GS 04, GSL 04, GS 21	408
Capacitive forked sensors	GK 14	426
Ultrasonic forked sensors	GSU 06, GSU 14C	430
Measuring CCD forked sensors	GS 754(B)	286

Common technical data

Electrical data	Operating voltage U_B	10 … 30VDC
	Residual ripple	≤ 15% of U_B
	Open-circuit current	≤ 30mA
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Green LED	Ready to operate
	Yellow LED	Switching output
	LED red (optional)	teach / function error
Mechanical data	Housing	GS 61: plastic GS 63: metal/plastic
	Weight	20g … 100g
Environmental data	Ambient temperature (operation)	-20°C … +60°C
	VDE safety class	III
	Protection class	IP 65 [1]
	Standards applied	IEC 60947-5-2, UL 508

1) With mounted connector

Features

- **Precise detection of labels on base material**
- **Slim-line design for installation directly on the dispensing edge**
- **Smallest dimensions with excellent price / performance ratio**
- **High switching frequency of 10kHz**
- **Simple adjustment via multiturn potentiometer or teach-in button**

Optical Sensor ABC

- Throughbeam sensors Page 593

OPTICAL FORKED SENSORS

Part description Part No.:	Mouth width [mm]	Switching frequency	Light source	Output	Switching	Response time
Optical forked sensors with adjustment via multiturn potentiometer						
GS 61 / 6 - S8.3 50110761	3	10000 Hz	Infrared light	1 x push-pull	PNP gap signal NPN label signal	typ. 0.05 ms
GS 61 / 6 - S8 50110110	3	10000 Hz	Infrared light	1 x push-pull	PNP gap signal NPN label signal	typ. 0.05 ms
GS 61 / 6 - S8V 50110112	3	10000 Hz	Infrared light	1 x push-pull	PNP gap signal NPN label signal	typ. 0.05 ms
GS 61 / 6 50110769	3	10000 Hz	Infrared light	1 x push-pull	PNP gap signal NPN label signal	typ. 0.05 ms
GS 61 / 6, 200 - S12 50112423	3	10000 Hz	Infrared light	1 x push-pull	PNP gap signal NPN label signal	typ. 0.05 ms
GS 61 / 6D - S8.3 50110762	3	10000 Hz	Infrared light	1 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms
GS 61 / 6D - S8 50110111	3	10000 Hz	Infrared light	1 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms
GS 61 / 6D - S8V 50110113	3	10000 Hz	Infrared light	1 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms
GS 61 / 6D 50110770	3	10000 Hz	Infrared light	1 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms
GS 61 / 6D, 200 - S12 50112427	3	10000 Hz	Infrared light	1 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
f	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC

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GS 61

Optical forked sensors

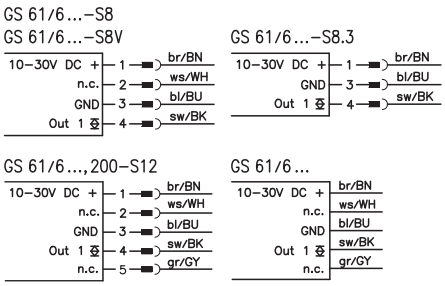
	Repeatability [1]	Connection	Option	Accessories	
	± 5 … ± 40µm	M8 connector, 3-pin horizontal outlet	1, 4, 5	a, b	
	± 5 … ± 40µm	M8 connector, 4-pin horizontal outlet	1, 4, 5	c, d	
	± 5 … ± 40µm	M8 connector, 4-pin vertical outlet	1, 4, 5	c, d	
	± 5 … ± 40µm	Cable, 2m	1, 4, 5		
	± 5 … ± 40µm	Cable, 0.2m, with M12 connector	1, 4, 5	e, f	
	± 5 … ± 40µm	M8 connector, 3-pin horizontal outlet	1, 4, 5	a, b	
	± 5 … ± 40µm	M8 connector, 4-pin horizontal outlet	1, 4, 5	c, d	
	± 5 … ± 40µm	M8 connector, 4-pin vertical outlet	1, 4, 5	c, d	
	± 5 … ± 40µm	Cable, 2m	1, 4, 5		
	± 5 … ± 40µm	Cable, 0.2m, with M12 connector	1, 4, 5	e, f	

1) Linear, dependent on the conveyor speed, in range 25 … 200m/min.

Optical Sensor ABC

- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1	Sensitivity adjustment via multiturn potentiometer
2	Sensitivity adjustment via teach button
3	Sensitivity adjustment via teach button and teach input
4	Removable operating head for potentiometer adjustment without tool
5	UL approval (class 2 acc. to NEC)

OPTICAL FORKED SENSORS

Part description Part No.:	Mouth width [mm]	Switching frequency	Light source	Output	Switching	Response time
Optical forked sensors with adjustment via teach button/teach input						
GS 61 / 6.2 - S8.3 50110765	3	10000 Hz	Infrared light	1 x push-pull	PNP gap signal NPN label signal	typ. 0.05 ms
GS 61 / 6.2 - S8 50110108	3	10000 Hz	Infrared light	1 x push-pull	PNP gap signal NPN label signal	typ. 0.05 ms
GS 61 / 6.2 - S8V 50110763	3	10000 Hz	Infrared light	1 x push-pull	PNP gap signal NPN label signal	typ. 0.05 ms
GS 61 / 6.2 50110767	3	10000 Hz	Infrared light	1 x push-pull	PNP gap signal NPN label signal	typ. 0.05 ms
GS 61 / 6.2, 200 - S12 50112422	3	10000 Hz	Infrared light	1 x push-pull	PNP gap signal NPN label signal	typ. 0.05 ms
GS 61 / 6D.2 - S8.3 50110766	3	10000 Hz	Infrared light	1 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms
GS 61 / 6D.2 - S8 50110109	3	10000 Hz	Infrared light	1 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms
GS 61 / 6D.2 - S8V 50110764	3	10000 Hz	Infrared light	1 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms
GS 61 / 6D.2 50110768	3	10000 Hz	Infrared light	1 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms
GS 61 / 6D.2, 200 - S12 50112426	3	10000 Hz	Infrared light	1 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
f	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC

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GK 14
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GS 61

Optical forked sensors

	Repeatability [1]	Connection	Option	Accessories	
	± 5 … ± 40µm	M8 connector, 3-pin horizontal outlet	2, 4, 5	a, b	
	± 5 … ± 40µm	M8 connector, 4-pin horizontal outlet	2, 4, 5	c, d	
	± 5 … ± 40µm	M8 connector, 4-pin vertical outlet	2, 4, 5	c, d	
	± 5 … ± 40µm	Cable, 2m outlet at 45°	2, 4, 5		
	± 5 … ± 40µm	Cable, 0.2m, outlet at 45°, with M12 connector	2, 4, 5		
	± 5 … ± 40µm	M8 connector, 3-pin horizontal outlet	2, 4, 5	a, b	
	± 5 … ± 40µm	M8 connector, 4-pin horizontal outlet	2, 4, 5	c, d	
	± 5 … ± 40µm	M8 connector, 4-pin vertical outlet	2, 4, 5	c, d	
	± 5 … ± 40µm	Cable, 2m outlet at 45°	2, 4, 5		
	± 5 … ± 40µm	Cable, 0.2m, outlet at 45°, with M12 connector	2, 4, 5		

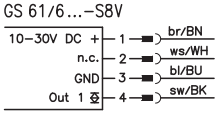
1) Linear, dependent on the conveyor speed, in range 25 … 200m/min.

Optical Sensor ABC

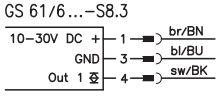
- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

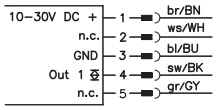
GS 61/6...-S8
GS 61/6...-S8V



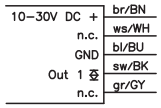
GS 61/6...-S8.3



GS 61/6...,200-S12



GS 61/6...



Options

1	Sensitivity adjustment via multiturn potentiometer
2	Sensitivity adjustment via teach button
3	Sensitivity adjustment via teach button and teach input
4	Removable operating head for potentiometer adjustment without tool
5	UL approval (class 2 acc. to NEC)

OPTICAL FORKED SENSORS

Part description Part No.:	Mouth width [mm]	Switching frequency	Light source	Output	Switching	Response time	
Optical forked sensors with adjustment via teach button/teach input							
GS 61 / 6.3 50112424	3	10000 Hz	Infrared light	1 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms	
GS 61 / 6.3, 200 - S12 50112425	3	10000 Hz	Infrared light	1 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms	

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000 mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000 mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC
e	50104560	K - D M12W - 5P - 10m - PVC	Connection cable 10000 mm, M12 angular, 5-pin, PVC
f	50104559	K - D M12A - 5P - 10m - PVC	Connection cable 10000 mm, M12 axial, 5-pin, PVC

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GS 61

Optical forked sensors

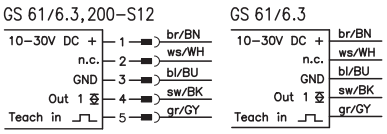
	Repeatability [1]	Connection	Option	Accessories	
	± 5 … ± 40µm	Cable, 2m outlet at 45°	3, 5		
	± 5 … ± 40µm	Cable, 0.2m, outlet at 45°, with M12 connector	3, 5	e, f	

1) Linear, dependent on the conveyor speed, in range 25 … 200m/min.

Optical Sensor ABC

- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1	Sensitivity adjustment via multiturn potentiometer
2	Sensitivity adjustment via teach button
3	Sensitivity adjustment via teach button and teach input
4	Removable operating head for potentiometer adjustment without tool
5	UL approval (class 2 acc. to NEC)

OPTICAL FORKED SENSORS

Part description Part No.:	Mouth width [mm]	Switching frequency	Light source	Output	Switching	Response time	
Optical forked sensors with adjustment via multiturn potentiometer							
GS 63 / 6 - S8 50112617	3	10000 Hz	Infrared light	1 x push-pull	PNP gap signal NPN label signal	typ. 0.05 ms	
GS 63 / 6 - S8V 50112618	3	10000 Hz	Infrared light	1 x push-pull	PNP gap signal NPN label signal	typ. 0.05 ms	
GS 63 / 6 50112615	3	10000 Hz	Infrared light	2 x push-pull	PNP gap signal NPN label signal	typ. 0.05 ms	
GS 63 / 6, 200 - S12 50112616	3	10000 Hz	Infrared light	1 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms	
GS 63 / 6D - S8 50112620	3	10000 Hz	Infrared light	1 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms	
GS 63 / 6D 50112619	3	10000 Hz	Infrared light	2 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms	
GS 63 / 6D, 200 - S12 50113790	3	10000 Hz	Infrared light	2 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms	

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000 mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000 mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
f	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC

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GS 63

Optical forked sensors

	Repeatability [1]	Connection	Option	Accessories	
	± 5 … ± 40µm	M8 connector, 4-pin horizontal outlet	1, 4, 5	a, b, c, d	
	± 5 … ± 40µm	M8 connector, 4-pin vertical outlet	1, 4, 5	a, b, c, d	
	± 5 … ± 40µm	Cable, 2m outlet at 45°	1, 4, 5		
	± 5 … ± 40µm	Cable, 0.2m, outlet at 45°, with M12 connector	1, 4, 5	a, b, c, d	
	± 5 … ± 40µm	M8 connector, 4-pin horizontal outlet	1, 4, 5	a, b, c, d	
	± 5 … ± 40µm	Cable, 2m outlet at 45°	1, 4, 5		
	± 5 … ± 40µm	Cable, 0.2m, outlet at 45°, with M12 connector	1, 4, 5	e, f	

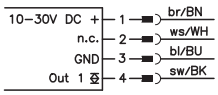
1) Linear, dependent on the conveyor speed, in range 25 … 200m/min.

Optical Sensor ABC

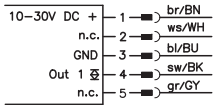
- Throughbeam sensors Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

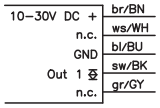
GS 63/6...-S8
GS 63/6...-S8V



GS 63/6...,200-S12



GS 63/6...



Options

1	Sensitivity adjustment via multiturn potentiometer
2	Sensitivity adjustment via teach button
3	Sensitivity adjustment via teach button and teach input
4	Removable operating head for potentiometer adjustment without tool
5	UL approval (class 2 acc. to NEC)

OPTICAL FORKED SENSORS

Part description Part No.:	Mouth width [mm]	Switching frequency	Light source	Output	Switching	Response time
Optical forked sensors with adjustment via teach button/teach input						
GS 63 / 6.3 - S8 50110104	3	10000 Hz	Infrared light	1 x push-pull	PNP gap signal NPN label signal	typ. 0.05 ms
GS 63 / 6.3 - S8V 50110106	3	10000 Hz	Infrared light	1 x push-pull	PNP gap signal NPN label signal	typ. 0.05 ms
IGS 63 / 6.3 50110759	3	10000 Hz	Infrared light	2 x push-pull	PNP gap signal NPN label signal	typ. 0.05 ms
IGS 63 / 6.3, 200 - S12 50112428	3	10000 Hz	Infrared light	2 x push-pull	PNP gap signal NPN label signal	typ. 0.05 ms
GS 63 / 6D.3 - S8 50110105	3	10000 Hz	Infrared light	1 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms
GS 63 / 6D.3 - S8V 50110107	3	10000 Hz	Infrared light	1 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms
IGS 63 / 6D.3 50110760	3	10000 Hz	Infrared light	2 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms
IGS 63 / 6D.3, 200 - S12 50112429	3	10000 Hz	Infrared light	2 x push-pull	PNP label signal NPN gap signal	typ. 0.05 ms

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000 mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000 mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
f	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC

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(I)GS 63

Optical forked sensors

	Repeatability [1]	Connection	Option	Accessories	
	± 5 … ± 40µm	M8 connector, 4-pin horizontal outlet	3, 5	a, b, c, d	
	± 5 … ± 40µm	M8 connector, 4-pin vertical outlet	3, 5	a, b, c, d	
	± 5 … ± 40µm	Cable, 2m outlet at 45°	3, 4, 5		
	± 5 … ± 40µm	Cable, 2m outlet at 45°	3, 4, 5	e, f	
	± 5 … ± 40µm	M8 connector, 4-pin horizontal outlet	3, 5	a, b, c, d	
	± 5 … ± 40µm	M8 connector, 4-pin vertical outlet	3, 5	a, b, c, d	
	± 5 … ± 40µm	Cable, 2m outlet at 45°	3, 4, 5		
	± 5 … ± 40µm	Cable, 2m outlet at 45°	3, 4, 5	e, f	

1) Linear, dependent on the conveyor speed, in range 25 … 200m/min.

Optical Sensor ABC

- Throughbeam sensors Page 593
- Connection types Page 598
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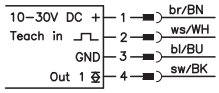
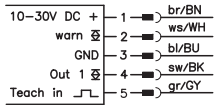
Electrical connection

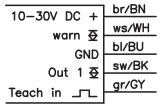
GS 63/6...-S8
GS 63/6...-S8V



IGS 63/6...,200-S12



IGS 63/6...



Options

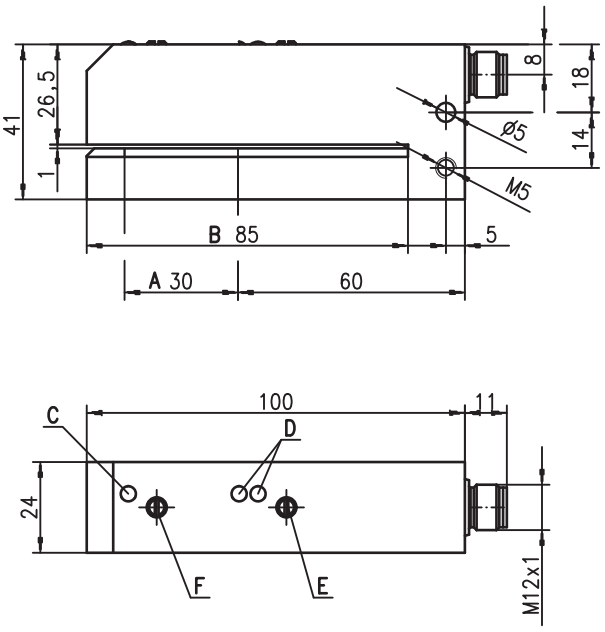
1	Sensitivity adjustment via multiturn potentiometer
2	Sensitivity adjustment via teach button
3	Sensitivity adjustment via teach button and teach input
4	Warning output
5	UL approval (class 2 acc. to NEC)

OVERVIEW OF CAPACITIVE FORKED SENSORS

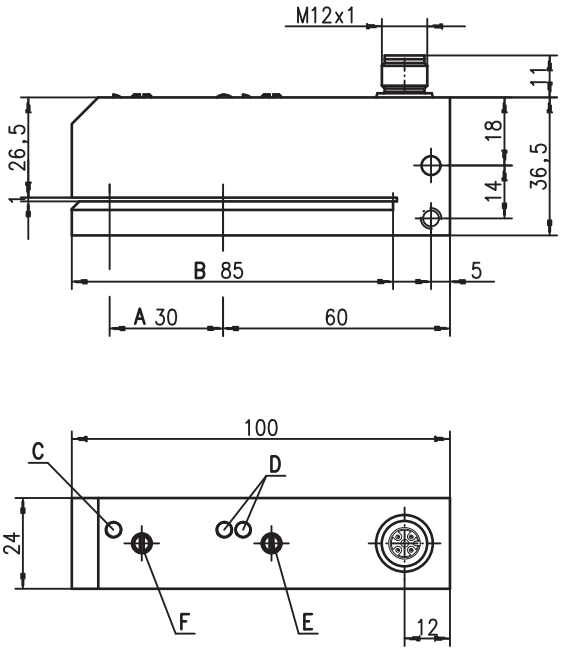
Detection of transparent labels

Dimensioned drawing

GK 14 / 24 L



GK 14 / 24 L.2



A Sensor
B Mouth depth
C Switching output indicator diode
D Base adjustment indicator diode
E Base adjustment
F Sensitivity adjustment (clockwise rotation = increase in sensitivity)

Further details can be found in the respective data sheet.

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GK 14

Capacitive forked sensors	Mouth widths	Page
Capacitive forked sensors GK 14	0.9 ± 0.1 mm	428

Additional products - forked sensors:

Optical forked sensors	GS 04, GSL 04, GS 21	408
Optical forked sensors	GS 61, (l)GS 63	414
Ultrasonic forked sensors	GSU 06, GSU 14C	430
Measuring CCD forked sensors	GS 754(B)	286

Common technical data

Electrical data	Operating voltage U_B	10 … 30 VDC
	Residual ripple	≤ 15 % of U_B
	Open-circuit current	≤ 35 mA
	Signal voltage high/low	≥ (U_B-2 V)/≤ 2 V
Indicators	Yellow LED 1	Switching output
	Yellow LED 2	Base adjustment
Mechanical data	Housing	Aluminum, anodized
	Weight	175 g
Environmental data	Ambient temperature (operation)	0 °C … +60 °C
	VDE safety class	III
	Protection class	IP 65
	Standards applied	IEC 60947-5-2

Features

- **Detection of paper and transparent labels**
- **Conveyor speeds up to 10 m/s**
- **Attractive cost/performance ratio**

CE

Optical Sensor ABC

CAPACITIVE FORKED SENSORS

Part description Part No.:	Mouth width [mm]	Switching frequency	Sensor principle	Output	Switching	Response time	
Capacitive forked sensors							
GK 14 / 24 L 50026371	0.9 ± 0.1	5000 Hz	Capacitive	1 x NPN 1 x PNP	Light	0.1 ms	
GK 14 / 24 L.2 50031714	0.9 ± 0.1	5000 Hz	Capacitive	1 x NPN 1 x PNP	Light	0.1 ms	

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000 mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000 mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC
e	50104560	K - D M12W - 5P - 10m - PVC	Connection cable 10000 mm, M12 angular, 5-pin, PVC
f	50104559	K - D M12A - 5P - 10m - PVC	Connection cable 10000 mm, M12 axial, 5-pin, PVC

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GK 14

Capacitive forked sensors

	Repeatability	Connection	Option	Accessories	
	± 0.20 mm	M12 connector	1, 2, 3	a, b, c, d, e, f	
	± 0.20 mm	M12 connector [1]	1, 2, 3	a, b, c, d, e, f	

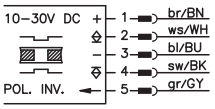
1) Plug outlet points upward

Optical Sensor ABC

- Connection types Page 598
- Outputs Page 598

Electrical connection

GK 14/24 L
GK 14/24 L.2



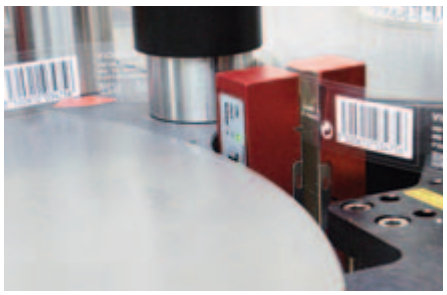
Options

1 Sensitivity adjustment via potentiometer

2 Base adjustment via potentiometer

3 Inverting input for switching output signal

OVERVIEW OF ULTRASONIC FORKED SENSORS

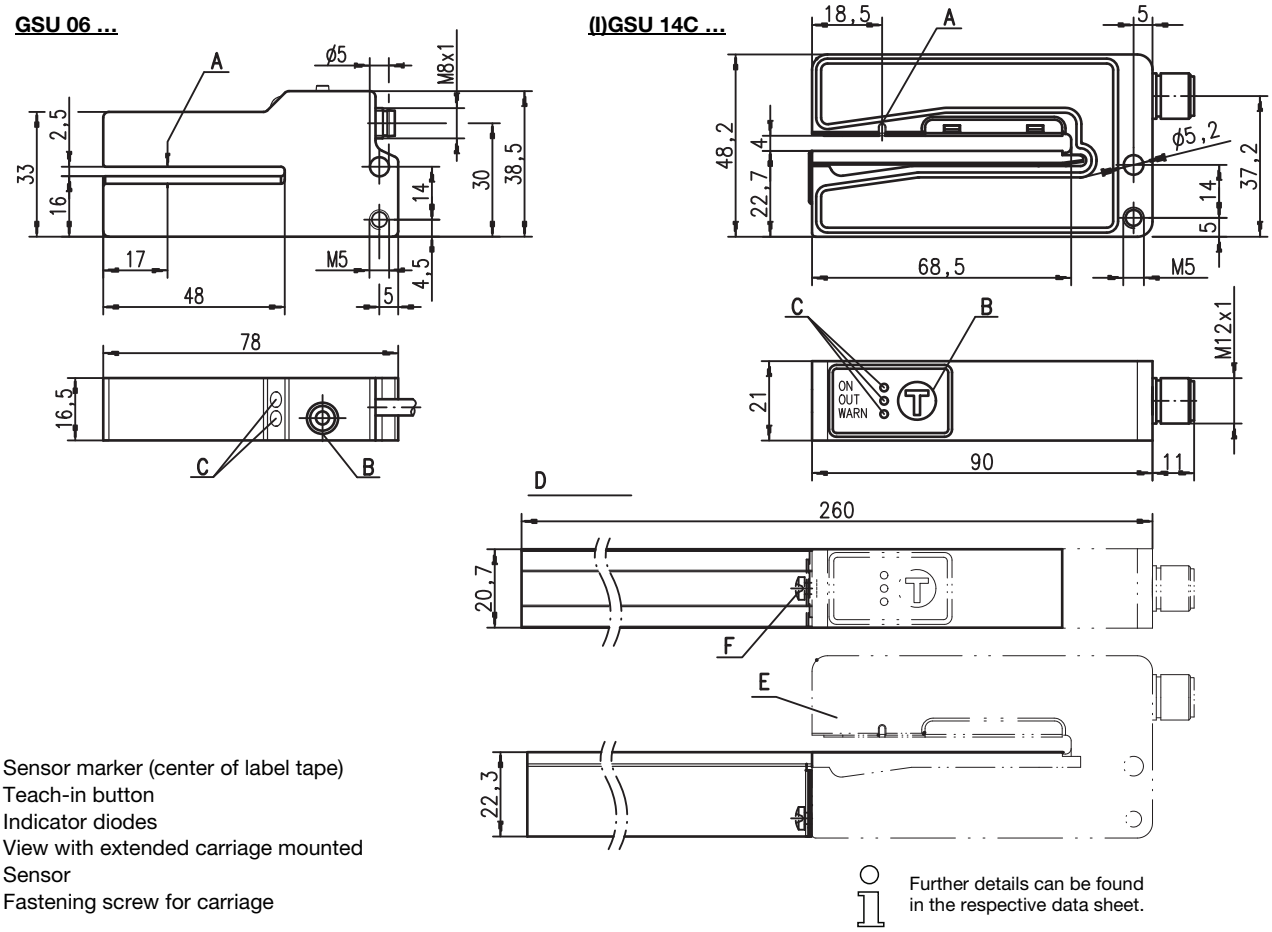


Detection of transparent labels

Detection of paper labels

Detection of metallized labels

Dimensioned drawing



A Sensor marker (center of label tape)
B Teach-in button
C Indicator diodes
D View with extended carriage mounted
E Sensor
F Fastening screw for carriage

Further details can be found in the respective data sheet.

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GSU 06 / (I)GSU 14C

Ultrasonic forked sensors	Mouth widths	Page
Ultrasonic forked sensors GSU 06	2.5mm	432
Ultrasonic forked sensors (I)GSU 14C	4mm	434

Additional products - forked sensors:

Optical forked sensors	GS 04, GSL 04, GS 21	408
Optical forked sensors	GS 61, (I)GS 63	414
Capacitive forked sensors	GK 14	426
Measuring CCD forked sensors	GS 754(B)	286

Common technical data

Electrical data	Operating voltage U_B	10 … 30/12 … 30VDC
	Residual ripple	≤ 15% of U_B
	Open-circuit current	≤ 40mA/≤ 70mA
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Green LED	Ready/Teach-in
	Yellow LED	Switching point in the label gap
	Red LED	Teach/function error
Mechanical data	Housing	Aluminum, anodized
	Weight	60g / 160g
Environmental data	Ambient temperature (operation)	GSU 06: +5°C … +50°C GSU 14C: 0°C … +60°C
	VDE safety class	III
	Protection class	GSU 06: IP 62 GSU 14C: IP 65
	Standards applied	IEC 60947-5-2, UL 508

Mounting systems for this series can be found from **page 551** onwards

Features

- **Detection of paper, transparent and metallized labels**
- **Conveyor speeds up to 4m/s**
- **Simple adjustment via teach-in button or remote calibration**

Optical Sensor ABC

ULTRASONIC FORKED SENSORS

Part description Part No.:	Mouth width [mm]	Switching frequency [1]	Sensor principle	Output	Switching	Response time	
Ultrasonic forked sensors							
GSU 06 / 24 - 2 - S8 50039638	2.5	2000 labels/min.	Ultrasonics	1 x NPN 1 x PNP	Light	0.15 ms	
GSU 06 / 24 - 2 50040191	2.5	2000 labels/min.	Ultrasonics	1 x NPN 1 x PNP	Light	0.15 ms	
GSU 06 / 24D - 2 - S8 50040190	2.5	2000 labels/min.	Ultrasonics	1 x NPN 1 x PNP	Dark	0.15 ms	
GSU 06 / 24D - 2 50040192	2.5	2000 labels/min.	Ultrasonics	1 x NPN 1 x PNP	Dark	0.15 ms	
GSU 06 / 24D - 2, 200 - S12 50108819	2.5	2000 labels/min.	Ultrasonics	1 x NPN 1 x PNP	Dark	0.15 ms	

1) Depending on conveyor speed, label length and label gap
2) Material dependent

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000 mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000 mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC
e	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
f	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC

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GSU 06

Ultrasonic forked sensors

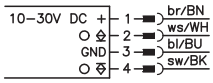
	Repeatability [2]	Connection	Option	Accessories	
	±0.3 mm	M8 connector	1, 4	a, b, c, d	
	±0.3 mm	Cable, 2 m	1, 2, 4		
	±0.3 mm	M8 connector	1, 4	a, b, c, d	
	±0.3 mm	Cable, 2 m	1, 2, 4		
	±0.3 mm	Cable, 0.2 m, with M12 connector	1, 2, 4	e, f	

Optical Sensor ABC

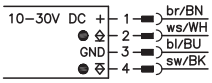
- Connection types Page 598
- Outputs Page 598

Electrical connection

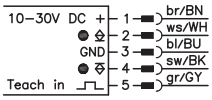
GSU 06/24-2-S8



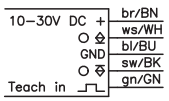
GSU 06/24 D-2-S8



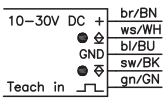
GSU 06/24 D-2, 200-S12



GSU 06/24-2



GSU 06/24 D-2



Options

1	Teach-in via teach button
2	Teach-in via teach input
3	Forked sensor for tape-tear monitoring
4	UL approval

ULTRASONIC FORKED SENSORS

Part description Part No.:	Mouth width [mm]	Conveyor speed [m/min.]	Sensor principle	Output	Switching	Response time
Ultrasonic forked sensors						
IGSU 14C / 6.3 - S12 50116936	4	≤ 240 1)	Ultrasonics	1 x Push-pull/DC	Light/dark antivalent	≤ 200 µs
IGSU 14C / 6.3 SD - S12 50115736	4	≤ 2400 2)	Ultrasonics	1 x Push-pull/DC	Light/dark antivalent	≤ 250 µs
IGSU 14C / 6.31 - S12 50116937	4	≤ 240 1)	Ultrasonics	1 x Push-pull/DC	Light/dark antivalent	≤ 200 µs
IGSU 14C / 6D.3 - S12 50116938	4	≤ 240 1)	Ultrasonics	1 x Push-pull/DC	Dark/light antivalent	≤ 200 µs
GSU 14C / 66.3 - S12 50116933	4	≤ 240 1)	Ultrasonics	2 x Push-pull/DC	Light/dark antivalent	≤ 200 µs
GSU 14C / 66D.3 - S12 50116934	4	≤ 240 1)	Ultrasonics	2 x Push-pull/DC	Dark/light antivalent	≤ 200 µs
GSU 14C / 66D.31 - S12 50116935	4	≤ 240 1)	Ultrasonics	2 x Push-pull/DC	Dark/light antivalent	≤ 200 µs

1) Label length ≥ 5 mm, label gap ≥ 2 mm
2) At splice width ≥ 10 mm

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104556	K - D M12W - 5P - 2m - PVC	Connection cable 2000 mm, M12 angular, 5-pin, PVC
b	50104555	K - D M12A - 5P - 2m - PVC	Connection cable 2000 mm, M12 axial, 5-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
d	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC
e	50104559	K - D M12A - 5P - 10m - PVC	Connection cable 10000 mm, M12 axial, 5-pin, PVC
f	50109579	Extended carriage	Extended guide rail for GSU 14B, 260 mm long

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GSU 06/14C
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(I)GSU 14C

Ultrasonic forked sensors

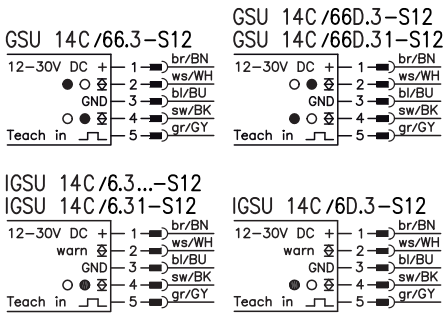
	Repeatability [1]	Connection	Option	Accessories	
	±0.2mm	M12 connector	1, 2, 3, 4, 5, 8	a, b, c, d, e, f	
		M12 connector	1, 2, 3, 5, 7, 8	a, b, c, d, e, f	
	±0.2mm	M12 connector	1, 2, 3, 4, 5, 6, 8	a, b, c, d, e	
	±0.2mm	M12 connector	1, 2, 3, 4, 5, 8	a, b, c, d, e, f	
	±0.2mm	M12 connector	1, 2, 8	a, b, c, d, e, f	
	±0.2mm	M12 connector	1, 2, 8	a, b, c, d, e, f	
	±0.2mm	M12 connector	1, 2, 6, 8	a, b, c, d, e	

1) Depending on material, conveyor speed, label length and spacing between labels

Optical Sensor ABC

- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1 Teach-in via teach button

2 Teach-in via teach input

3 *easyTeach* function

4 ALC (auto level control) - online optimization of the switching threshold

5 Warning output

6 With extended carriage

7 Splice sensor with integrated paper tear monitoring

8 UL approval (class 2 acc. to NEC)

SELECTION GUIDE

Contrast scanners

Operating principle

Contrast scanners detect markings, even those with only slight contrast with respect to the background, at very high processing speeds. Automatic adaptation of the wavelength allows the slightest changes in grey value to be detected, independent of the color combination of the marking and background.

Products and typ. scanning ranges [mm]

KRT... 3B from **page 438** onwards
Scanning ranges: **14.5 / 60**

KRT... 55 from **page 438** onwards
Scanning ranges: **13**

KRT... 20B from **page 438** onwards
Scanning ranges: **13.5**

KRTM 20 from **page 438** onwards
Scanning ranges: **12** / **20** / **50**

Features

- Multicolor-, white-light- and laser contrast scanners available
- Detection of the slightest differences in contrast by means of highly dynamic transmitter regulation
- Various teach-in variants for optimum process integration
- Special functions can be enabled via a keyboard
- Temperature compensation ensures stable scanning over a long operating period

Color sensors

Operating principle

Color sensors detect the color of an object by comparing with a taught-in reference color. They generate a switching signal when both colors match within a specified tolerance range.

Products and typ. scanning ranges [mm]

CRT 20B from **page 466** onwards
Scanning ranges: **12.5** / **60**

CRT 442 from **page 466** onwards
Scanning ranges: **12.5**

Features

- Multicolor LED transmitter
- Color detection with incident light and transmitted light
- Detection of different colors via 1/4 digital outputs
- Up to four reference colors can be stored
- Programming via teach-in
- Analogue evaluation with transmitter switchover

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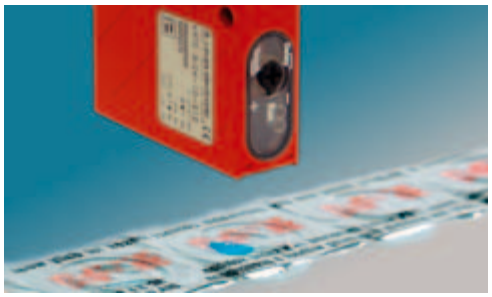
Luminescence scanners

Operating principle



A luminescent material which is illuminated with blue light reflects light with a longer wavelength. This effect, combined with appropriate filtering, makes it possible to detect luminescent markings or materials, even on optically critical surfaces.

Products and typ. scanning ranges [mm]

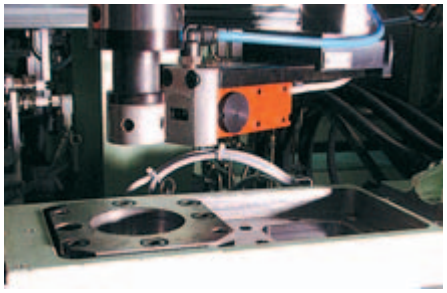
LRT 8 from **page 472** onwards
Scanning ranges: **0** … **100**

LRT 440 from **page 472** onwards
Scanning ranges: **0** … **150**

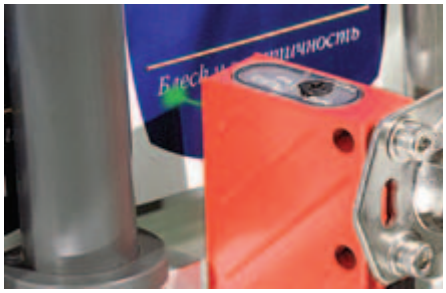
Features

- UV LED transmitter
- Detection of visible and invisible luminescent material
- Luminescence scanners in various housings
- Filtering options
- PNP, NPN and analog outputs

OVERVIEW OF CONTRAST SCANNERS



Slit and hole recognition

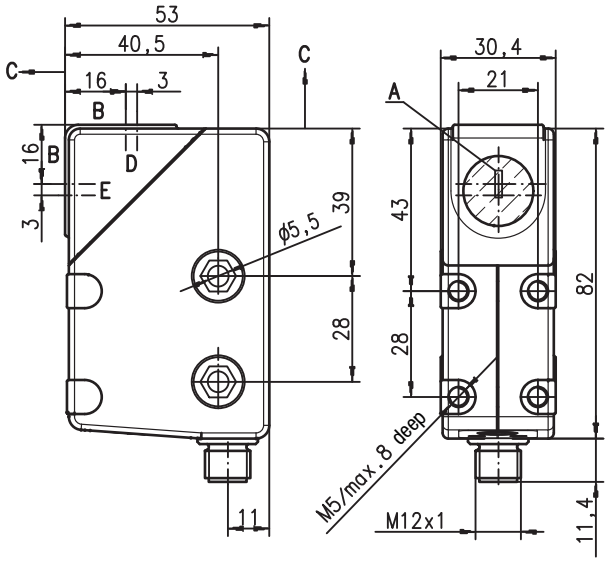


Mark detection

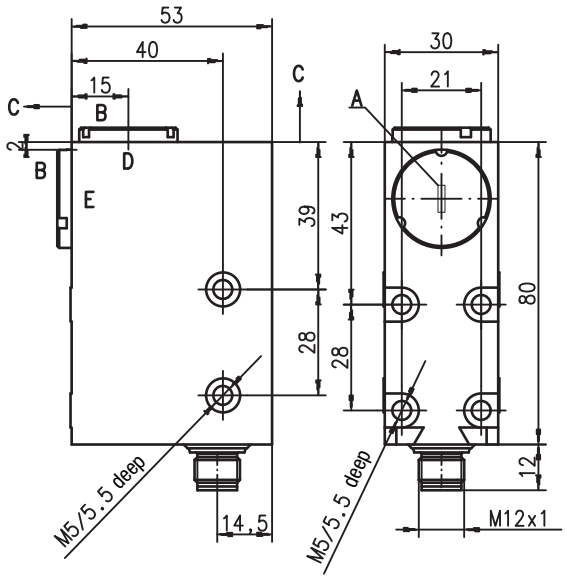
Dimensioned drawing KRT... 3B... see **3B Series standard sensors** on **page 32**.
Dimensioned drawing KRT... 55... see **55 Series standard sensors** on **page 142**.

Dimensioned drawing

KRT... 20B



KRT... 20



A Vertical light spot orientation
B Optical axis
C Scanning range
D Head
E Front

Further details can be found in the respective data sheet.

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LRT Page 472

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KRT 3B / 55 / 20(B)

Contrast scanners	Scanning ranges	Page
Contrast scanner KRT... 3B	14.5 / 60mm	440
Contrast scanner KRT... 55	13mm	450
Contrast scanner KRT... 20(B)	12 ... 50mm	456

Additional products - special sensors:

Color sensors	CRT 20B, CRT 442	466
Luminescence scanners	LRT 8, LRT 440	472

Common technical data

Electrical data	Operating voltage U_B	10 ... 30/18 ... 30VDC
	Residual ripple	≤ 15% of U_B
	Open-circuit current	≤ 35mA/≤ 60mA
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Green LED	Ready, teach-in
	Yellow LED	Obj. detected, teach-in
Mechanical data	Housing	Metal
	Optics cover	Glass
	Weight (...3B/...55/...20)	10g/50g/300g
Environmental data	Ambient temperature (operation)	..3B: -30°C ... +55°C Laser 3B: -10°C ... +55°C ..55/20B:-30°C ... +55°C ..20: -25°C ... +60°C
	VDE safety class	II, III for metal connector
	Protection class	IP 67, IP 69K
	LED class	1 acc. to EN 60825-1
	Standards applied	IEC 60947-5-2, UL 508

Mounting systems for this series can be found from **page 552** onwards

Features

- **Multicolor, white light or laser light**
- **Variants with interchangeable lenses for scanning ranges of 12mm, 20mm and 50mm**
- **Models with memory for up to 128 different labels**
- **Analog and digital 10µs high-speed interface**
- **Automatic amplifier adaptation for shiny and dull cut marks**
- **IO-Link**

Optical Sensor ABC

- Contrast scanners Page 595

CONTRAST SCANNERS

Part description Part No.:	Scanning range	Operating voltage	Switching frequency	Light source Light spot	Output	
Multicolor contrast scanner						
KRTM 3B / 4.1121 - S8 50110584	14.5 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1 x PNP	
KRTM 3B / 4.1121, 200 - S8 50113785	14.5 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1 x PNP	
KRTM 3B / 4.1121, 200 - S12 50110586	14.5 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1 x PNP	
KRTM 3B / 4.1221 - S8 50110588	14.5 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1 x PNP	
KRTM 3B / 4.1221, 200 - S12 50110590	14.5 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1 x PNP	
KRTM 3B / 4.2121 - S8 50111768	14.5 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1 x PNP	

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC

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KRT 3B

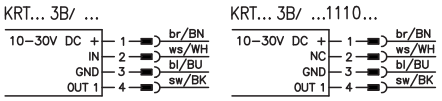
Contrast scanners

	Connection	Option	Accessories	
	M8 connector	1, 4, 6, 7, 8, 10	a, b, c, d	
	Cable, 0.2m, with M8 connector	1, 4, 6, 7, 8, 10	a, b, c, d	
	Cable, 0.2m, with M12 connector	1, 4, 6, 7, 8, 10	e, f	
	M8 connector	1, 5, 6, 7, 8, 10	a, b, c, d	
	Cable, 0.2m, with M12 connector	1, 5, 6, 7, 8, 10	e, f	
	M8 connector	1, 5, 6, 7, 8, 9, 10	a, b, c, d	

Optical Sensor ABC

- Contrast scanners Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1	Teach input
2	Direct connection to AS-interface I/O coupling modules
3	Static 1-point teach-in via teach button/line
4	Static 2-point teach-in via teach button/line
5	Dynamic 2-point teach-in via teach button/line
6	Switching threshold adjustment with EasyTune via teach button
7	Switchable pulse stretching
8	Keyboard lockout
9	Light spot orientation horizontal
10	UL approval (class 2 acc. to NEC)

CONTRAST SCANNERS

Part description Part No.:	Scanning range	Operating voltage	Switching frequency	Light source Light spot	Output	
Multicolor contrast scanner						
KRTM 3B / 2.1121 - S8 50110585	14.5 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1xNPN	
KRTM 3B / 2.1121, 200 - S12 50110587	14.5 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1xNPN	
KRTM 3B / 2.1221 - S8 50110589	14.5 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1xNPN	
KRTM 3B / 2.1221, 200 - S12 50110591	14.5 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1xNPN	
KRTM 3B / 6.1121 - S8 50111312	14.5 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1xPush-pull/DC	
KRTM 3B / 6.1221 - S8 50111313	14.5 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1xPush-pull/DC	

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC

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KRT 3B

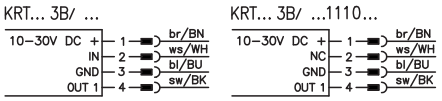
Contrast scanners

	Connection	Option	Accessories	
	M8 connector	1, 4, 6, 7, 8, 10	a, b, c, d	
	Cable, 0.2m, with M12 connector	1, 4, 6, 7, 8, 10	e, f	
	M8 connector	1, 5, 6, 7, 8, 10	a, b, c, d	
	Cable, 0.2m, with M12 connector	1, 5, 6, 7, 8, 10	e, f	
	M8 connector	1, 4, 6, 7, 8, 9, 10	a, b, c, d	
	M8 connector	1, 5, 6, 7, 8, 9, 10	a, b, c, d	

Optical Sensor ABC

- Contrast scanners Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1	Teach input
2	Direct connection to AS-interface I/O coupling modules
3	Static 1-point teach-in via teach button/line
4	Static 2-point teach-in via teach button/line
5	Dynamic 2-point teach-in via teach button/line
6	Switching threshold adjustment with EasyTune via teach button
7	Switchable pulse stretching
8	Keyboard lockout
9	IO-Link COM2
10	UL approval (class 2 acc. to NEC)

CONTRAST SCANNERS

Part description Part No.:	Scanning range	Operating voltage	Switching frequency	Light source Light spot	Output	
White light contrast scanner						
KRTW 3B / 4.1110 - S8 50110572	14.5 ± 2mm	10 … 30VDC	6kHz	White light 1.5 x 4.0mm²	1 x PNP	
KRTW 3B / 4.1121 - S8 50110576	14.5 ± 2mm	10 … 30VDC	10kHz	White light 1.5 x 4.0mm²	1 x PNP	
KRTW 3B / 4.1121, 200 - S12 50110578	14.5 ± 2mm	10 … 30VDC	10kHz	White light 1.5 x 4.0mm²	1 x PNP	
KRTW 3B / 4.2121 - S8 50111769	14.5 ± 2mm	10 … 30VDC	10kHz	White light 4.0 x 1.5mm²	1 x PNP	
KRTW 3B / 4.1321 - S8 50110580	14.5 ± 2mm	10 … 30VDC	10kHz	White light 1.5 x 4.0mm²	1 x PNP	
KRTW 3B / 4.1321, 200 - S12 50110582	14.5 ± 2mm	10 … 30VDC	10kHz	White light 1.5 x 4.0mm²	1 x PNP	

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC

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KRT 3B

Contrast scanners

	Connection	Option	Accessories	
	M8 connector	2, 4, 5, 10	a, b, c, d	
	M8 connector	1, 4, 6, 7, 8, 10	a, b, c, d	
	Cable, 0.2m, with M12 connector	1, 4, 6, 7, 8, 10	e, f	
	M8 connector	1, 4, 6, 7, 8, 9, 10	a, b, c, d	
	M8 connector	1, 3, 6, 7, 8, 10	a, b, c, d	
	Cable, 0.2m, with M12 connector	1, 3, 6, 7, 8, 10	e, f	

Optical Sensor ABC

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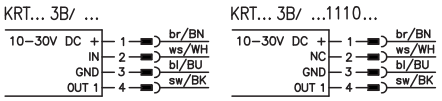
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1	Teach input
2	Direct connection to AS-interface I/O coupling modules
3	Static 1-point teach-in via teach button/line
4	Static 2-point teach-in via teach button/line
5	Economy housing
6	Switching threshold adjustment with EasyTune via teach button
7	Switchable pulse stretching
8	Keyboard lockout
9	Light spot orientation horizontal
10	UL approval (class 2 acc. to NEC)

CONTRAST SCANNERS

Part description Part No.:	Scanning range	Operating voltage	Switching frequency	Light source Light spot	Output	
White light contrast scanner						
KRTW 3B / 2.1110 - S8 50110573	14.5 ± 2mm	10 … 30VDC	6kHz	White light 1.5 x 4.0mm²	1xNPN	
KRTW 3B / 2.1121 - S8 50110577	14.5 ± 2mm	10 … 30VDC	10kHz	White light 1.5 x 4.0mm²	1xNPN	
KRTW 3B / 2.1121, 200 - S12 50110579	14.5 ± 2mm	10 … 30VDC	10kHz	White light 1.5 x 4.0mm²	1xNPN	
KRTW 3B / 2.1321 - S8 50110581	14.5 ± 2mm	10 … 30VDC	10kHz	White light 1.5 x 4.0mm²	1xNPN	
KRTW 3B / 2.1321, 200 - S12 50110583	14.5 ± 2mm	10 … 30VDC	10kHz	White light 1.5 x 4.0mm²	1xNPN	
KRTW 3B / 6.1121 - S8 50111319	14.5 ± 2mm	10 … 30VDC	10kHz	White light 1.5 x 4.0mm²	1xPush-pull/DC	
KRTW 3B / 6.1321 - S8 50111320	14.5 ± 2mm	10 … 30VDC	10kHz	White light 1.5 x 4.0mm²	1xPush-pull/DC	

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC

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KRT 3B

Contrast scanners

	Connection	Option	Accessories	
	M8 connector	2, 4, 5, 10	a, b, c, d	
	M8 connector	1, 4, 6, 7, 8, 10	a, b, c, d	
	Cable, 0.2 m, with M12 connector	1, 4, 6, 7, 8, 10	e, f	
	M8 connector	1, 3, 6, 7, 8, 10	a, b, c, d	
	Cable, 0.2 m, with M12 connector	1, 3, 6, 7, 8, 10	e, f	
	M8 connector	1, 4, 6, 7, 8, 9, 10	a, b, c, d	
	M8 connector	1, 3, 6, 7, 8, 9, 10	a, b, c, d	

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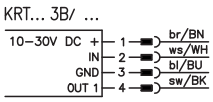
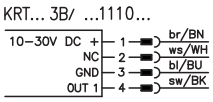
Electrical connection





Options

1	Teach input
2	Direct connection to AS-interface I/O coupling modules
3	Static 1-point teach-in via teach button/line
4	Static 2-point teach-in via teach button/line
5	Dynamic 2-point teach-in via teach button/line
6	Switching threshold adjustment with EasyTune via teach button
7	Switchable pulse stretching
8	Keyboard lockout
9	IO-Link COM2
10	UL approval (class 2 acc. to NEC)

CONTRAST SCANNERS

Part description Part No.:	Scanning range	Operating voltage	Switching frequency	Light source Light spot	Output	
Laser contrast scanner						
KRTL 3B / 4.3111 - S8 50110592	60 ± 20mm	10 … 30VDC	4kHz	Red light laser class 1 0.5 x 1.0mm²	1 x PNP	
KRTL 3B / 4.3111, 200 - S12 50110594	60 ± 20mm	10 … 30VDC	4kHz	Red light laser class 1 0.5 x 1.0mm²	1 x PNP	
KRTL 3B / 2.3111 - S8 50110593	60 ± 20mm	10 … 30VDC	4kHz	Red light laser class 1 0.5 x 1.0mm²	1xNPN	
KRTL 3B / 2.3111, 200 - S12 50110595	60 ± 20mm	10 … 30VDC	4kHz	Red light laser class 1 0.5 x 1.0mm²	1xNPN	
KRTL 3B / 6.3111 - S8 50111321	60 ± 20mm	10 … 30VDC	4kHz	Red light laser class 1 0.5 x 1.0mm²	1xPush-pull/DC	

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC

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KRT 3B

Contrast scanners

	Connection	Option	Accessories	
	M8 connector	1, 4, 6, 7, 8, 10	a, b, c, d	
	Cable, 0.2m, with M12 connector	1, 4, 6, 7, 8, 10	e, f	
	M8 connector	1, 4, 6, 7, 8, 10	a, b, c, d	
	Cable, 0.2m, with M12 connector	1, 4, 6, 7, 8, 10	e, f	
	M8 connector	1, 4, 6, 7, 8, 9, 10	a, b, c, d	

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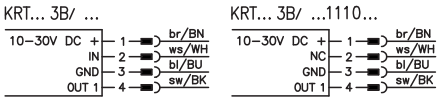
Electrical connection



Options

1	Teach input
2	Direct connection to AS-interface I/O coupling modules
3	Static 1-point teach-in via teach button/line
4	Static 2-point teach-in via teach button/line
5	Dynamic 2-point teach-in via teach button/line
6	Switching threshold adjustment with EasyTune via teach button
7	Switchable pulse stretching
8	Keyboard lockout
9	IO-Link COM2
10	UL approval (class 2 acc. to NEC)

CONTRAST SCANNERS

Part description Part No.:	Scanning range	Operating voltage	Switching frequency	Light source Light spot	Output	
Multicolor contrast scanner						
KRTM 55 / 4.1121 - S8 50111644	13 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1 x PNP	
KRTM 55 / 4.1121, 5000 50114074	13 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1 x PNP	
KRTM 55 / 4.1121, 200 - S12 50110611	13 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1 x PNP	
KRTM 55 / 4.1221 - S8 50110613	13 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1 x PNP	
KRTM 55 / 4.1221, 200 - S12 50110615	13 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1 x PNP	

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC

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KRT 55

Contrast scanners

	Connection	Option	Accessories	
	M8 connector	1, 4, 6, 7, 8, 9	a, b, c, d	
	Cable, 5 m	1, 4, 6, 7, 8, 9		
	Cable, 0.2 m, with M12 connector	1, 4, 6, 7, 8, 9	e, f	
	M8 connector	1, 5, 6, 7, 8, 9	a, b, c, d	
	Cable, 0.2 m, with M12 connector	1, 5, 6, 7, 8, 9	e, f	

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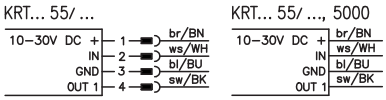
Electrical connection



Options

1	Teach input
2	IO-Link COM2
3	Static 1-point teach-in via teach button/line
4	Static 2-point teach-in via teach button/line
5	Dynamic 2-point teach-in via teach button/line
6	Switching threshold adjustment with EasyTune via teach button
7	Switchable pulse stretching
8	Keyboard lockout
9	UL approval (class 2 acc. to NEC)

CONTRAST SCANNERS

Part description Part No.:	Scanning range	Operating voltage	Switching frequency	Light source Light spot	Output	
Multicolor contrast scanner						
KRTM 55 / 2.1121 - S8 50111610	13 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1xNPN	
KRTM 55 / 2.1121, 200 - S12 50110612	13 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1xNPN	
KRTM 55 / 2.1221 - S8 50110614	13 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1xNPN	
KRTM 55 / 2.1221, 200 - S12 50110616	13 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1xNPN	
KRTM 55 / 6.1121 - S8 50111643	13 ± 2mm	10 … 30VDC	10kHz	RGB 1.5 x 6.5mm²	1xPush-pull/DC	

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC

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Contrast scanners

	Connection	Option	Accessories	
	M8 connector	1, 4, 6, 7, 8, 9	a, b, c, d	
	Cable, 0.2m, with M12 connector	1, 4, 6, 7, 8, 9	e, f	
	M8 connector	1, 5, 6, 7, 8, 9	a, b, c, d	
	Cable, 0.2m, with M12 connector	1, 5, 6, 7, 8, 9	e, f	
	M8 connector	1, 2, 4, 6, 7, 8, 9	a, b, c, d	

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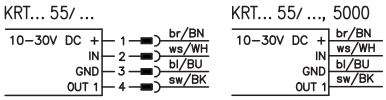
Electrical connection



Options

1 Teach input

2 IO-Link COM2

3 Static 1-point teach-in via teach button/line

4 Static 2-point teach-in via teach button/line

5 Dynamic 2-point teach-in via teach button/line

6 Switching threshold adjustment with EasyTune via teach button

7 Switchable pulse stretching

8 Keyboard lockout

9 UL approval (class 2 acc. to NEC)

CONTRAST SCANNERS

Part description Part No.:	Scanning range	Operating voltage	Switching frequency	Light source Light spot	Output	
White light contrast scanner						
KRTW 55 / 4.1121 - S8 50111642	13 ± 2mm	10 … 30VDC	10kHz	White light 1.5 x 4.0mm²	1 x PNP	
KRTW 55 / 4.1121, 5000 50114075	13 ± 2mm	10 … 30VDC	10kHz	White light 1.5 x 4.0mm²	1 x PNP	
KRTW 55 / 4.1121, 200 - S12 50110602	13 ± 2mm	10 … 30VDC	10kHz	White light 1.5 x 4.0mm²	1 x PNP	
KRTW 55 / 2.1121 - S8 50110601	13 ± 2mm	10 … 30VDC	10kHz	White light 1.5 x 4.0mm²	1xNPN	
KRTW 55 / 2.1121, 200 - S12 50110603	13 ± 2mm	10 … 30VDC	10kHz	White light 1.5 x 4.0mm²	1xNPN	
KRTW 55 / 6.1121 - S8 50111641	13 ± 2mm	10 … 30VDC	10kHz	White light 1.5 x 4.0mm²	1xPush-pull/DC	

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000mm, M8 axial, 4-pin, PVC
e	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
f	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC

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Contrast scanners

	Connection	Option	Accessories	
	M8 connector	1, 4, 6, 7, 8, 10	a, b, c, d	
	Cable, 5 m	1, 4, 6, 7, 8, 10		
	Cable, 0.2 m, with M12 connector	1, 4, 6, 7, 8, 10	e, f	
	M8 connector	1, 4, 6, 7, 8, 10	a, b, c, d	
	Cable, 0.2 m, with M12 connector	1, 4, 6, 7, 8, 10	e, f	
	M8 connector	1, 2, 4, 6, 7, 8, 10	a, b, c, d	

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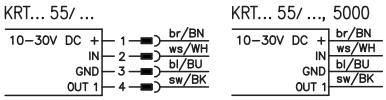
Electrical connection



Options

1	Teach input
2	IO-Link COM2
3	Static 1-point teach-in via teach button/line
4	Static 2-point teach-in via teach button/line
5	Dynamic 2-point teach-in via teach button/line
6	Switching threshold adjustment with EasyTune via teach button
7	Switchable pulse stretching
8	Keyboard lockout
9	Light spot orientation horizontal
10	UL approval (class 2 acc. to NEC)

CONTRAST SCANNERS

Part description Part No.:	Scanning range	Operating voltage	Switching frequency	Light source Light spot	Output	
RGB multicolor contrast scanners						
KRTM 20B/4.4110 - S12 50112446	13.5 ± 3mm	10 … 30VDC	6kHz (internally)	RGB light 4.0 x 1.5mm²	PNP	
KRTM 20B/4.5110 - S12 50112447	13.5 ± 3mm	10 … 30VDC	6kHz (internally)	RGB light 4.0 x 1.5mm²	PNP	
KRTM 20B/4.4121 - S12 50111627	13.5 ± 3mm	10 … 30VDC	10kHz (internally)	RGB light 4.0 x 1.5mm²	PNP	
KRTM 20B/4.4221 - S12 50111633	13.5 ± 3mm	10 … 30VDC	10kHz (internally)	RGB light 4.0 x 1.5mm²	PNP	
KRTM 20B/4.5121 - S12 50111628	13.5 ± 3mm	10 … 30VDC	10kHz (internally)	RGB light 4.0 x 1.5mm²	PNP	
KRTM 20B/4.5221 - S12 50111634	13.5 ± 3mm	10 … 30VDC	10kHz (internally)	RGB light 4.0 x 1.5mm²	PNP	
KRTM 20B/4.6121 - S12 50111771	13.5 ± 3mm	10 … 30VDC	10kHz (internally)	RGB light 1.5 x 4mm²	PNP	

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000mm, M12 axial, 4-pin, PVC

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KRT 20B

Contrast scanners

	Connection	Option	Accessories	
	M12 connector	1, 4, 7	a, b, c, d, e, f	
	M12 connector	1, 5, 7	a, b, c, d, e, f	
	M12 connector	2, 4, 7	a, b, c, d, e, f	
	M12 connector	3, 4, 7	a, b, c, d, e, f	
	M12 connector	2, 5, 7	a, b, c, d, e, f	
	M12 connector	3, 5, 7	a, b, c, d, e, f	
	M12 connector	2, 4, 6, 7	a, b, c, d, e, f	

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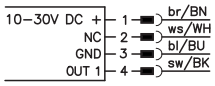
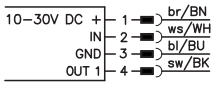


KRTM 20B/... 21–S12



Options

1	Static 2-point teach-in via teach button
2	Static 2-point teach-in via teach button/input
3	Dynamic 2-point teach-in via teach button/input
4	Light beam gate on face
5	Light beam gate on front
6	Light spot orientation horizontal
7	UL approval (class 2 acc. to NEC)

CONTRAST SCANNERS

Part description Part No.:	Scanning range	Operating voltage	Switching frequency	Light source Light spot	Output
RGB multicolor contrast scanners					
KRTM 20B/2.4110 - S12 50110600	13.5 ± 3mm	10 … 30VDC	6kHz (internally)	RGB light 4.0 x 1.5mm²	NPN
KRTM 20B/2.5110 - S12 50112445	13.5 ± 3mm	10 … 30VDC	6kHz (internally)	RGB light 4.0 x 1.5mm²	NPN
KRTM 20B/2.4121 - S12 50111629	13.5 ± 3mm	10 … 30VDC	10kHz (internally)	RGB light 4.0 x 1.5mm²	NPN
KRTM 20B/2.4221 - S12 50111635	13.5 ± 3mm	10 … 30VDC	10kHz (internally)	RGB light 4.0 x 1.5mm²	NPN
KRTM 20B/2.5121 - S12 50111630	13.5 ± 3mm	10 … 30VDC	10kHz (internally)	RGB light 4.0 x 1.5mm²	NPN
KRTM 20B/2.5221 - S12 50111636	13.5 ± 3mm	10 … 30VDC	10kHz (internally)	RGB light 4.0 x 1.5mm²	NPN
KRTM 20B/6.4121 - S12 50111625	13.5 ± 3mm	10 … 30VDC	10kHz (internally)	RGB light 1.5 x 4mm²	Push-pull/DC
KRTM 20B/6.5121 - S12 50111626	13.5 ± 3mm	10 … 30VDC	10kHz (internally)	RGB light 1.5 x 4mm²	Push-pull/DC

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000mm, M12 axial, 4-pin, PVC

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KRT 20B

Contrast scanners

	Connection	Option	Accessories	
	M12 connector	1, 4, 7	a, b, c, d, e, f	
	M12 connector	1, 5, 7	a, b, c, d, e, f	
	M12 connector	2, 4, 7	a, b, c, d, e, f	
	M12 connector	3, 4, 7	a, b, c, d, e, f	
	M12 connector	2, 5, 7	a, b, c, d, e, f	
	M12 connector	3, 5, 7	a, b, c, d, e, f	
	M12 connector	2, 4, 6, 7	a, b, c, d, e, f	
	M12 connector	2, 5, 6, 7	a, b, c, d, e, f	

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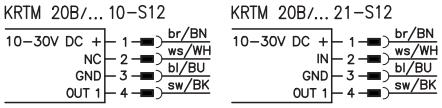
Electrical connection



Options

1	Static 2-point teach-in via teach button
2	Static 2-point teach-in via teach button/input
3	Dynamic 2-point teach-in via teach button/input
4	Light beam gate on face
5	Light beam gate on front
6	IO-Link COM2
7	UL approval (class 2 acc. to NEC)

CONTRAST SCANNERS

Part description Part No.:	Scanning range	Operating voltage	Switching frequency	Light source Light spot	Output	
White light contrast scanner						
KRTW 20B/4.4121 - S12 50111621	13.5 ± 3mm	10 … 30VDC	10kHz (internally)	White light 4.0 x 1.5mm²	PNP	
KRTW 20B/4.5121 - S12 50111622	13.5 ± 3mm	10 … 30VDC	10kHz (internally)	White light 4.0 x 1.5mm²	PNP	
KRTW 20B/4.6121 - S12 50111770	13.5 ± 3mm	10 … 30VDC	10kHz (internally)	White light 1.5 x 4mm²	PNP	
KRTW 20B/2.4121 - S12 50111623	13.5 ± 3mm	10 … 30VDC	10kHz (internally)	White light 4.0 x 1.5mm²	NPN	
KRTW 20B/2.5121 - S12 50111624	13.5 ± 3mm	10 … 30VDC	10kHz (internally)	White light 4.0 x 1.5mm²	NPN	
KRTW 20B/6.4121 - S12 50111619	13.5 ± 3mm	10 … 30VDC	10kHz (internally)	White light 4.0 x 1.5mm²	Push-pull/DC	

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000mm, M12 axial, 4-pin, PVC

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KRT 20B

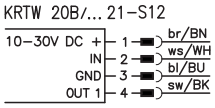
Contrast scanners

	Connection	Option	Accessories	
	M12 connector	1, 2, 6	a, b, c, d, e, f	
	M12 connector	1, 3, 6	a, b, c, d, e, f	
	M12 connector	1, 2, 4, 6	a, b, c, d, e, f	
	M12 connector	1, 2, 6	a, b, c, d, e, f	
	M12 connector	1, 3, 6	a, b, c, d, e, f	
	M12 connector	1, 2, 5, 6	a, b, c, d, e, f	

Optical Sensor ABC

- Contrast scanners Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1	Static 2-point teach-in via teach button/input
2	Light beam gate on face
3	Light beam gate on front
4	Light spot orientation horizontal
5	IO-Link COM2
6	UL approval (class 2 acc. to NEC)

CONTRAST SCANNERS

Part description Part No.:	Scanning range [1]	Operating voltage	Switching frequency	Light source Light spot	Output	
RGB multicolor contrast scanners						
KRTM 20 M/P - 12 - 6420 - S12 50116474	12 ± 1 mm	12 … 30 VDC	25/50 kHz (digital)	RGB light 3.0 x 1.0 mm²	PNP	
KRTM 20 M/P - 20 - 6320 - S12 50113435	20 ± 2 mm	12 … 30 VDC	25/50 kHz (digital)	RGB light 4.0 x 1.2 mm²	PNP	
KRTM 20 M/P - 20 - 3320 - S12 50114202	20 ± 2 mm	12 … 30 VDC	25/50 kHz (digital)	RGB light Ø 0.6 mm	PNP	
KRTM 20 M/N - 20 - 6320 - S12 50113436	20 ± 2 mm	12 … 30 VDC	25/50 kHz (digital)	RGB light 4.0 x 1.2 mm²	NPN	
KRTM 20 M/N - 20 - 3320 - S12 50114201	20 ± 2 mm	12 … 30 VDC	25/50 kHz (digital)	RGB light Ø 0.6 mm	NPN	

1) Other scanning ranges of 12 ± 1 mm, 20 ± 2 mm or 50 ± 5 mm are possible by changing the lens.

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000 mm, M12 angular, 5-pin, PVC
b	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000 mm, M12 axial, 5-pin, PVC
c	50034051	OB 12 - KRT 20	Lens for 12 mm scanning range
d	50034050	OB 20 - KRT 20	Lens for 20 mm scanning range
e	50034049	OB 50 - KRT 20	Lens for 50 mm scanning range
f	50034118	WZ - OB - KRT 20	Tool for changing lenses

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KRTM 20

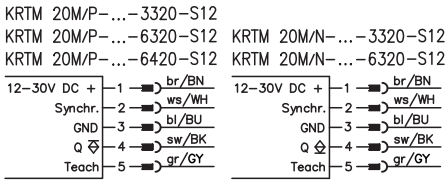
Contrast scanners

	Connection	Option	Accessories	
	M12 connector	2, 3, 4, 7, 8, 9	a, b, c, d, e, f	
	M12 connector	1, 3, 4, 7, 8, 9	a, b, c, d, e, f	
	M12 connector	1, 3, 4, 7, 8, 9	a, b, c, d, e, f	
	M12 connector	1, 3, 4, 7, 8, 9	a, b, c, d, e, f	
	M12 connector	1, 3, 4, 7, 8, 9	a, b, c, d, e, f	

Optical Sensor ABC

- Contrast scanners Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1	Static teach-in via teach button/line
2	Dynamic teach-in via teach button/line
3	Synchronous input
4	High resolution design: 70 gray levels for digital/ 400 gray levels for analog
5	Cut-marking system with memory for 128 data sets
6	Freely programmable via protocol interface (buttons disabled)
7	Switchable pulse stretching
8	Light/dark switching
9	UL approval

CONTRAST SCANNERS

Part description Part No.:	Scanning range [1]	Operating voltage	Switching frequency	Light source Light spot	Output	
RGB multicolor contrast scanners						
KRTM 20 M/V - 20 - 0004 - S12 50041007	20 ± 2mm	12 … 30VDC	16kHz (digital)	RGB light 4.0 x 1.2mm²	Analog/mA PNP	
KRTM 20 M/V - 20 - 0001 - S12 50035674	20 ± 2mm	12 … 30VDC	16kHz (digital)	RGB light 4.0 x 1.2mm²	Analog/mA PNP	
KRTM 20 M/C - 20 - 6526 - S12 50113438	20 ± 2mm	12 … 30VDC	25/50kHz (digital)	RGB light 4.0 x 1.2mm²	Analog/mA PNP	
KRTM 20 M/C - 20 - 6626 - S12 50113437	20 ± 2mm	12 … 30VDC	25/50kHz (digital)	RGB light 4.0 x 1.2mm²	Analog/mA NPN	
KRTM 20 M/P - 50 - 6320 - S12 50116177	50 ± 5mm	12 … 30VDC	25/50kHz (digital)	RGB light 10.0 x 2.0mm²	PNP	

1) Other scanning ranges of 12 ± 1mm, 20 ± 2mm or 50 ± 5mm are possible by changing the lens.

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000mm, M12 angular, 5-pin, PVC
b	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000mm, M12 axial, 5-pin, PVC
c	50034051	OB 12 - KRT 20	Lens for 12mm scanning range
d	50034050	OB 20 - KRT 20	Lens for 20mm scanning range
e	50034049	OB 50 - KRT 20	Lens for 50mm scanning range
f	50034118	WZ - OB - KRT 20	Tool for changing lenses

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KRTM 20

Contrast scanners

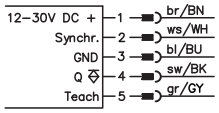
	Connection	Option	Accessories	
	M12 connector	1, 5, 7, 8, 9	a, b, c, d, e, f	
	M12 connector	6, 9	a, b, c, d, e, f	
	M12 connector	1, 4, 7, 8, 9	a, b, c, d, e, f	
	M12 connector	1, 4, 7, 8, 9	a, b, c, d, e, f	
	M12 connector	1, 3, 4, 7, 8, 9	a, b, c, d, e, f	

Optical Sensor ABC

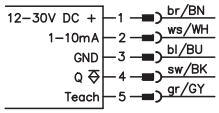
- Contrast scanners Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection

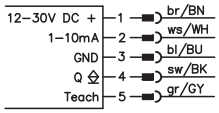
KRTM 20M/P-...-6320-S12



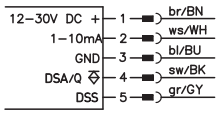
KRTM 20M/C-...-6526-S12



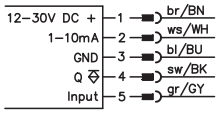
KRTM 20M/C-...-6626-S12



KRTM 20M/V-20-0004-S12



KRTM 20M/V-20-0001-S12

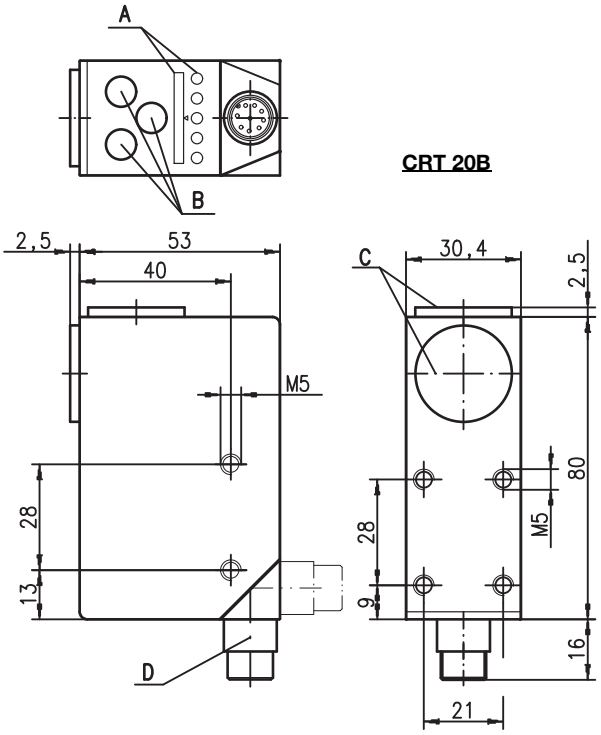


Options

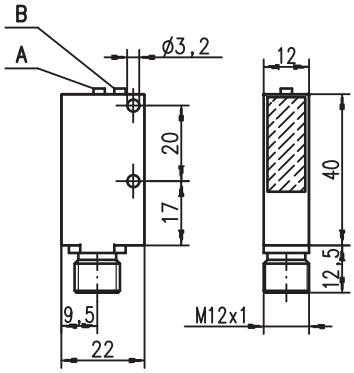
1	Static teach-in via teach button/line
2	Dynamic teach-in via teach button/line
3	Synchronous input
4	High resolution design: 70 gray levels for digital/ 400 gray levels for analog
5	Cut-marking system with memory for 128 data sets
6	Freely programmable via protocol interface (buttons disabled)
7	Switchable pulse stretching
8	Light/dark switching
9	UL approval

OVERVIEW OF COLOR SENSORS

Dimensioned drawing



CRT 20B



CRT 442

A Display elements
B Control buttons
C Lens
D 90° turning connector

Further details can be found in the respective data sheet.

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CRT 20B / 442

Color sensors	Scanning ranges	Page
Color sensors - digital output CRT 20B	12.5 / 60mm	468
Color sensors - digital output CRT 442	12.5mm	470

Additional products - special sensors:

Contrast scanners	KRT… 3B, KRTG 8, KRT… 20	438
Luminescence scanners	LRT 8, LRT 440	472

Common technical data

Electrical data	Operating voltage U_B	10 … 30 / 24VDC
	Residual ripple	≤ 15% of U_B
	Open-circuit current	≤ 80mA/≤ 60mA
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Green LED	Ready to operate
	Yellow LED	Switching state/error
	Orange LED (CRT 448…)	Teach-in
Mechanical data	Housing	ABS / metal
	Optics cover	Glass
	Weight (…448/…20)	11g/125g/300g
Environmental data	Ambient temperature (operation)	-10°C … +55°C …20: -25°C … +55°C
	Protection class	IP 67
	LED class	1 acc. to EN 60825-1
	Standards applied	IEC 60947-5-2, UL 508

Mounting systems for this series can be found from **page 552** onwards

Features

- **Scanning ranges of 12.5mm and 60mm**
- **Simple assignment of colors with teach function**
- **Reversible transmitter colors for sensitive measurement tasks**
- **High switching frequencies**
- **Up to 4 digital switching outputs**

Optical Sensor ABC

- Color sensors Page 595

COLOR SENSORS

Part description Part No.:	Scanning range	Operating voltage	Switching frequency	Light source Light spot	Output	
Color sensors with digital output						
CRT 20B M/P - 60 - 001 - S12 50109597	60mm	10 … 30VDC	6kHz	RGB light 13.0 x 13.0mm²	1 x PNP	
CRT 20B M/P - 60 - 004 - S12 50109601	60mm	10 … 30VDC	3.5kHz	RGB light 13.0 x 13.0mm²	4 x PNP	
CRT 20B M/N - 60 - 001 - S12 50109595	60mm	10 … 30VDC	6kHz	RGB light 13.0 x 13.0mm²	1xNPN	
CRT 20B M/N - 60 - 004 - S12 50109599	60mm	10 … 30VDC	3.5kHz	RGB light 13.0 x 13.0mm²	4xNPN	
CRT 20B M/P - 12 - 001 - S12 50109596	12.5mm	10 … 30VDC	6kHz	RGB light 4.0 x 2.0mm²	1 x PNP	
CRT 20B M/P - 12 - 004 - S12 50109600	12.5mm	10 … 30VDC	3.5kHz	RGB light 4.0 x 2.0mm²	4 x PNP	
CRT 20B M/N - 12 - 001 - S12 50109594	12.5mm	10 … 30VDC	6kHz	RGB light 4.0 x 2.0mm²	1xNPN	
CRT 20B M/N - 12 - 004 - S12 50109598	12.5mm	10 … 30VDC	3.5kHz	RGB light 4.0 x 2.0mm²	4xNPN	

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000mm, M12 angular, 5-pin, PVC
b	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000mm, M12 axial, 5-pin, PVC
c	50104591	K - D M12A - 8P - 2m - PUR	Connection cable 2000mm, M12 axial, 8-pin, PUR
d	50104590	K - D M12A - 8P - 5m - PUR	Connection cable 5000mm, M12 axial, 8-pin, PUR

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CRT 20B

Color sensors

	Connection	Option	Accessories	
	M12 connector	1, 3	a, b	
	M12 connector	2, 3	c, d	
	M12 connector	1, 3	a, b	
	M12 connector	2, 3	c, d	
	M12 connector	1, 3	a, b	
	M12 connector	2, 3	c, d	
	M12 connector	1, 3	a, b	
	M12 connector	2, 3	c, d	

Optical Sensor ABC

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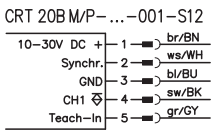
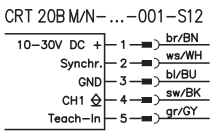
- Outputs Page 598

Electrical connection

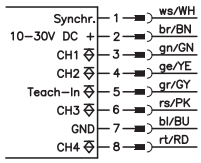
CRT 20B M/P-...-001-S12



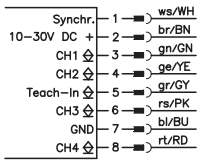
CRT 20B M/N-...-001-S12



CRT 20B M/P-...-004-S12



CRT 20B M/N-...-004-S12



Options

1	Color sensor with 1 channel, teach-in of reference color
2	Color sensor with 4 channels, teach-in of reference color
3	UL approval

COLOR SENSORS

Part description Part No.:	Scanning range	Operating voltage	Switching frequency	Light source Light spot	Output	
Color sensors with digital output						
CRT 442 K/P - 12 - 001 - S12 50109603	12.5 ± 2mm	24VDC ± 20%	1.5kHz	RGB light 1.5 x 6.5mm²	1 x PNP	
CRT 442 K/N - 12 - 001 - S12 50109602	12.5 ± 2mm	24VDC ± 20%	1.5kHz	RGB light 1.5 x 6.5mm²	1xNPN	

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e	50104547	K - D M12W - 4P - 10m - PVC	Connection cable 10000mm, M12 angular, 4-pin, PVC
f	50104546	K - D M12A - 4P - 10m - PVC	Connection cable 10000mm, M12 axial, 4-pin, PVC

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CRT 442

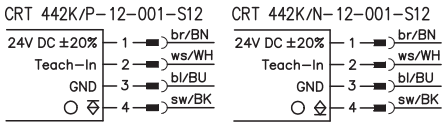
Color sensors

	Connection	Option	Accessories	
	M12 connector	1, 2	a, b, c, d, e, f	
	M12 connector	1, 2	a, b, c, d, e, f	

Optical Sensor ABC

- Color sensors Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection



Options

1 Teach-in of reference color

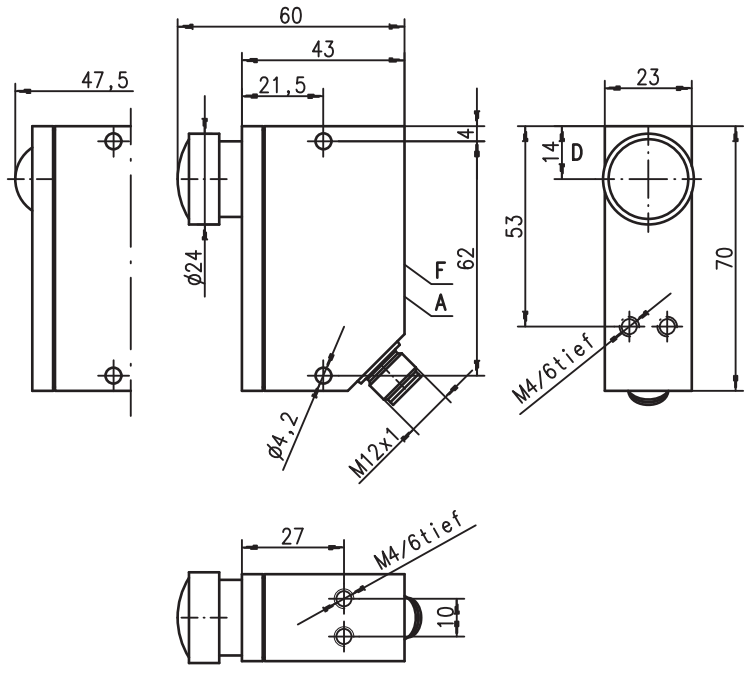
2 UL approval

OVERVIEW OF LUMINESCENCE SCANNERS

Dimensioned drawing LRT 8... see **8 Series standard sensors** on **page 64**.

Dimensioned drawing

LRT 440 / 24 - 50 - ... **LRT 440 / 24 - 150 - ...**



A Indicator diode
B Transmitter
C Receiver
D Optical axis
E Sensitivity adjustment
F Control button panel

Further details can be found in the respective data sheet.

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LRT 8 / 440

Luminescence scanners	Scanning ranges	Page
Luminescence scanner LRT 8	0 … 50mm / 0 … 100mm	474
Luminescence scanner LRT 440	0 … 150mm	474

Additional products - special sensors:

Contrast scanners	KRT… 3B, KRT… 55, KRT… 20	438
Color sensors	CRTM 20, CRT 20B, CRT 442	466

Common technical data

Electrical data	Operating voltage U_B	10 … 30VDC
	Residual ripple	≤ 15% of U_B
	Open-circuit current	≤ 35mA/≤ 40mA
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Yellow LED	Obj. detected/Reflection
Mechanical data	Housing	Metal
	Optics cover	Glass
	Weight (…8/…440)	70g/250g
Environmental data	Ambient temperature (operation)	-20°C … +60°C
	Protection class	IP 67
	Standards applied	IEC 60947-5-2, UL 508 1)

1) LRT 8 only

Mounting systems for this series can be found from **page 553** onwards

Features

- **Scanning ranges up to 150mm**
- **Among others, luminescence scanners in compact housings**
- **Filter possibility for distinguishing between different-colored luminescences**
- **Analog sensitivity adjustment via connector interface**

1)

Optical Sensor ABC

- Luminescence scanners Page 595

LUMINESCENCE SCANNERS

Part description Part No.:	Scanning range	Operating voltage	Switching frequency	Light source	Output
Luminescence scanners					
LRT 8 / 24.00 - 50 - S12 50041839	0 … 50mm	10 … 30VDC	1500Hz	UV light, LED	1 x PNP 1 x NPN
LRT 8 / 24.04 - 50 - S12 50041840	0 … 50mm	10 … 30VDC	1500Hz	UV light, LED	1 x PNP 1 x NPN
LRT 8 / 24.04 - 100 - S12 50109343	0 … 100mm	10 … 30VDC	1500Hz	UV light, LED	1 x PNP 1 x NPN
LRT 440 / 24 - 150 - 000 - S12 50115505	0 … 150mm	10 … 30VDC	600Hz	Blue light, LED	1 x PNP 1 x NPN
LRT 440 / 24 - 150 - 004 - S12 50037909	0 … 150mm	10 … 30VDC	600Hz	UV light, LED	1 x PNP 1 x NPN
LRT 440 / 24 - 50 - 104 - S12 50037910	0 … 50mm	10 … 30VDC	600Hz	UV light, LED	Analog/mA 1xPNP 1xNPN

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000mm, M12 angular, 5-pin, PVC
f	50104557	K - D M12A - 5P - 5m - PVC	Connection cable 5000mm, M12 axial, 5-pin, PVC

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CRT
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LRT
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LRT 8 / 440

Luminescence scanners

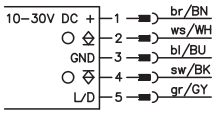
	Connection	Option	Accessories	
	M12 connector	1, 3, 6, 7	e, f	
	M12 connector	1, 3, 4, 5, 6, 7	e, f	
	M12 connector	1, 3, 4, 5, 6, 7	e, f	
	M12 connector	2, 3	a, b, c, d	
	M12 connector	2, 4, 5	a, b, c, d	
	M12 connector	2, 4, 5	e, f	

Optical Sensor ABC

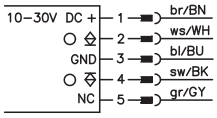
- Luminescence scanners Page 595
- Connection types Page 598
- Outputs Page 598

Electrical connection

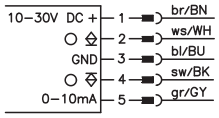
LRT 8/24.00–50–S12
LRT 8/24.04–50–S12
LRT 8/24.04–100–S12



LRT 440/24–150–000–S12
LRT 440/24–150–004–S12



LRT 440/24–50–104–S12



Options

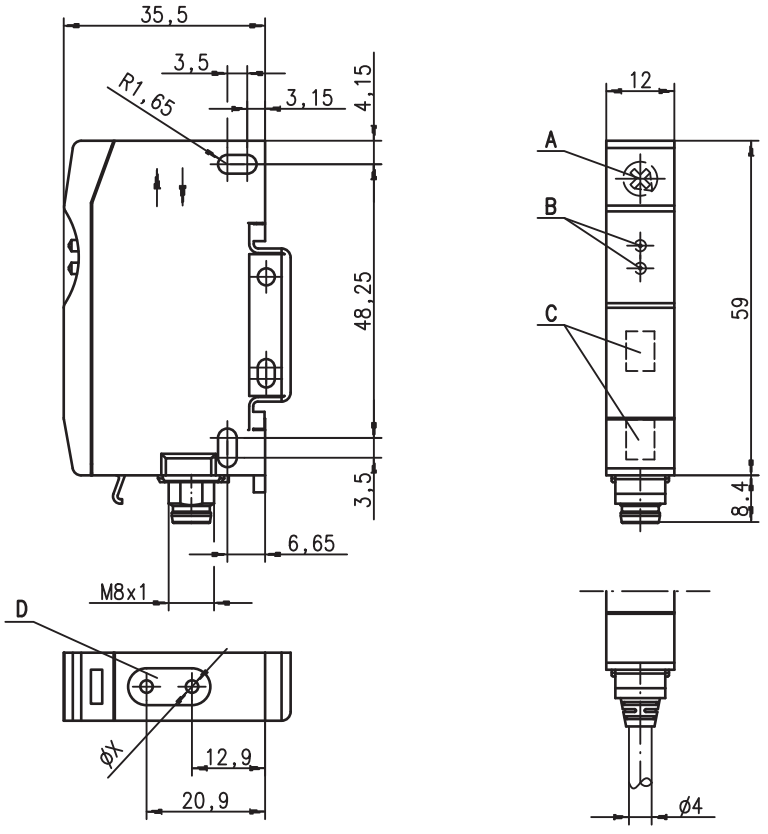
1	Sensitivity adjustment via potentiometer
2	Sensitivity adjustment in 256 levels via buttons
3	For detecting red luminescence
4	For detecting blue/colorless luminescence
5	For detecting yellow/yellow-green luminescence
6	Light/dark switching
7	UL approval

OVERVIEW OF FIBER OPTIC AMPLIFIERS

Dimensioned drawing

	X
LVSR 325K/P-201	ø 2.2
LVSR 325K/P-202-S8	ø 2.2
LVSR 325K/N-201	ø 2.2
LVSR 325K/N-202-S8	ø 2.2
LVSR 325K/P-401	ø 4
LVSR 325K/P-402-S8	ø 4

Further details can be found in the respective data sheet.



A Fiber optics fixing screw
B Indicator diodes
C Sensitivity adjustment
D Fiber optics input

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LVSR 325

Fiber optic amplifiers	Fiber optics	Page
Fiber optic amplifier LVSR 325	Plastic / glass fiber	478

Additional products:

	Fiber optic amplifier	LVSR 424	480
GLL	Glass fiber optics	GF	484
KLL	Plastic fiber optics	KF	490

Common technical data

Electrical data	Operating voltage U_B	10 … 30VDC
	Residual ripple	≤ 10% of U_B
	Open-circuit current	≤ 25mA
	Signal voltage high/low	≥ (U_B-2V)/≤ 2V
Indicators	Green LED	Ready/Teach-in
	Yellow LED	Switching output
	Red LED	Performance res./Teach-in
Mechanical data	Housing	Plastic
	Fiber optic connection	Screw connection
	Weight (without cable)	30g
Environmental data	Ambient temperature (operation)	-20°C … +70°C
	Protection class	IP 65

Features

- **For plastic or glass fiber optics**
- **Teach-in for optimum sensitivity adjustment**
- **Activation or teach input**
- **Warning output**

CE

Optical Sensor ABC

- Fiber optic sensors Page 596

FIBER OPTIC AMPLIFIERS

Part description Part No.:	Fiber optics	Light source	Output	Switching	
Fiber optic amplifiers for glass and plastic fiber optic cables					
LVSR 325 K / P - 402 - S8 50081301	Glass fiber GF, Ø 4mm	Red light	PNP	Light/dark configurable	
LVSR 325 K / P - 401 50081300	Glass fiber GF, Ø 4mm	Red light	PNP	Light/dark configurable	
LVSR 325 K / P - 202 - S8 50081298	Plastic KF, Ø 2.2mm	Red light	PNP	Light/dark configurable	
LVSR 325 K / P - 201 50081297	Plastic KF, Ø 2.2mm	Red light	PNP	Light/dark configurable	
LVSR 325 K / N - 202 - S8 50033579	Plastic KF, Ø 2.2mm	Red light	NPN	Light/dark configurable	
LVSR 325 K / N - 201 50033581	Plastic KF, Ø 2.2mm	Red light	NPN	Light/dark configurable	

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104525	K - D M8W - 4P - 2m - PVC	Connection cable 2000mm, M8 angular, 4-pin, PVC
b	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000mm, M8 axial, 4-pin, PVC
c	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC
d	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000mm, M8 axial, 4-pin, PVC
e	50104529	K - D M8W - 4P - 10m - PVC	Connection cable 10000mm, M8 angular, 4-pin, PVC
f	50104528	K - D M8A - 4P - 10m - PVC	Connection cable 10000mm, M8 axial, 4-pin, PVC

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LVSR 325

Fiber optic amplifiers

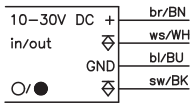
	Connection	Option	Accessories	
	M8 connector	1	a, b, c, d, e, f	
	Cable, 2 m	1		
	M8 connector	1	a, b, c, d, e, f	
	Cable, 2 m	1		
	M8 connector	1	a, b, c, d, e, f	
	Cable, 2 m	1		

Optical Sensor ABC

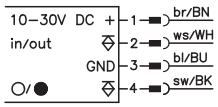
- Fiber optic sensors Page 596
- Connection types Page 598
- Outputs Page 598

Electrical connection

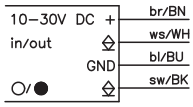
LVSR 325K/P–201
LVSR 325K/P–401



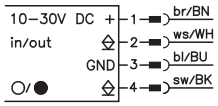
LVSR 325K/P–202–S8
LVSR 325K/P–402–S8



LVSR 325K/N–201



LVSR 325K/N–202–S8

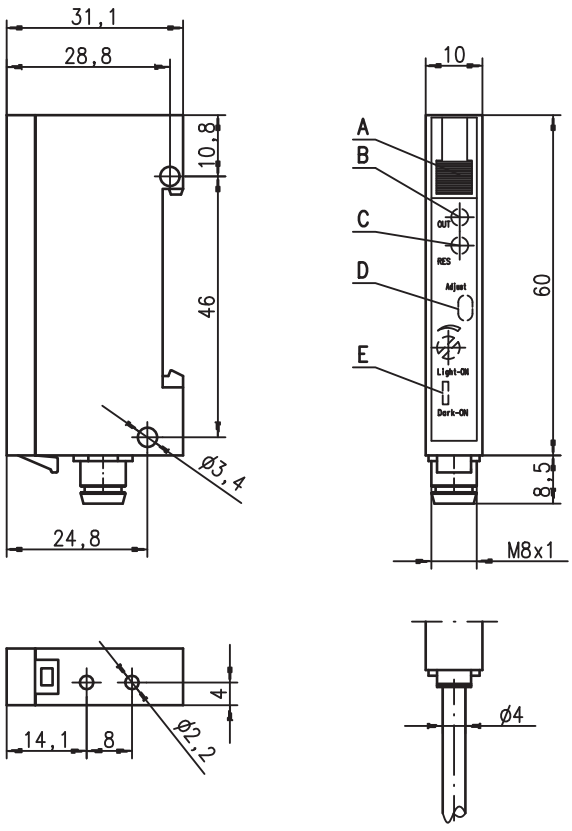


Options

1 Teach-in via buttons

OVERVIEW OF FIBER OPTIC AMPLIFIERS

Dimensioned drawing



Further details can be found in the respective data sheet.

A Clamping lever for fiber optic
B Yellow indicator diode
C Green indicator diode
D Sensitivity adjustment
E Light/dark switching

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LVSR 424

Fiber optic amplifiers	Fiber optics	Page
Fiber optic amplifier LVSR 424	Plastic	482

Additional products:

Fiber optic amplifier	LVSR 325	476
Glass fiber optics	GF	484
Plastic fiber optics	KF	490

Common technical data

Electrical data	Operating voltage U_B	10 … 30VDC
	Residual ripple	≤ 10% of U_B
	Open-circuit current	≤ 15mA
	Signal voltage high/low	≥ (U_B-2.5V)/≤ 2.5V
Indicators	Green LED	Performance reserve
	Yellow LEDs	Object detected
Mechanical data	Housing	Plastic (PBTP)
	Fiber optic connection	Clamp
	Weight (without cable)	18g
Environmental data	Ambient temperature (operation)	-25°C … +55°C
	Protection class	IP 64
	Standards applied	IEC 60947-5-2

Features

- **For plastic fiber optics**
- **12-turn potentiometer for sensitivity adjustment**
- **Warning output**
- **3-pin or 4-pin plug connection**

CE

Optical Sensor ABC

- Fiber optic sensors Page 596

FIBER OPTIC AMPLIFIERS

Part description Part No.:	Fiber optics	Light source	Output	Switching	
Fiber optic amplifiers for plastic fiber optics					
LVSR 424 / P - 203 - S8 50102992	Plastic KF, Ø 2.2 mm	Red light	PNP	Light/dark reversible	
LVSR 424 / P - 204 - S8 50103475	Plastic KF, Ø 2.2 mm	Red light	PNP	Light/dark reversible	
LVSR 424 / P - 204 50103515	Plastic KF, Ø 2.2 mm	Red light	PNP	Light/dark reversible	
LVSR 424 / N - 204 - S8 50107069	Plastic KF, Ø 2.2 mm	Red light	NPN	Light/dark reversible	
LVSR 424 / N - 204 50103516	Plastic KF, Ø 2.2 mm	Red light	NPN	Light/dark reversible	

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104521	K - D M8W - 3P - 2m - PVC	Connection cable 2000 mm, M8 angular, 3-pin, PVC
b	50104520	K - D M8A - 3P - 2m - PVC	Connection cable 2000 mm, M8 axial, 3-pin, PVC
c	50104523	K - D M8W - 3P - 5m - PVC	Connection cable 5000 mm, M8 angular, 3-pin, PVC
d	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000 mm, M8 axial, 3-pin, PVC
e	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000 mm, M8 angular, 4-pin, PVC
f	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000 mm, M8 axial, 4-pin, PVC

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LVSR 424

Fiber optic amplifiers

	Connection	Option	Accessories	
	M8 connector, 3-pin	1	a, b, c, d	
	M8 connector, 4-pin	1, 2	e, f	
	Cable, 2 m	1, 2		
	M8 connector, 4-pin	1, 2	e, f	
	Cable, 2 m	1, 2		

Optical Sensor ABC

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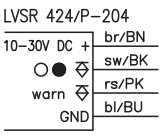
- Connection types Page 598
- Outputs Page 598

Electrical connection

LVSR 424/P–204



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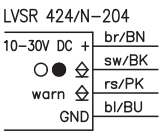
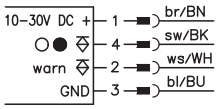
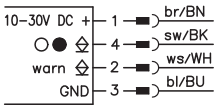


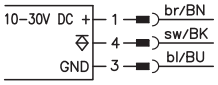
LVSR 424/P–204–S8



LVSR 424/N–204–S8



LVSR 424/P–203–S8

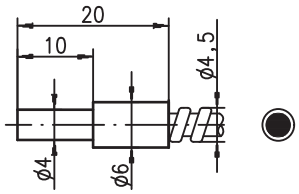
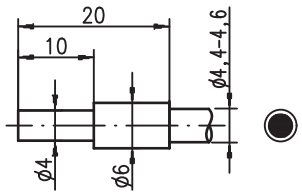


Options

1 Sensitivity adjustment via 12-turn potentiometer

2 Warning output

GLASS FIBER OPTICS

Dimensioned drawing of light beam gate	Part description Part No.:	Operating range	Fiber length sheathing [1]	Active light diameter (A)
Function: throughbeam sensor				
	**GF 500 / 1 LS - MS** 50001030	250 mm [2]	500 mm Brass	Ø 1.14 mm
	GF 1000 / 1 LS - MS 50001032	250 mm [2]	1000 mm Brass	Ø 1.14 mm
	GF 500 / 1 LS - VA 50000042	250 mm [2]	500 mm Stainless steel	Ø 1.14 mm
	GF 1000 / 1 LS - VA 50000044	250 mm [2]	1000 mm Stainless steel	Ø 1.14 mm
	**GF 500 / 1 LS - SI** 50006779	250 mm [2]	500 mm Silicone	Ø 1.3 mm
	GF 1000 / 1 LS - SI 50000036	250 mm [2]	1000 mm Silicone	Ø 1.3 mm

1) Operation and storage temp.

Brass: -30 °C ... +200 °C
Stainl. steel: -30 °C ... +200 °C (for short periods +300 °C)
Silicone: -30 °C ... +180 °C (for short periods +200 °C)

2) In combination with LVSR 325

Accessories

	Part No.	Designation	Features
1	50014649	GF - L1	Lens for glass fiber optics
2	50009382	GF - U1	Deflectors for glass fiber optics

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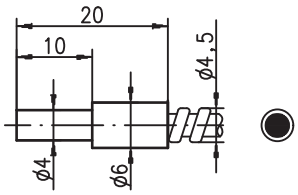
GF

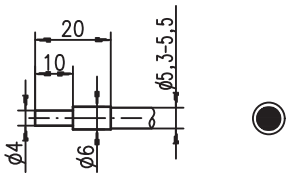
Glass fiber optics

GLL

Dimensioned drawing of light beam gate	Part description Part No.:	Operating range	Fiber length sheathing [1]	Active light diameter (A)
Function: throughbeam sensor				
	**GF 500 / 4 LS - MS** 50001031	300 mm [2]	500 mm Brass	Ø 2.28 mm
	GF 1000 / 4 LS - MS 50001033	300 mm [2]	1000 mm Brass	Ø 2.28 mm
	GF 1500 / 4 LS - MS 50021192	300 mm [2]	1500 mm Brass	Ø 2.28 mm
	GF 2000 / 4 LS - MS 50000051	300 mm [2]	2000 mm Brass	Ø 2.28 mm
	GF 3000 / 4 LS - MS 50024604	300 mm [2]	3000 mm Brass	Ø 2.28 mm
	GF 500 / 4 LS - VA 50000043	300 mm [2]	500 mm Stainless steel	Ø 2.28 mm
	GF 1000 / 4 LS - VA 50000045	300 mm [2]	1000 mm Stainless steel	Ø 2.28 mm
	GF 1500 / 4 LS - VA 50018698	300 mm [2]	1500 mm Stainless steel	Ø 2.28 mm
	GF 2000 / 4 LS - VA 50009331	300 mm [2]	2000 mm Stainless steel	Ø 2.28 mm
	GF 3000 / 4 LS - VA 50039145	300 mm [2]	3000 mm Stainless steel	Ø 2.28 mm
	GF 5000 / 4 LS - VA 50022139	300 mm [2]	5000 mm Stainless steel	Ø 2.28 mm

Fiber optics available in lengths up to 6 m.

GLASS FIBER OPTICS

Dimensioned drawing of light beam gate	Part description Part No.:	Operating range	Fiber length sheathing [1]	Active light diameter (A)
Function: throughbeam sensor				
	**GF 500 / 4 LS - SI** 50000035	300 mm [2]	500 mm Silicone	Ø 2.3 mm
	GF 1000 / 4 LS - SI 50000037	300 mm [2]	1000 mm Silicone	Ø 2.3 mm
	GF 2000 / 4 LS - SI 50041611	300 mm [2]	2000 mm Silicone	Ø 2.3 mm
	GF 3000 / 4 LS - SI 50036128	300 mm [2]	3000 mm Silicone	Ø 2.3 mm

1) Operation and storage temp. Brass: -30 °C ... +200 °C
Stainl. steel: -30 °C ... +200 °C (for short periods +300 °C)
Silicone: -30 °C ... +180 °C (for short periods +200 °C)

2) In combination with LVSR 325

Fiber optics available in lengths up to 6 m.

Accessories

	Part No.	Designation	Features
1	50014649	GF - L1	Lens for glass fiber optics
2	50009382	GF - U1	Deflectors for glass fiber optics

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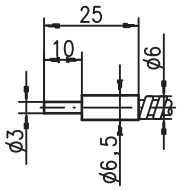
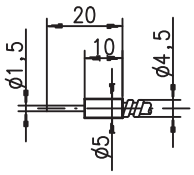
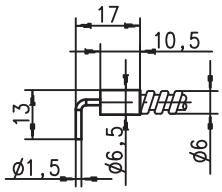
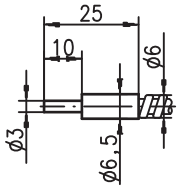
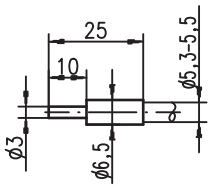
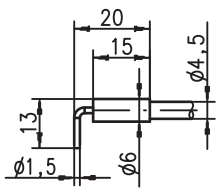
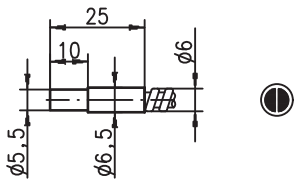
Dimensioned drawing of light beam gate	Part description Part No.:	Scanning range	Fiber length sheathing [1]	Active light diameter (A)
Function: diffuse reflection scanner				
	**GF 500 / 1 RT - MS** 50001034	50 mm [2]	500 mm Brass	Ø 1.8 mm
	GF 1000 / 1 RT - MS 50001036	50 mm [2]	1000 mm Brass	Ø 1.8 mm
	GF 1500 / 1 RT - MS 50019341	50 mm [2]	1500 mm Brass	Ø 1.8 mm
	**GF 600 / 1 RT - MS - D5 - L10** 50105340	20 mm [2]	600 mm Brass	Ø 1.0 mm
	**GF 1000 / 1 RT - MS.1** 50011508	20 mm [2]	1000 mm Brass	Ø 1.0 mm
	**GF 500 / 1 RT - VA** 50000046	50 mm [2]	500 mm Stainless steel	Ø 1.8 mm
	GF 1000 / 1 RT - VA 50000048	50 mm [2]	1000 mm Stainless steel	Ø 1.8 mm
	**GF 500 / 1 RT - SI** 50000038	50 mm [2]	500 mm Silicone	Ø 1.8 mm
	GF 1000 / 1 RT - SI 50000040	50 mm [2]	1000 mm Silicone	Ø 1.8 mm
	**GF 600 / 1 RT - Si - W - 1.5** 50034368	20 mm [2]	600 mm Silicone	Ø 1.0 mm

GLASS FIBER OPTICS

Dimensioned drawing of light beam gate	Part description Part No.:	Scanning range	Fiber length sheathing [1]	Active light diameter (A)
Function: diffuse reflection scanner				
	**GF 500 / 4 RT - MS** 50001035	80 mm [2]	500 mm Brass	Ø 3.5 mm
	GF 1000 / 4 RT - MS 50001037	80 mm [2]	1000 mm Brass	Ø 3.5 mm
	GF 1500 / 4 RT - MS 50023019	80 mm [2]	1500 mm Brass	Ø 3.5 mm
	GF 2000 / 4 RT - MS 50000053	80 mm [2]	2000 mm Brass	Ø 3.5 mm
	GF 2500 / 4 RT - MS 50039392	80 mm [2]	2500 mm Brass	Ø 3.5 mm
	GF 3000 / 4 RT - MS 50022551	80 mm [2]	3000 mm Brass	Ø 3.5 mm
	GF 5000 / 4 RT - MS 50105274	80 mm [2]	5000 mm Brass	Ø 3.5 mm
	GF 6000 / 4 RT - MS 50041477	80 mm [2]	6000 mm Brass	Ø 3.5 mm

1) Operation and storage temp.
Brass: -30 °C ... +200 °C
Stainl. steel: -30 °C ... +200 °C (for short periods +300 °C)
Silicone: -30 °C ... +180 °C (for short periods +200 °C)

2) In combination with LVSR 325

Accessories

	Part No.	Designation	Features
1	50014649	GF - L1	Lens for glass fiber optics
2	50009382	GF - U1	Deflectors for glass fiber optics

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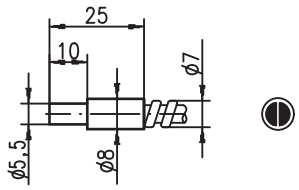
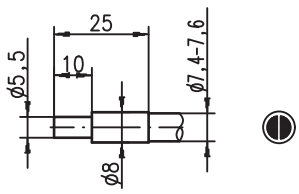
GF

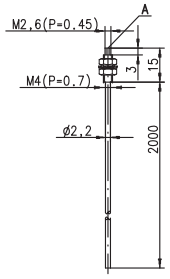
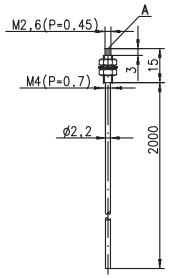
Glass fiber optics

GLL

Dimensioned drawing of light beam gate	Part description Part No.:	Scanning range	Fiber length sheathing [1]	Active light diameter (A)
Function: diffuse reflection scanner				
	**GF 500 / 4 RT - VA** 50000047	80 mm [2]	500 mm Stainless steel	Ø 3.5 mm
	GF 1000 / 4 RT - VA 50000049	80 mm [2]	1000 mm Stainless steel	Ø 3.5 mm
	GF 1500 / 4 RT - VA 50010567	80 mm [2]	1500 mm Stainless steel	Ø 3.5 mm
	GF 2000 / 4 RT - VA 50000054	80 mm [2]	2000 mm Stainless steel	Ø 3.5 mm
	GF 2500 / 4 RT / VA 50041741	80 mm [2]	2500 mm Stainless steel	Ø 3.5 mm
	GF 3500 / 4 RT / VA 50041742	80 mm [2]	3500 mm Stainless steel	Ø 3.5 mm
	**GF 500 / 4 RT - SI** 50000039	80 mm [2]	500 mm Silicone	Ø 3.5 mm
	GF 1000 / 4 RT - SI 50000041	80 mm [2]	1000 mm Silicone	Ø 3.5 mm
	GF 2000 / 4 RT - SI 50010820	80 mm [2]	2000 mm Silicone	Ø 3.5 mm
	GF 3000 / 4 RT - SI 50060384	80 mm [2]	3000 mm Silicone	Ø 3.5 mm

Fiber optics available in lengths up to 6 m.

PLASTIC FIBER OPTICS

Dimensioned drawing	Part description Part No.:	Operating range	Fiber length sheathing [1]	Active light diameter (A)
Function: throughbeam sensor				
	**KF 2000 / 2 LS.4 - 01** 50027775	200 mm [2] 300 mm [3]	2000 mm PVC	Ø 1 mm
	**KF 2000 / 2 LS.4 - 08** 50035309 [4]	200 mm [2] 300 mm [3]	2000 mm PVC	Ø 1 mm

1) Operation and storage temp. PVC: -25 °C ... +80 °C
2) In combination with LVSR 325
3) In combination with LVSR 424
4) Delivery does not include cutting device
5) With bendable end piece, minimum bending radius 10 mm

Accessories

	Part No.	Designation	Features
1	50034065	KF - L1	Attachment lens for greater operating ranges
2	50034064	KF - U1	90° deflector for plastic fiber optics

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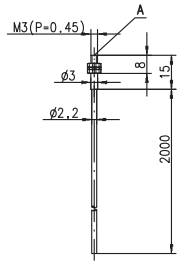
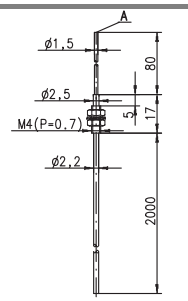
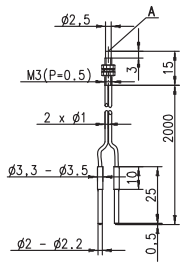
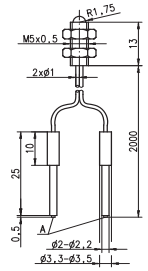
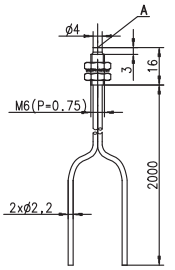
KF

Plastic fiber optics

KLL

Dimensioned drawing	Part description Part No.:	Operating range	Fiber length sheathing [1]	Active light diameter (A)
Function: throughbeam sensor				
	**KF 2000 / 2 LS.4 - 02** 50027780	200 mm [2] 400 mm [3]	2000 mm PVC	Ø 1 mm
	**KF 2000 / 2 LS.5 - 03** 50027781 [5]	200 mm [2] 400 mm [3]	2000 mm PVC	Ø 1 mm

PLASTIC FIBER OPTICS

Dimensioned drawing	Part description Part No.:	Scanning range	Fiber length sheathing [1]	Active light diameter (A)
Function: diffuse reflection scanner				
	**KF 2000 / 1 RT.4 - 06** 50027784	15 mm [2] 25 mm [3]	2000 mm PVC	2 x Ø 0.5 mm
	**KF 2000 / 1 RT - M5 - Z8** 50104483	15 mm [2] 25 mm [3]	2000 mm PVC	2 x Ø 0.5 mm
	**KF 2000 / 2 RT.4 - 04** 50027782	65 mm [2] 100 mm [3]	2000 mm PVC	2 x Ø 0.85 mm

1) Operation and storage temp. PVC: -25 °C ... +80 °C
2) In combination with LVSR 325
3) In combination with LVSR 424
4) With bendable end piece, minimum bending radius 10 mm

Accessories

	Part No.	Designation	Features
1	50034065	KF - L1	Attachment lens for greater operating ranges
2	50034064	KF - U1	90° deflector for plastic fiber optics

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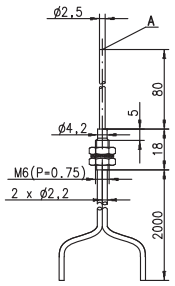
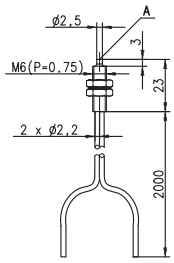
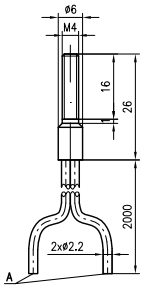
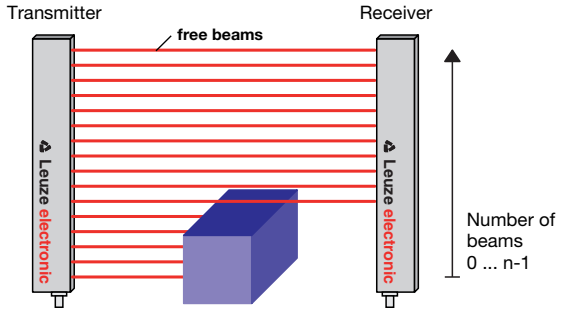
Dimensioned drawing	Part description Part No.:	Scanning range	Fiber length sheathing [1]	Active light diameter (A)
Function: diffuse reflection scanner				
	**KF 2000 / 2 RT.5 - 07** 50027785 [4]	65 mm [2] 100 mm [3]	2000 mm PVC	2 x Ø 0.85 mm
	**KF 2000 / 2 RT.4 - 05** 50027783	80 mm [2] 120 mm [3]	2000 mm PVC	2 x Ø 1.0 mm
	**KF 2000 / 2 RT - M4 - D6** 50105372	80 mm [2] 120 mm [3]	2000 mm PVC	2 x Ø 1.0 mm

SELECTION GUIDE

VARIO B switching light curtains

Measurement principle



The infrared light signal emitted by the transmitter diode is detected at the receiver. If one or more beams are interrupted by an object, this is signalled at the switching output. Triggering of the integrated system and soiling control is signalled via the warning output.

Products and measurement field lengths [mm]

Op. range: **0.7 ... 5m**
Cycle time: **1ms / beam**

VARIO B beam spacing **5mm** from **page 496** onwards
35 155

VARIO B beam spacing **12.5mm** from **page 496** onwards
88 388

VARIO B beam spacing **25mm** from **page 496** onwards
175 775

VARIO B beam spacing **50mm** from **page 496** onwards
350 1550

VARIO B beam spacing **100mm** from **page 496** onwards
700 3100

Features

- Plug'n Play use through factory-set configuration and simple installation
- Can be specially configured to detect optically critical objects
- Integrated control device with signal and warning output
- Measurement field coverage up to 3.2m with an operating range of up to 5m

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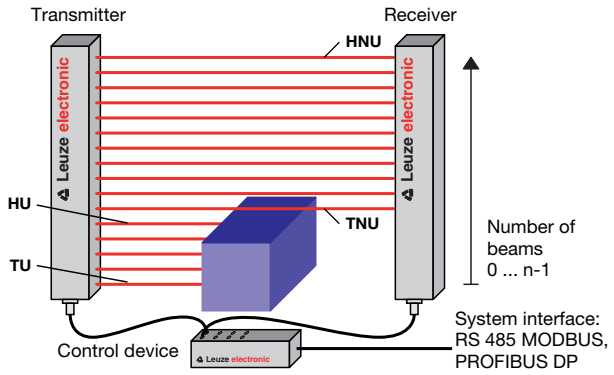
KONTURflex measuring light curtains

Measurement principle



The state of the infrared light field between the transmitter and receiver light strips is analysed in the external control device for configurable functions. The corresponding information is passed on to the primary control via the system interface.

Products and measurement field lengths [mm]

Op. range: **0 … 4m**
Cycle time: **(Σ number of light beams in system + 3) x 50µs**

KONTURflex beam spacing **5mm** from **page 502** onwards

80	2560

KONTURflex beam spacing **10mm** from **page 502** onwards

160	3200

KONTURflex beam spacing **20mm** from **page 502** onwards

160	3200

QUATTRO control device from **page 502** onwards

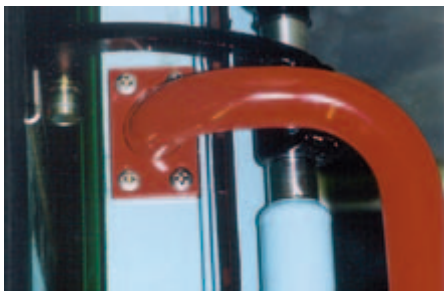
Features

- Up to 4 light curtains with varying number of beams with a total of up to 512 beams per control device
- Configuration of the control device either directly or offline via PC configuration software with subsequent download
- Fast measurement value acquisition dependent on the number of system beams connected to the control device
- Integrated and configurable measurement functions (e.g. hole recognition, web centre recognition, blanking)

OVERVIEW OF SWITCHING LIGHT CURTAINS

Projection control in materials handling

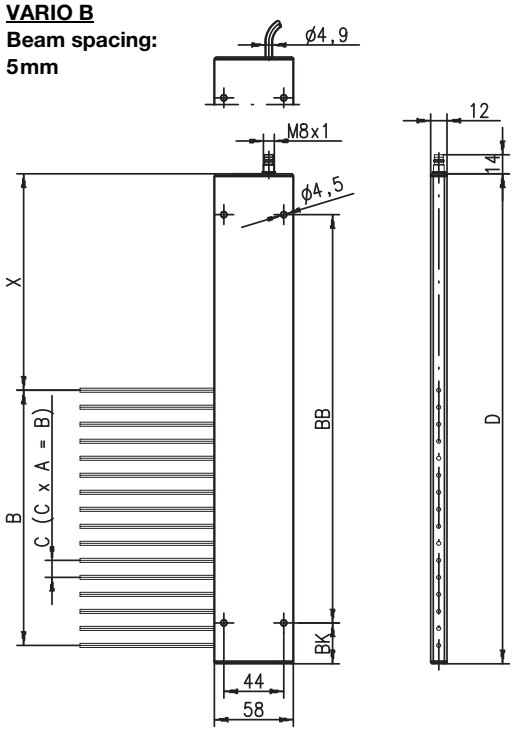
Process control in foil packaging



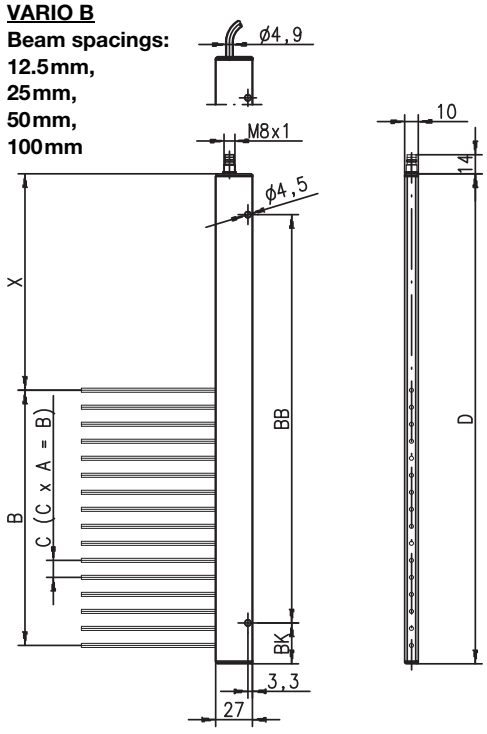
Access control in public transportation

Dimensioned drawing

VARIO B
Beam spacing: 5mm



VARIO B
Beam spacings: 12.5mm, 25mm, 50mm, 100mm



A	Beam spacing
B	Measurement field length
C	Number of beams
D	Profile length
BB	Distance from bore hole to bore hole
BK	Distance from bore hole to housing edge
X	Distance from first beam to housing edge

Dimensions of optional measurement field lengths on request. Further details can be found in the respective data sheet.

VARIO B
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KONTURflex
Page 502

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VARIO B

Light curtain	Beam spacing	Page
VARIO B switching light curtain	5 … 100mm	498

Additional products:

Measuring light curtain	KONTURflex	502

Common technical data

Electrical data	Operating voltage U_B	24VDC
	Residual ripple	≤ 15% of U_B
	Output	2 x PNP or 2 x NPN, max. 200mA per output
	Cycle time (parallel mode)	1ms / beam (min. 30ms)
Optical data	Max. no. of beams	64
	Operating range	0.7 … 5m
	Wavelength	880nm (infrared light)
	Max. misalignment angle	± 10° between transmitter and receiver
Mechanical data	Housing	Aluminum, anodized
	Dimensions (W x H)	12 x 58mm and 10 x 27mm, resp.
	Connection	M8 connector or cable
Environmental data	Ambient temperature	-10°C … +45°C
	Protection class	IP 54

Mounting systems for this series can be found from **page 554** onwards

Features

- **Beam spacing 5 / 12.5 / 25 / 50 / 100mm**
- **Operating range 5m**
- **Calibratability for optically critical objects**
- **Factory-set configuration**
- **Configuration software**

CE

Optical Sensor ABC

- Light curtain Page 593

SWITCHING LIGHT CURTAINS

Part description Part No.:	▶ = Transmitter ◀ = Receiver	A [mm]	B [mm]	C	D [mm]	BB [mm]	BK [mm]	X [mm]	Op. range [m]	Light source
▶ VBT-5-35-S8 ◀ IVBR/4-5-35-00-S8	50107869 50107869-00	5	35	8	120	108	6	67.5	0.7 … 5	Infrared light 880nm
▶ VBT-5-35-S8 ◀ IVBR/2-5-35-00-S8	50107869 50107869-10	5	35	8	120	108	6	67.5	0.7 … 5	Infrared light 880nm
▶ VBT-12.5-88-S8 ◀ IVBR/4-12.5-88-00-S8	50107888 50107888-00	12.5	88	8	260	200	30	158.5	0.7 … 5	Infrared light 880nm
▶ VBT-12.5-88-S8 ◀ IVBR/2-12.5-88-00-S8	50107888 50107888-10	12.5	88	8	260	200	30	158.5	0.7 … 5	Infrared light 880nm
▶ VBT-25-175-S8 ◀ IVBR/4-25-175-00-S8	50107911 50107911-00	25	175	8	360	300	30	165	0.7 … 5	Infrared light 880nm
▶ VBT-25-2175,4000 ◀ IVBR/4-25-2175-00,4000	50107936 50107936-00	25	175	8	360	300	30	165	0.7 … 5	Infrared light 880nm
▶ VBT-25-175-S8 ◀ IVBR/2-25-175-00-S8	50107911 50107911-10	25	175	8	360	300	30	165	0.7 … 5	Infrared light 880nm
▶ VBT-50-350-S8 ◀ IVBR/4-50-350-00-S8	50107939 50107939-00	50	350	8	560	400	80	190	0.7 … 5	Infrared light 880nm
▶ VBT-50-350-S8 ◀ IVBR/2-50-350-00-S8	50107939 50107939-10	50	350	8	560	400	80	190	0.7 … 5	Infrared light 880nm
▶ VBT-100-700-S8 ◀ IVBR/4-100-700-00-S8	50107970 50107970-00	100	700	8	970	400	85	190	0.7 … 5	Infrared light 880nm
▶ VBT-100-700-S8 ◀ IVBR/2-100-700-00-S8	50107970 50107970-10	100	700	8	970	400	85	190	0.7 … 5	Infrared light 880nm

A Beam spacing **B** Meas. field length **C** Number of beams **D** Profile length **BB** Distance from bore hole to bore hole **BK** Distance from bore hole to housing edge **X** Distance from first beam to housing edge

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50107711	VB - Int - 232	Interface module for PC configuration via RS 232
b	50107925	UPG 50	Calibration adapter for VARIO B with M8 connector
c	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000mm, M8 axial, 4-pin, PVC
d	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC
e	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000mm, M8 axial, 4-pin, PVC

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KONTURflex
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VARIO B

Light curtain

	Output [1] / Switching	Connection[2]	Option	Accessories	
	PNP / light	M8 connector	1, 2, 3	a, b, c, d, e	
	NPN / light	M8 connector	1, 2, 3	a, b, c, d, e	
	PNP / light	M8 connector	1, 2, 3	a, b, c, d, e	
	NPN / light	M8 connector	1, 2, 3	a, b, c, d, e	
	PNP / light	M8 connector	1, 2, 3	a, b, c, d, e	
	PNP / light	Cable, 4 m	1, 2, 3	a	
	NPN / light	M8 connector	1, 2, 3	a, b, c, d, e	
	PNP / light	M8 connector	1, 2, 3	a, b, c, d, e	
	NPN / light	M8 connector	1, 2, 3	a, b, c, d, e	
	PNP / light	M8 connector	1, 2, 3	a, b, c, d, e	
	NPN / light	M8 connector	1, 2, 3	a, b, c, d, e	

1) The factory-set configuration can be changed at a later time using the VARIOsoft conf. software
2) Also available with line connection, line length 4 m

Additional light curtains available with **measurement field lengths of up to 3150 mm** and **up to 64 beams**, see **table on page 500**.
VARIOsoft configuration software available at no cost at *www.leuze.com*.

Options

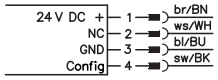
1	Combined warning output / calibration input (configurable)
2	Parallel beam mode / parallel and diagonal beam mode configurable
3	Light/dark switching configurable

Optical Sensor ABC

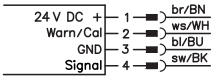
- Light curtain Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

VBT... – S8

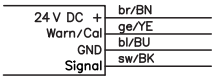


IVBR... – S8



VBT... ,4000

IVBR... ,4000



SWITCHING LIGHT CURTAINS

VARIO B transmitter

V B T - 1 2 . 5 - 6 8 8 - S 8

Model

VBT	VARIO B transmitter

Beam spacing A

5	5 mm
12.5	12.5 mm
25	25 mm
50	50 mm
100	100 mm

Measurement field length B

XXXX	In mm, see adjacent table 'Measurement field length'

Electrical connection

S8	M8 connector, 4-pin, axial

VARIO B receiver

I V B R / 2 - 1 2 . 5 - 6 8 8 - 0 0 - S 8

Model

IVBR	VARIO B receiver with warning output

Output

2	NPN
4	PNP

Beam spacing A

5	5 mm
12.5	12.5 mm
25	25 mm
50	50 mm
100	100 mm

Measurement field length B

XXXX	In mm, see adjacent table 'Measurement field length'

Measurement function

00	Parallel beam method, light switching
01	Parallel and diagonal beam method, light switching
02	Parallel beam method, dark switching
03	Parallel and diagonal beam method, dark switching

Electrical connection

S8	M8 connector, 4-pin, axial

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VARIO B

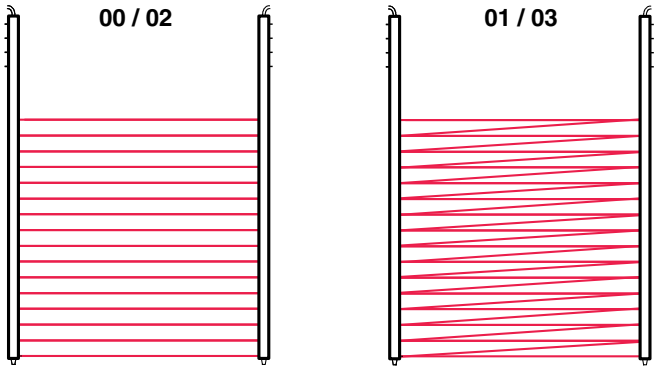
Light curtain

Beam spacing A [mm]	Measurement field length B [mm]										
5	35	75	115	155	195	235	275	315			
12.5	88	188	288	388	488	588	688	788			
25	175	375	575	775	975	1175	1375	1575	1775[1)]	2175[1)]	2375[1)]
50	350	750	1150	1550	1950	2350	2750	3150			
100	700	1100	1500	1900	2300	2700	3100				

1) Only available with PNP switching output and with measurement function **00**!

Beam spacing A and **measurement field length B** of a transmitter/receiver pair **must be the same**!

Measurement function	Light switching	Dark switching
Parallel beam method	**00**	**02**
Parallel and diagonal beam method	**01**	**03**



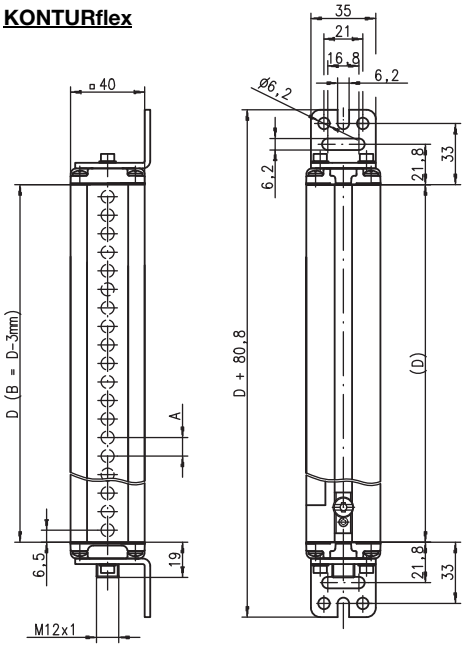
OVERVIEW OF MEASURING LIGHT CURTAINS

Powder-coating system

Painting system

Dimensioned drawing

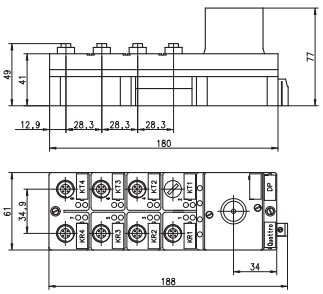
KONTURflex



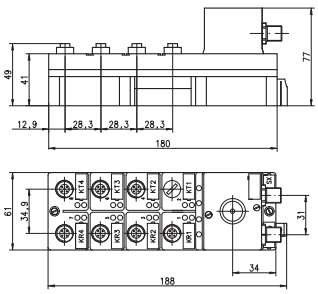
Dimensions of optional measurement field lengths on request.
Further details can be found in the respective data sheet.

A Beam spacing
B Measurement field length
D Profile length

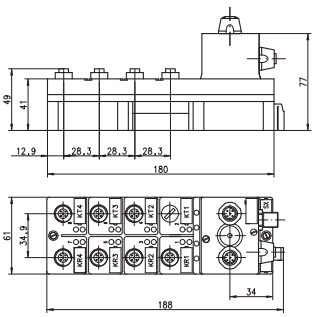
QUATTRO - RSX, QUATTRO - DP, QUATTRO - CANopen



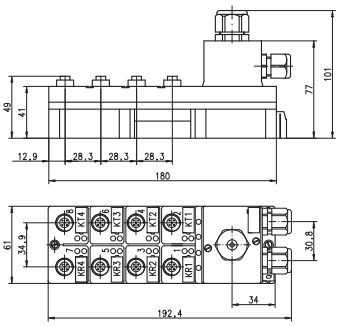
QUATTRO - RSX / M12



QUATTRO - DP / M12



QUATTRO - DP / KV



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KONTURflex

Light curtain	Beam spacing	Page
KONTURflex measuring light curtain	5 … 20mm	504

Additional products:

Switching light curtain	VARIO B	496

Common technical data

Electrical data	Operating voltage U_B	12VDC (light curtain) 24VDC (control device)
	Residual ripple	≤ 20% of U_B
	Cycle time	(Number of beams in system + 3) x 50µs
	Output	1 x PNP, configurable
	Connection	M12 cable, 5-pin, max. 20m between control device and light curtains
	System interface	RS 485 PROFIBUS DP CANopen
	Config. interface	RS 232
Optical data	Max. no. of beams	512 on 4 systems
	Wavelength	880nm (infrared light)
Mechanical data	Housing	Light curtain: aluminum Control device: plastic
Environmental data	Ambient temperature	0°C … +55°C (operation)
	Protection class	IP 65
	Standards applied	IEC 60947-5-2, UL 508

Mounting systems for this series can be found from **page 554** onwards

Features

- **Beam spacings 5 / 10 / 20mm**
- **Operating range 4m**
- **Up to 4 light curtains per QUATTRO control device**
- **Integrated and configurable functions**
- **Factory-set configuration**
- **PC configuration software**

Optical Sensor ABC

- Light curtain Page 593

MEASURING LIGHT CURTAINS

Part description Part No.:	▶ = Transmitter ◀ = Receiver	Beam spacing A [mm]	Meas. field length B [mm]	No. of beams	Profile length D [mm]	Op. range [m]	Light source
KONTURflex measuring light curtains							
▶ **KT 5-80**	671008	5	80	16	83	0 … 4	Infrared light 880nm
◀ **KR 5-80**	670008						
▶ **KT 10-160**	673016	10	160	16	163	0 … 4	Infrared light 880nm
◀ **KR 10-160**	672016						
▶ **KT 20-160**	675016	20	160	8	163	0 … 4	Infrared light 880nm
◀ **KR 20-160**	674016						
For other measurement field lengths, see type key on page 506!							

A **QUATTRO control device is absolutely necessary** for operating the KONTURflex light curtains.
See following double page!

KONTURflexsoft configuration software available at no cost at *www.leuze.com*.
Accessories / connection cables: additional cable lengths available!

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	678033	CB - M12 - 2500S - 5GF/GM	QUATTRO-KT/KR connection cable, length 2.5m, shielded
b	678035	CB - M12 - 5000S - 5GF/GM	QUATTRO-KT/KR connection cable, length 5m, shielded
c	678040	CB - M12 - 10000S - 5GF/GM	QUATTRO-KT/KR connection cable, length 10m, shielded
d	50104557	K - D M12A - 5P - 5m - PVC	QUATTRO-RSX/M12 RS 232 connection cable 5m, M12 axial
e	50104590	K - D M12A - 8P - 5m - PUR	QUATTRO-RSX/M12 RS 485/U_B connection cable 5m, M12 axial
f	50111864	QUATTRO-DP Adapter M12	DP adapter from 5-pin built-in plug to M12 connector
g	678100	K - CB - SUBP - 3000	QUATTRO-PC diagnosis cable, 3m

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KONTURflex

Light curtain

	Cycle time [1] [µs]	Output [2]	Connection	Option	Accessories	
	950	QUATTRO control device	M12 connector	1	a, b, c	
	950	QUATTRO control device	M12 connector	1	a, b, c	
	550	QUATTRO control device	M12 connector	1	a, b, c	

1) Cycle time = (total number of beams + 3) x 50 µs
2) The factory-set config. can be changed at a later time using the KONTURflexsoft config. software

Optical Sensor ABC

- Light curtain Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

See Quattro control devices!

Options

1 UL approval (class 2 acc. to NEC)

MEASURING LIGHT CURTAINS

KONTURflex

K	T		1	0	-	1	2	8	0		0	0

Model

KT	KONTURflex transmitter
KR	KONTURflex receiver

Beam spacing A

5	5 mm
10	10 mm
20	20 mm

Measurement field length B

XXXX	In mm, see adjacent table 'Measurement field length'

Optional

Ex	Ex version

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KONTURflex

Light curtain

Beam spacing A [mm]	Measurement field length B [mm]																							
	80	160	240	320	400	480	560	640	720	800	960	1120	1280	1440	1600	1760	1920	2080	2240	2400	2560	2720	2880	3040	3200
5	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•				
10		•		•		•		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
20		•		•		•		•		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Beam spacing A and **measurement field length B** of a transmitter/receiver pair **must be the same**!

MEASURING LIGHT CURTAINS

Part description Part No.:	Description
QUATTRO control devices for KONTURflex measuring light curtains	
QUATTRO - RSX 670001	Control device for up to 4 KONTURflex light curtains, system interface: **RS 232/RS 485**, connection via 5-pin built-in plug
QUATTRO - RSX / M12 670003	Control device for up to 4 KONTURflex light curtains, system interface: **RS 232/RS 485**, connection via 5-/8-pin M12 connector
QUATTRO - DP 670002	Control device for up to 4 KONTURflex light curtains, system interface: **RS 485/PROFIBUS DP**, connection via 5-pin built-in plug
QUATTRO - DP / M12 50111868	Control device for up to 4 KONTURflex light curtains, system interface: **RS 485/PROFIBUS DP**, connection via 5-pin M12 connector
QUATTRO - DP / KV 670005	Control device for up to 4 KONTURflex light curtains, system interface: **RS 485/PROFIBUS DP**, connection via 5-pin built-in plug with screwed cable gland
QUATTRO - CANopen 670004	Control device for up to 4 KONTURflex light curtains, system interface: **CANopen**, connection via 5-pin built-in plug

A **QUATTRO control device is absolutely necessary** for operating the KONTURflex light curtains.
Please include with your order.

KONTURflexsoft configuration software available at no cost at *www.leuze.com*.
Accessories / connection cables: additional cable lengths available!

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	678033	CB - M12 - 2500S - 5GF/GM	QUATTRO-KT/KR connection cable, length 2.5m, shielded
b	678035	CB - M12 - 5000S - 5GF/GM	QUATTRO-KT/KR connection cable, length 5m, shielded
c	678040	CB - M12 - 10000S - 5GF/GM	QUATTRO-KT/KR connection cable, length 10m, shielded
d	50104557	K - D M12A - 5P - 5m - PVC	QUATTRO-RSX/M12 RS 232 connection cable 5m, M12 axial
e	50104590	K - D M12A - 8P - 5m - PUR	QUATTRO-RSX/M12 RS 485/U_B connection cable 5m, M12 axial
f	50111864	QUATTRO-DP Adapter M12	DP adapter from 5-pin built-in plug to M12 connector
g	678100	K - CB - SUBP - 3000	QUATTRO-PC diagnosis cable, 3m
h	s. p. 569	MA 2xx*i*	Modular connector unit with fieldbus gateway
i	50116791	K-DS M12A-MA-5P-3m-1S-PUR	Interface cable for connection to the MA 2xx*i*

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KONTURflex

Light curtain

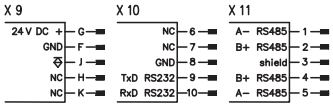
Output	Connection	Option	Accessories
1 x PNP, configurable	Built-in plug	1, 2, 3, 5, 6	a, b, c, g
1 x PNP, configurable	M12 connector	1, 2, 3, 5, 6	a, b, c, d, e, g, h, i
1 x PNP, configurable	Built-in plug	1, 2, 4, 5, 6	a, b, c, f, g
1 x PNP, configurable	M12 connector	1, 2, 4, 5, 6	a, b, c, d, g
1 x PNP, configurable	Built-in plug with screwed cable gland	1, 2, 4, 5, 6	a, b, c, g
1 x PNP, configurable	Built-in plug	1, 2, 4, 6	a, b, c, g

Optical Sensor ABC

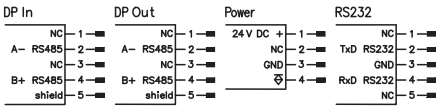
- Light curtain Page 593
- Connection types Page 598
- Outputs Page 598

Electrical connection

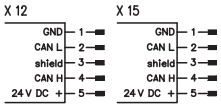
... RSX
... DP
... DP/KV



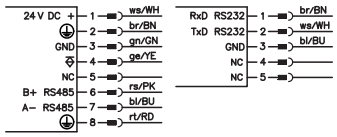
... DP/M12



... CANopen



... RSX/M12



Options

1	Configuration with KONTURflexsoft PC software
2	Integrated functions such as web-center monitoring, hole recognition, etc.
3	Data transmission and configuration via MODBUS RTU protocol
4	Data transmission and configuration via PROFIBUS DP or CANopen
5	Integrated, connectable bus terminator
6	UL approval (class 2 acc. to NEC)

SINGLE BEAM SAFETY DEVICES

Part description Part No.:		Operating range [m] Typ. op. range limit [m]	Operating voltage	Switching frequency	Light source	Output
Protective throughbeam sensors (AOPD type 2)			▶ = Transmitter ◀ = Receiver			
▶ **SLSSR 8.8 - S12** ◀ **SLSER 8 / 66 - S12**	500 38791 500 38792	0 10 0 14	10 … 30VDC	200Hz	Red light	2xPush-pull/DC
▶ **SLSSR 25B.8 - S8** ◀ **SLSER 25B / 66 - S8**	50108490 50108493	0 20 0 22	10 … 30VDC	100Hz	Red light	2xPush-pull/DC
▶ **SLSSR 25B.8 - S12** ◀ **SLSER 25B / 66 - S12**	50108489 50108492	0 20 0 22	10 … 30VDC	100Hz	Red light	2xPush-pull/DC
▶ **SLSSR 25B.8** ◀ **SLSER 25B / 66**	50108491 50108494	0 20 0 22	10 … 30VDC	100Hz	Red light	2xPush-pull/DC
▶ **SLSSR 25B.8, 200 - S12** ◀ **SLSER 25B / 66, 200 - S12**	50110151 50110152	0 20 0 22	10 … 30VDC	100Hz	Red light	2xPush-pull/DC
▶ **SLSSR 46B.8 - S12** ◀ **SLSER 46B / 66 - S12**	50108538 50108540	0 40 0 44	10 … 30VDC	100Hz	Red light	2xPush-pull/DC
▶ **SLSSR 46B.8** ◀ **SLSER 46B / 66**	50108539 50108541	0 40 0 44	10 … 30VDC	100Hz	Red light	2xPush-pull/DC
▶ **SLSR 95 / 2.8 SE - L** ◀ **SLSR 95 / 44 E - L**	50080183 50080184	0 8 0 10	10 … 30VDC	200Hz	Red light	2x PNP

Dimensioned drawings see **standard sensors:**
SLSR 8… on **page 64**, **SLS 25B…** on **page 86**, **SLS 46B…** on **page 112, SLSR 95…** on **page 156**.
Additional information and products can also be found in the **Safety at work** catalog from **Leuze electronic**.

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104527	K - D M8W - 4P - 5m - PVC	Connection cable 5000mm, M8 angular, 4-pin, PVC
b	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
c	50104558	K - D M12W - 5P - 5m - PVC	Connection cable 5000mm, M12 angular, 5-pin, PVC
d	50040739	ARH 46	Alignment aid for 46 Series sensors
e	50109545	SAT 5	Sensorscope, alignment control for all series
f	50000670	US 1	Deflection mirror
g	50017434	US 2	Deflection mirror on mounting plate, can be turned by 90°

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AOPD Type 2

Protective sensors

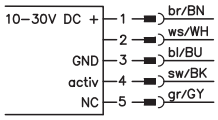
	Switching	Connection	Minimum object size	Option	Accessories	
	Light/dark antivalent	M12 connector	Ø 13 mm	1, 3	c, e, f, g	
	Light/dark antivalent	M8 connector	Ø 14 mm	1, 4	a, e, f, g	
	Light/dark antivalent	M12 connector	Ø 14 mm	1, 4	b, e, f, g	
	Light/dark antivalent	Cable, 2 m	Ø 14 mm	1, 4	e, f, g	
	Light/dark antivalent	Cable, 0.2 m, with M12 connector	Ø 14 mm	1, 4	b, e, f, g	
	Light/dark antivalent	M12 connector	Ø 22 mm	1, 2, 4	b, d, e, f, g	
	Light/dark antivalent	Cable, 2 m	Ø 22 mm	1, 2, 4	d, e, f, g	
	Light/dark antivalent	M12 connector	Ø 13 mm	1, 3	b, e, f, g	

Optical Sensor ABC

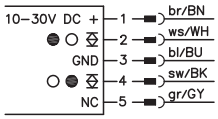
- Protective sensors Page 596
- Connection types Page 598
- Outputs Page 598

Electrical connection

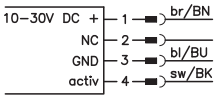
SLSSR 8.8–S12



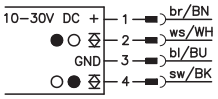
SLSER 8/66–S12



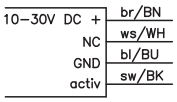
SLSSR 25B.8–S8
SLSSR 25B.8–S12
SLSSR 25B.8, 200–S12
SLSSR 46B.8–S12



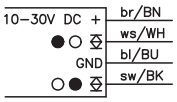
SLSER 25B/66–S8
SLSER 25B/66–S12
SLSER 25B/66, 200–S12
SLSER 46B/66–S12



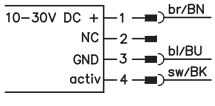
SLSSR 25B.8
SLSSR 46B.8



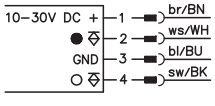
SLSER 25B/66
SLSER 46B/66



SLSR 95/2.8 SE–L



SLSR 95/44 E–L



The protective throughbeam 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, up to category 2, and PL d according to EN ISO 13849-1.
The safety sensor must only be used after it has been selected in accordance with the respectively applicable instructions and relevant standards, rules and regulations regarding labor protection and occupational safety, and after it has been installed on the machine, connected, commissioned, and checked by a competent person.

Options

1	Transmitter with activation input for testing and interlinking
2	Highly visible LED display assists with alignment
3	UL approval
4	UL approval (class 2 acc. to NEC)

SINGLE BEAM SAFETY DEVICES

Part description Part No.:		Operating range [m] Typ. op. range limit [m]	Operating voltage	Switching frequency	Light source	Output
Protective throughbeam sensors (AOPD type 2)			▶ = Transmitter ◀ = Receiver			
▶ **SLSS 96 M - 1080 - T2 - 45**	50025215	0 50 0 65	10 … 30VDC	500Hz	Infrared light	PNP
◀ **SLSE 96 M/P - 1070 - T2 - 41**	50025193					
▶ **SLSS 96 M - 1090 - T2 - 45**	50080478	0 50 0 65	10 … 30VDC	500Hz	Infrared light	PNP
◀ **SLSE 96 M/P - 1071 - T2 - 41**	50080479					
▶ **SLSS 96 M - 1080 - T2 - 24**	50025213	0 50 0 65	10 … 30VDC	500Hz	Infrared light	PNP
◀ **SLSE 96 M/P - 1070 - T2 - 21**	50025192					
▶ **SLSS 96 M - 1090 - T2 - 24**	50029454	0 50 0 65	10 … 30VDC	500Hz	Infrared light	PNP
◀ **SLSE 96 M/P - 1071 - T2 - 21**	50029455					
▶ **SLSS 96 M - 1210 - T2 - 45**	50031249	0 30 0 39	10 … 30VDC	500Hz	Red light	PNP
◀ **SLSE 96 M/P - 1200 - T2 - 41**	50031250					
▶ **SLSS 96 M/P - 1210 - T2 - 24**	50025209	0 30 0 39	10 … 30VDC	500Hz	Red light	PNP
◀ **SLSE 96 M/P - 1200 - T2 - 21**	50031562					
▶ **SLSS 96 K 1080 - T2 - 45**	50031559	0 50 0 65	10 … 30VDC	500Hz	Infrared light	PNP
◀ **SLSE 96 K/P 1070 - T2 - 41**	50031561					
▶ **SLSS 96 K 1080 - T2 - 24**	50081292	0 50 0 65	10 … 30VDC	500Hz	Infrared light	PNP
◀ **SLSE 96 K/P 1070 - T2 - 21**	50081293					

Dimensioned drawings see **standard sensors: SLS 96…** on **page 164**.
Additional information and products can also be found in the **Safety at work** catalog from **Leuze electronic**.

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000mm, M12 axial, 4-pin, PVC
b	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
c	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
d	50080502	ARH 96	Alignment aid for 96 Series sensors
e	50109545	SAT 5	Sensorscope, alignment control for all series
f	50000670	US 1	Deflection mirror
g	50017434	US 2	Deflection mirror on mounting plate, can be turned by 90°

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AOPD Type 2

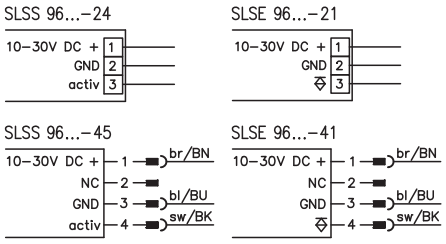
Protective sensors

	Switching	Connection	Minimum object size	Option	Accessories	
	Light	M12 connector	Ø 28 mm	1, 3	a, b, c, d, e, f, g	
	Light	M12 connector	Ø 28 mm	1, 2, 3	a, b, c, d, e, f, g	
	Light	Terminals	Ø 28 mm	1, 3	d, e, f, g	
	Light	Terminals	Ø 28 mm	1, 2, 3	d, e, f, g	
	Light	M12 connector	Ø 28 mm	1, 3	a, b, c, d, e, f, g	
	Light	Terminals	Ø 28 mm	1, 3	d, e, f, g	
	Light	M12 connector	Ø 28 mm	1, 3	a, b, c, d, e, f, g	
	Light	Terminals	Ø 28 mm	1, 3	d, e, f, g	

Optical Sensor ABC

- Protective sensors Page 596
- Connection types Page 598
- Outputs Page 598

Electrical connection



The protective throughbeam 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, up to category 2, and PL d according to EN ISO 13849-1.
The safety sensor must only be used after it has been selected in accordance with the respectively applicable instructions and relevant standards, rules and regulations regarding labor protection and occupational safety, and after it has been installed on the machine, connected, commissioned, and checked by a competent person.

Options

1	Transmitter with activation input for testing and interlinking
2	Low-temperature version with optics heating
3	UL approval

SINGLE BEAM SAFETY DEVICES

Part description Part No.:		Operating range [m] Typ. op. range limit [m]	Operating voltage	Switching frequency	Light source	Output
Protective throughbeam sensors (AOPD type 2)			▶ = Transmitter ◀ = Receiver			
▶ **SLSS 96 K - 1210 - T2 - 45** ◀ **SLSE 96 K/P - 1200 - T2 - 41**	50028011 50028012	0 30 0 39	10 … 30VDC	500Hz	Red light	PNP
▶ **SLSS 96 K - 1210 - T2 - 45** ◀ **SLSE 96 K/P - 1207 - T2 - 41**	50028011 50041109	0 30 0 39	10 … 30VDC	500Hz	Red light	PNP
▶ **SLSS 96 K - 1210 - T2 - 24** ◀ **SLSE 96 K/P - 1200 - T2 - 21**	50028009 50028010	0 30 0 39	10 … 30VDC	500Hz	Red light	PNP
▶ **SLSS 96 K - 1210 - T2 - 24** ◀ **SLSE 96 K/P - 1207 - T2 - 21**	50028009 50035078	0 30 0 39	10 … 30VDC	500Hz	Red light	PNP
▶ **SLSS 318 M - S12** ◀ **SLSE 318 M/P - S12**	50082199 50082200	0 10 0 12	10 … 30VDC	1000Hz	Red light	2x PNP
▶ **SLSS 318 K - S12** ◀ **SLSE 318 K/P - S12**	50083116 50083117	0 10 0 12	10 … 30VDC	1000Hz	Red light	2x PNP
▶ **SLSS 318 K** ◀ **SLSE 318 K/P**	50083132 50083133	0 10 0 12	10 … 30VDC	1000Hz	Red light	2x PNP

Dimensioned drawings see **standard sensors: SLS 96…** on **page 164**, **SLS 318…** on **page 200**.
Additional information and products can be found in the **Safety at work** catalog from **Leuze electronic**.

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e	50080502	ARH 96	Alignment aid for 96 Series sensors
f	50109545	SAT 5	Sensorscope, alignment control for all series
g	50000670	US 1	Deflection mirror
h	50017434	US 2	Deflection mirror on mounting plate, can be turned by 90°

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AOPD Type 2

Protective sensors

	Switching	Connection	Minimum object size	Option	Accessories	
	Light	M12 connector	Ø 28 mm	1, 3	a, b, c, d, e, f, g, h	
	Light	M12 connector	Ø 28 mm	1, 2, 3	a, b, c, d, e, f, g, h	
	Light	Terminals	Ø 28 mm	1, 3	e, f, g, h	
	Light	Terminals	Ø 28 mm	1, 2, 3	e, f, g, h	
	Light/dark antivalent	M12 connector	Ø 13 mm	1, 4	a, b, c, d, f, g, h	
	Light/dark antivalent	M12 connector	Ø 13 mm	1, 4	a, b, c, d, f, g, h	
	Light/dark antivalent	Cable, 2 m	Ø 13 mm	1, 4	f, g, h	

The protective throughbeam 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, up to category 2, and PL d according to EN ISO 13849-1.
The safety sensor must only be used after it has been selected in accordance with the respectively applicable instructions and relevant standards, rules and regulations regarding labor protection and occupational safety, and after it has been installed on the machine, connected, commissioned, and checked by a competent person.

Options

1 Transmitter with activation input for testing and interlinking

2 Filter for multi-axis operation

3 UL approval

4 UL approval (class 2 acc. to NEC)

Optical Sensor ABC

- Protective sensors Page 596
- Connection types Page 598
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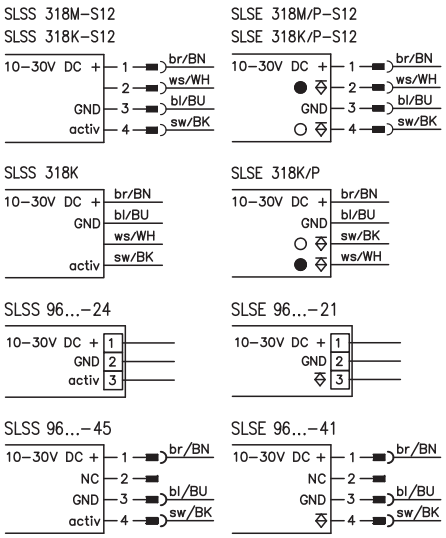
Electrical connection



SAFETY RELAYS/CONTROLLERS

Part description Part No.:	Feature	Function	
Safety relays (type 2)			
MSI - TR1 549988	Periodic testing of type 2 sensors	1, 2, 3, 4	
MSI - TR2 549990	Periodic testing of type 2 sensors with filter time 130 ms	1, 2, 3, 4	
MSI - TS 549989	Periodic testing of type 2 sensors with STOP1 function	1, 2, 3, 5	
Safety Controllers			
MSI 101 547802	MSI Safety Controller, pluggable screw terminals, 20 safe inputs, 4 transistor outputs	6, 7	
MSI 102 547812	MSI Safety Controller, pluggable spring-loaded terminals, 20 safe inputs, 4 transistor outputs	6, 7	
MSI 201 547803	MSI Safety Controller, pluggable screw terminals, 20 safe inputs, 4 transistor outputs, extendable with MSI-EM20x-8I4IO	6, 7, 8	
MSI 202 547813	MSI Safety Controller, pluggable spring-loaded terminals, 20 safe inputs, 4 transistor outputs, extendable with MSI-EM20x-8I4IO	6, 7, 8	
MSI - EM201 - 8I4IO 547804	Digital extension module for MSI 20x, 8 additional safe inputs and 4 freely-configurable safe channels, pluggable screw terminals	8	
MSI - EM202 - 8I4IO 547814	Digital extension module for MSI 20x, 8 additional safe inputs and 4 freely-configurable safe channels, pluggable spring-loaded terminals	8	
MSI - FB - PB101 547806	PROFIBUS module for MSI 10x / MSI 20x, pluggable screw terminals	9	

Dimensioned drawings and **electrical connection** at **www.leuze.com**.
Additional information, accessories and products can be found in the **Safety at work** catalog from **Leuze electronic**.

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MSI

Safety relays/controllers

MSI-T... functions

1 Start/restart interlock selectable

2 Contactor monitoring (EDM) selectable

3 "Error" message output

4 "Safety on" message output

5 "STOP1" message output

Special MSI 100/200 features

- **20 safe inputs, 4 safe switching outputs (OSSDs)**
- **Extension modules with additional input/output modules available for MSI 200**
- **4 message outputs, 2 clock switching outputs, 2 ground-switching outputs**
- **Free configuration with MSI*safesoft* software**
- **Comprehensive module library with certified function blocks**
- **Data stick with configuration memory**
- **Designs with screw terminals as well as with spring-cage terminals**
- **Start-up set for quickly getting up to speed**

Optical Sensor ABC

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Electrical connection

Observe the operating instructions!
Download from *www.leuze.com*

MSI 100/200 functions

6 Freely configurable safety base module

7 Monitoring of all safe functions in machines and systems

8 Safety-oriented expandability with additional input/output modules

9 Connection to PROFIBUS / transmission of diagnostic data

SENSORS FOR POTENTIALLY EXPLOSIVE AREAS

Part description Part No.:	Device category	Operating range [m]	Operating voltage	Light source	Output
Throughbeam sensors	▶ = Transmitter ◀ = Receiver				
▶LS 92 / 3 SE - L Ex 50080722 **◀LS 92 / 3 E - L Ex** 50080721	2G, 2D intrinsically safe ia IIC	0 12	5.5 … 13VDC	Infrared light	NAMUR
Retro-reflective sensors with polarization filter					
PRK 92 / 3 L Ex 50080723	2G, 2D intrinsically safe ia IIC	0.2 … 5	5.5 … 13VDC	Red light	NAMUR
Diffuse reflection scanners with background suppression					
FRK 92 / 3 - 300 L Ex 50080724	2G, 2D intrinsically safe ia IIC	0.03 … 0.3	5.5 … 13VDC	Infrared light	NAMUR
Isolated switching amplifier					
VS 403/N 50040825	2G, intrinsically safe NAMUR input ia IIC		18 … 31.2VDC		NPN
VS 403/R 50040826	2G, intrinsically safe NAMUR input ia IIC		18 … 31.2VDC		Relay
VS 403/R-AC 50040824	2G, intrinsically safe NAMUR input ia IIC		120 … 230VAC		Relay

Dimensioned drawing 92 Series at **www.leuze.com**.

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50037784	BK7 KB - 092 - 5000 - 4 Ex	Connection cable 5000mm for intrinsically safe circuits, blue, M12 angular, 4-pin
b	50037783	BK7 KB - 092 - 5000 - 4A Ex	Connection cable 5000mm for intrinsically safe circuits, blue, M12 axial, 4-pin

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	Switching	Connection	Option	Accessories	
	Light	M12 connector	1, 2	a, b	
	Light	M12 connector	1, 2	a, b	
	Light	M12 connector	1, 2	a, b	
	Light/dark reversible	Terminals	3, 4		
	Light/dark reversible	Terminals	3, 4		
	Light/dark reversible	Terminals	3, 4		

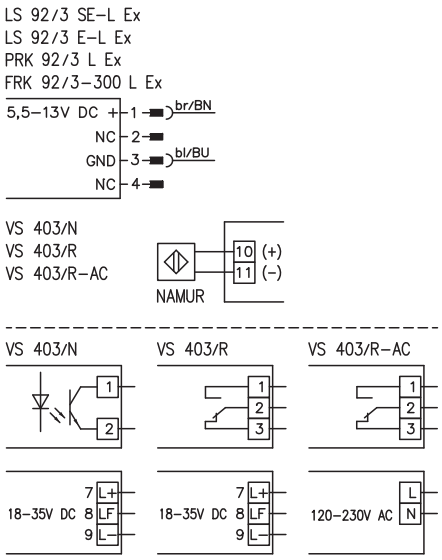
Options

1	Operation in combination with isolated switching amplifier VS 403
2	Light/dark switching at isolated switching amplifier
3	Line fault detection
4	Warning output for line fault/auxiliary power failure

Optical Sensor ABC

- Sensors for potentially explosive areas — Page 603
- Connection types — Page 598
- Outputs — Page 598

Electrical connection



SENSORS FOR POTENTIALLY EXPLOSIVE AREAS

Part description Part No.:	Device category	Meas. range [1] [mm]	Operating voltage	Light source Light spot [2]	Output	
Optical laser distance sensors						
ODSL 96B M/C6 - 2000 Ex d 50106735	2G, 2D, flameproof enclosure	200 2000	18 … 30VDC	Red light laser, class 2 2x6mm²	Analog/mA push-pull/DC	

1) Luminosity coefficient 6 … 90% throughout the entire temperature range, measurement object ≥ 50x50mm²
2) At 2000mm (ODSL 96B M/C6 - 2000…) or 1200mm (ODS 96 M/V 5510…)

Dimensioned drawings at **www.leuze.com**.

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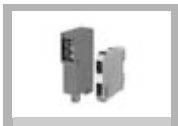
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Ex Sensors

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	Switching	Connection	Option	Accessories	
	Configurable	Cable, 5 m	1, 2, 3, 4		

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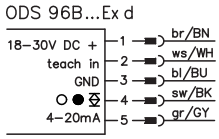
Electrical connection



Options

1	Measurement range and measure mode configurable via software
2	OLED display and key pad for configuration
3	Teach-in of switching output and analog output
4	Teach-in of the switching points via teach input

SENSORS FOR POTENTIALLY EXPLOSIVE AREAS

Part description Part No.:		Device category	Operating range [m]	Operating voltage	Light source	Output
Throughbeam sensors acc. to EN 60079-15:2005 and EN 61241-1:2004				▶ = Transmitter ◀ = Receiver		
▶ LSS 96M - 1079 - 23 - Ex n **◀ LSE 96M/P - 3019 - 21 Ex n**	50111015 50111016	3G, 3D Protection types nA and tD A22	0 120	10 … 30VDC	Infrared light	1 x PNP
▶ LSSR 46B, 200 - S12 S - Ex n **◀ LSER 46B/66, 200 - S12 S - Ex n**	50111519 50111520	3G, 3D Protection types nA and tD A22	0 50	10 … 30VDC	Red light	2xPush-pull/DC
Protective throughbeam sensors acc. to EN 60079-15:2005 and EN 61241-1:2004				▶ = Transmitter ◀ = Receiver		
▶ SLSS 96M - 1089 - T2 - 24 Ex n **◀ SLSE 96M/P - 1079 - T2 - 21 Ex n**	50111085 50111086	3G, 3D Protection types nA and tD A22	0 50	10 … 30VDC	Infrared light	1 x PNP

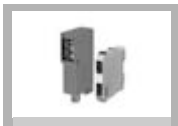
Dimensioned drawings at **www.leuze.com**.

The **sensors of the 3B, 25B and 55 series** can, with the exception of models HRTR…-L… and HRTR…-XL…, be used **in potentially explosive areas in combination with an Ex protective housing**.
Additional information is available on request.

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e	50109217	K - V M12 - Ex	Mechanical connector lock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Ex Sensors

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	Switching	Connection	Option	Accessories	
	Light/dark reversible	Terminals			
	Light/dark antivalent	Cable 0.2 m, with M12 connector	7	a, b, c, d, e	
	Light	Terminals			

Optical Sensor ABC

- Sensors for potentially explosive areas — Page 603
- Connection types — Page 598
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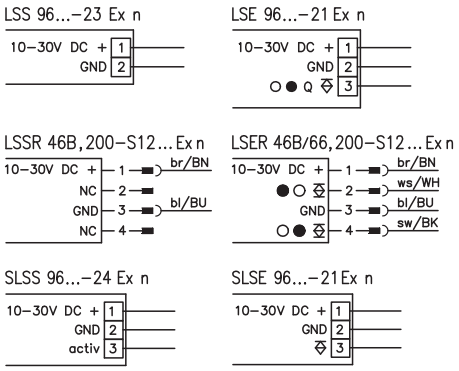
Electrical connection



Options

1 Sensitivity adjustment via potentiometer

2 Adjustment of the switching points via teach buttons

3 Autocollimation principle

4 Low-temperature version with optics heating

5 Shining surfaces

6 Transparent media

7 Standard housing: …-S12 **S**…; with flange for wall mounting: …-S12 **W**…

SENSORS FOR POTENTIALLY EXPLOSIVE AREAS

Part description Part No.:	Device category	Operating range [m]	Operating voltage	Light source	Output
Retro-reflective photoelectric sensors with polarization filter acc. to EN 60079-15:2005 and EN 61241-1:2004					
PRK 46B / 66, 200 - S12 S - Ex n 50108591	3G, 3D Protection types nA and tD A22	0.05 … 15	10 … 30VDC	Red light	2xPush-pull/DC
PRK 46B / 66, 200 - S12 W - Ex n 50108592	3G, 3D Protection types nA and tD A22	0.05 … 15	10 … 30VDC	Red light	2xPush-pull/DC
PRK 46B / 66.01, 200 - S12 S - Ex n 50108593	3G, 3D Protection types nA and tD A22	0.05 … 15	10 … 30VDC	Red light	2xPush-pull/DC
PRK 46B / 66.01, 200 - S12 W - Ex n 50108594	3G, 3D Protection types nA and tD A22	0.05 … 15	10 … 30VDC	Red light	2xPush-pull/DC
IPRK 46B / 4, 200 - S12 S - Ex n 50108945	3G, 3D Protection types nA and tD A22	0.05 … 15	10 … 30VDC	Red light	1 x PNP
IPRK 46B / 4, 200 - S12 W - Ex n 50108946	3G, 3D Protection types nA and tD A22	0.05 … 15	10 … 30VDC	Red light	1 x PNP

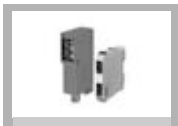
Dimensioned drawings at **www.leuze.com**.

The sensors of the **3B and 25B series** can, with the exception of models HRTR…-L… and HRTR…-XL…, be used **in potentially explosive areas in combination with an Ex protective housing**.
Additional information is available on request.

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104543	K - D M12W - 4P - 2m - PVC	Connection cable 2000mm, M12 angular, 4-pin, PVC
b	50104542	K - D M12A - 4P - 2m - PVC	Connection cable 2000mm, M12 axial, 4-pin, PVC
c	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
d	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
e	50109217	K - V M12 - Ex	Mechanical connector lock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Ex Sensors

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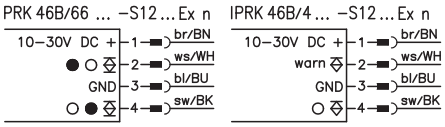
	Switching	Connection	Option	Accessories	
	Light/dark antivalent	Cable 0.2 m, with M12 connector	3	a, b, c, d, e	
	Light/dark antivalent	Cable 0.2 m, with M12 connector	3	a, b, c, d, e	
	Light/dark antivalent	Cable 0.2 m, with M12 connector	1, 3	a, b, c, d, e	
	Light/dark antivalent	Cable 0.2 m, with M12 connector	1, 3	a, b, c, d, e	
	Light	Cable 0.2 m, with M12 connector	2, 3	a, b, c, d, e	
	Light	Cable 0.2 m, with M12 connector	2, 3	a, b, c, d, e	

Optical Sensor ABC

- Sensors for potentially explosive areas — Page 603
- Connection types — Page 598
- Outputs — Page 598

Electrical connection



Options

1 Sensitivity adjustment via potentiometer

2 Warning output

3 Standard housing: …-S12 **S**…; with flange for wall mounting: …-S12 **W**…

SENSORS FOR POTENTIALLY EXPLOSIVE AREAS

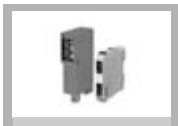
Part description Part No.:	Device category	Operating range [m]	Operating voltage	Light source	Output	
Retro-reflective photoelectric sensors with polarization filter acc. to EN 60079-15:2005 and EN 61241-1:2004						
PRK 55 / 6D.42 - S8.3 Ex 50115207	3G, 3D Protection types nA and tc IIIC	0 … 3.5	10 … 30VDC	Red light	1xPush-pull/DC	
PRK 96 M / P - 3369 - 21 Ex n 50111088	3G, 3D Protection types nA and tD A22	0.3 … 15	10 … 30VDC	Red light	1 x PNP	
PRK 96 M / P - 2838 - 28 Ex n 50109523	3G, 3D Protection types nA and tD A22	0 … 7	10 … 30VDC	Red light	2 x PNP	

Dimensioned drawings at **www.leuze.com**.

The sensors of the **3B and 25B series** can, with the exception of models HRTR…-L… and HRTR…-XL…, be used **in potentially explosive areas in combination with an Ex protective housing**.
Additional information is available on request.

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104520	K - D M8A - 3P - 2m - PVC	Connection cable 2000mm, M12 axial, 3-pin, PVC
b	50104522	K - D M8A - 3P - 5m - PVC	Connection cable 5000mm, M12 axial, 3-pin, PVC
c	50110556	K - D M8A - 3P - 10m - PVC	Connection cable 10000mm, M12 axial, 3-pin, PVC



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Ex Sensors

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	Switching	Connection	Option	Accessories	
	Light/dark reversible	With M8 connector	2, 3, 4, 5	a, b, c	
	Light/dark reversible	Terminals	1		
	Light/dark antivalent	Terminals	1, 3, 4		

Optical Sensor ABC

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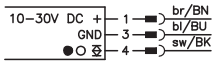
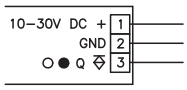
Electrical connection

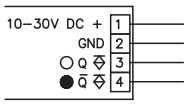
PRK 55/6D.42–S8.3 Ex



PRK 96...–21 Ex n



PRK 96...–28 Ex n



Options

1	Sensitivity adjustment via potentiometer
2	Adjustment of sensitivity via teach button
3	Autocollimation principle
4	Transparent media
5	316L stainless steel housing in Wash-Down-Design

SENSORS FOR POTENTIALLY EXPLOSIVE AREAS

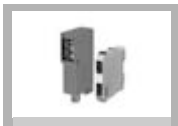
Part description Part No.:	Device category	Operating range [mm]	Operating voltage	Light source	Output
Diffuse reflection light scanners with background suppression acc. to EN 60079-15:2005 and EN 61241-1:2004					
HRTR 46B / 66, 200 - S12 S - Ex n 50108589	3G, 3D Protection types nA and tD A22	20 800	10 … 30VDC	Red light	2xPush-pull/DC
HRTR 46B / 66, 200 - S12 W - Ex n 50108590	3G, 3D Protection types nA and tD A22	20 800	10 … 30VDC	Red light	2xPush-pull/DC
HRT 46B / 66, 200 - S12 S - Ex n 50108587	3G, 3D Protection types nA and tD A22	10 1200	10 … 30VDC	Infrared light	2xPush-pull/DC
HRT 46B / 66, 200 - S12 W - Ex n 50108588	3G, 3D Protection types nA and tD A22	10 1200	10 … 30VDC	Infrared light	2xPush-pull/DC
IHRT 46B / 4, 200 - S12 S - Ex n 50108943	3G, 3D Protection types nA and tD A22	10 1200	10 … 30VDC	Infrared light	1 x PNP
IHRT 46B / 4, 200 - S12 W - Ex n 50108944	3G, 3D Protection types nA and tD A22	10 1200	10 … 30VDC	Infrared light	1 x PNP

Dimensioned drawings at **www.leuze.com**.

The sensors of the **3B and 25B series** can, with the exception of models HRTR…-L… and HRTR…-XL…, be used **in potentially explosive areas in combination with an Ex protective housing**.
Additional information is available on request.

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104545	K - D M12W - 4P - 5m - PVC	Connection cable 5000mm, M12 angular, 4-pin, PVC
b	50104544	K - D M12A - 4P - 5m - PVC	Connection cable 5000mm, M12 axial, 4-pin, PVC
c	50109217	K - V M12 - Ex	Mechanical connector lock



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Zone 1
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Zone 2
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Ex Sensors

Zone 2, Zone 22

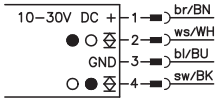
	Switching	Connection	Option	Accessories	
	Light/dark antivalent	Cable 0.2 m, with M12 connector	1, 3, 4	a, b, c	
	Light/dark antivalent	Cable 0.2 m, with M12 connector	1, 3, 4	a, b, c	
	Light/dark antivalent	Cable 0.2 m, with M12 connector	1, 3, 4	a, b, c	
	Light/dark antivalent	Cable 0.2 m, with M12 connector	1, 3, 4	a, b, c	
	Light	Cable 0.2 m, with M12 connector	1, 2, 3, 4	a, b, c	
	Light	Cable 0.2 m, with M12 connector	1, 2, 3, 4	a, b, c	

Optical Sensor ABC

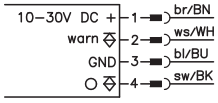
- Sensors for potentially explosive areas Page 603
- Connection types Page 598
- Outputs Page 598

Electrical connection

HRT 46B/66, 200–S12... Ex n
HRTR 46B/66, 200–S12... Ex n



IHRT 46B/4 ... –S12 ... Ex n



Options

1 Sensitivity adjustment via potentiometer

2 Warning output

3 Light/dark, as well as inclined/sloped surfaces

4 Standard housing: …-S12 **S**…; with flange for wall mounting: …-S12 **W**…

SENSORS FOR POTENTIALLY EXPLOSIVE AREAS

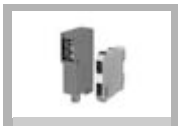
Part description Part No.:	Device category	Operating range [mm]	Operating voltage	Light source	Output
Diffuse reflection light scanners with background suppression acc. to EN 60079-15:2005 and EN 61241-1:2004					
HRTR 55 / 66 - S8 Ex 50115269	3G, 3D Protection types nA and tc IIIC	5 400	10 … 30VDC	Red light	2xPush-pull/DC
HRT 96 M / P - 1639 - 800 - 21 Ex n 50111087	3G, 3D Protection types nA and tD A22	100 800	10 … 30VDC	Red light	1 x PNP
HRT 96 M / P - 1649 - 800 - 21 Ex n 50111089	3G, 3D Protection types nA and tD A22	100 800	10 … 30VDC	Red light	1 x PNP
HRT 96 M / P - 3360 - 2500 - 21 Ex n 50108464	3G, 3D Protection types nA and tD A22	80 2200	10 … 30VDC	Red light	Analog/V 2xpush-pull/DC
HRT 96 M / P - 3370 - 5000 - 21.1 Ex n 50112358	3G, 3D Protection types nA and tD A22	100 5000	10 … 30VDC	Red light laser class 2	3xPush-pull/DC

Dimensioned drawings at **www.leuze.com**.

The sensors of the **3B and 25B series** can, with the exception of models HRTR…-L… and HRTR…-XL…, be used **in potentially explosive areas in combination with an Ex protective housing**.
Additional information is available on request.

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50104524	K - D M8A - 4P - 2m - PVC	Connection cable 2000mm, M8 axial, 4-pin, PVC
b	50104526	K - D M8A - 4P - 5m - PVC	Connection cable 5000mm, M8 axial, 4-pin, PVC
c	50104528	K - D M8A - 4P - 10m - PVC	Connection cable 10000mm, M8 axial, 4-pin, PVC



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Zone 1
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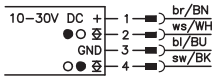
	Switching	Connection	Option	Accessories	
	Light/dark antivalent	With M8 connector	3, 4	a, b, c	
	Light/dark reversible	Terminals	1		
	Light/dark reversible	Terminals	1, 6		
	Light/dark antivalent	Terminals	2, 5		
	Light/dark reversible	Terminals	1, 5		

Optical Sensor ABC

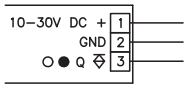
- Sensors for potentially explosive areas Page 603
- Connection types Page 598
- Outputs Page 598

Electrical connection

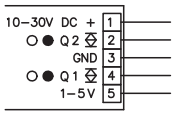
HRTR 55/66-S8 Ex



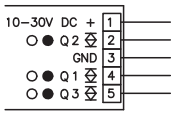
HRT 96 M/P-... 800-21 Ex n



HRT 96 M/P-3360...-21 Ex n



HRT 96 M/P-3370...-21.1 Ex n



Options

1	Sensitivity adjustment via potentiometer
2	Adjustment of the switching points via teach buttons
3	Scanning range adjustment via multiturn potentiometer
4	316L stainless steel housing in Wash-Down-Design
5	Shining surfaces
6	Switching delay

AS-INTERFACE SENSORS

Part description Part No.:	Operating range [m] Typ. op. range limit [m]	Operating voltage (acc. to AS-i spec.)	Light source	Output
Throughbeam sensors	▶ = Transmitter ◀ = Receiver			
▶ **LSSR 8 / A.8 - S12** 50038787 ◀ **ILSER 8 / A - S12** 50038788	0 12 0 20	26.5 … 31.6V	Red light	AS-interface
▶ **LSS 96 M - 180W - 44** 50082040 ◀ **LSE 96 M/ A - 182W - 44** 50082039	0 30 0 39	26.5 … 31.6V	Red light	AS-interface
Retro-reflective sensors with polarization filter				
IPRK 8 / A - S12 50038789	0.1 6.4 0.1 8	26.5 … 31.6V	Red light	AS-interface
IPRK 18 / A L.4 50030077	0 2.4 0 3	26.5 … 31.6V	Red light	AS-interface
IPRK 18 / A.1 L.4 50034119	0 2.4 0 3	26.5 … 31.6V	Red light	AS-interface
IPRK 18 / A - L.46 50040278	0 2.4 0 3	26.5 … 31.6V	Red light	AS-interface

Dimensioned drawings see **standard sensors:**
ILSR 8..., IPRK 8... on **page 64, IPRK 18...** on **page 78, LS 96...** on **page 164**.

Accessories / connection cables More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50024748	KB - 095 - 1000 - 3AW	Connection cable 1000 mm, M12 axial/angular
b	50024749	KB - 095 - 2000 - 3AW	Connection cable 2000 mm, M12 axial/angular
c	50081151	KB - 095 - 5000 - 3AW	Connection cable 5000 mm, M12 axial/angular
d	50024346	AM 06	AS-i bus terminal for profile cable

AS-i
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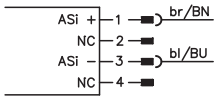
	Connection	Option	Accessories	
	M12 connector	4, 5, 6, 10, 11	a, b, c, d	
	M12 connector	5, 6, 9, 11	a, b, c, d	
	M12 connector	5, 6, 10, 11	a, b, c, d	
	M12 connector	1, 3, 4, 5, 6, 9, 11	a, b, c, d	
	M12 connector	1, 3, 4, 5, 6, 7, 9, 11	a, b, c, d	
	M12 connector	2, 3, 5, 6, 7, 8, 10, 11	a, b, c, d	

Optical Sensor ABC

- Throughbeam sensors Page 593
- Retro-reflective sensors with polarization filter Page 593
- AS-interface sensors Page 597

Electrical connection



Options

1	Sensitivity adjustment via potentiometer
2	Teach-in via rotary switch
3	Transparent media
4	Activation input (via AS-i)
5	Switching output with configurable light/dark switching (via AS-i)
6	Warning output (via AS-i)
7	Pulse stretching
8	Contamination compensation (tracking function)
9	AS-interface slave address range: 1 … 31
10	AS-interface slave address range: 1 … 62
11	UL approval

AS-INTERFACE SENSORS

Part description Part No.:	Operating range Typ. op. range limit	Operating voltage (acc. to AS-i spec.)	Light source	Output
Retro-reflective sensors with polarization filter				
PRK 95 / A L.4 50027095	0 1.8 m 0 3 m	26.5 … 31.6V	Red light	AS-interface
PRK 96 M / A - 3410 - 44 50082067	0.3 15 m 0.1 18 m	26.5 … 31.6V	Red light	AS-interface
Energetic diffuse reflection scanners				
IRTR 8 / A - 800 - S12 50038790	10 600 mm 5 800 mm	26.5 … 31.6V	Red light	AS-interface
Diffuse reflection scanners with background suppression				
HRT 96 M / A - 1670 - 800 - 44 50080048	100 800 mm 100 1200 mm	26.5 … 31.6V	Red light	AS-interface
HRT 96 M / A - 1660 - 1200 - 44 50025112	100 1200 mm 100 1800 mm	26.5 … 31.6V	Infrared light	AS-interface

Dimensioned drawings see **standard sensors:**
IRTR 8… on **page 64, PRK 95…** on **page 156, PRK 96…** and **HRT 96…** on **page 164**.

Accessories / connection cables

More accessories can be found from **page 536** onwards

	Part No.	Designation	Features
a	50024748	KB - 095 - 1000 - 3AW	Connection cable 1000 mm, M12 axial/angular
b	50024749	KB - 095 - 2000 - 3AW	Connection cable 2000 mm, M12 axial/angular
c	50081151	KB - 095 - 5000 - 3AW	Connection cable 5000 mm, M12 axial/angular
d	50024346	AM 06	AS-i bus terminal for profile cable

AS-i
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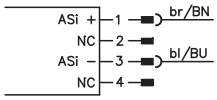
	Connection	Option	Accessories	
	M12 connector	1, 3, 4, 5, 6, 9, 11	a, b, c, d	
	M12 connector	1, 4, 5, 6, 9, 11	a, b, c, d	
	M12 connector	1, 5, 6, 10, 11	a, b, c, d	
	M12 connector	1, 4, 5, 9, 11	a, b, c, d	
	M12 connector	1, 4, 5, 9, 11	a, b, c, d	

Optical Sensor ABC

- Diffuse reflection scanners with background suppr. Page 594
- AS-interface sensors Page 597

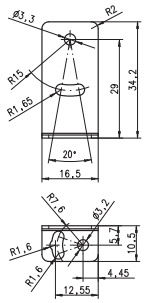
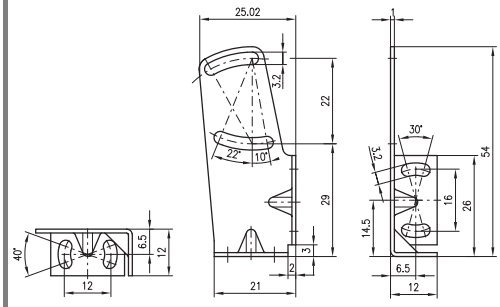
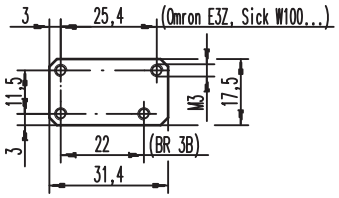
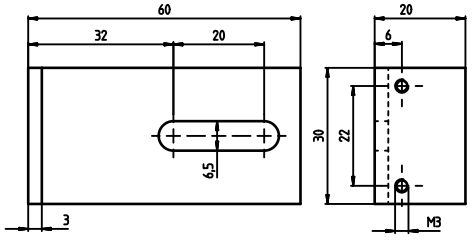
Electrical connection



Options

1	Sensitivity adjustment via potentiometer
2	Teach-in via rotary switch
3	Transparent media
4	Activation input (via AS-i)
5	Switching output with configurable light/dark switching (via AS-i)
6	Warning output (via AS-i)
7	Pulse stretching
8	Contamination compensation (tracking function)
9	AS-interface slave address range: 1 … 31
10	AS-interface slave address range: 1 … 62
11	UL approval

ACCESSORIES / MOUNTING SYSTEMS / OTHER

Dimensioned drawing	Part description Part No.:	Feature
2 Series		
	**BT 002M.5** 50112206	Mounting bracket
3B Series		
	**BT 3** 50060511	Mounting bracket
	BT 3.1 50105585	Retaining clip + 2 oval-head screws M3 x 16
	BT 3.5 50111830	Retaining clip + 2 oval-head screws M3 x 16, stainless steel model
	BT 3B 50105546	Mounting bracket + retaining clip + 2 oval-head screws M3 x 16
	**BT 3.2** 50103844	Adapter plate for alternate mounting of 3B Series sensors on 25.4 mm hole spacing
	**BT 003M.1** 50115197	Mounting bracket

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Mounting systems
Page 536

Connection technology
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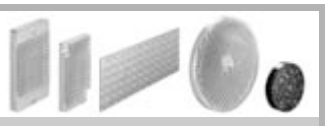
Reflectors
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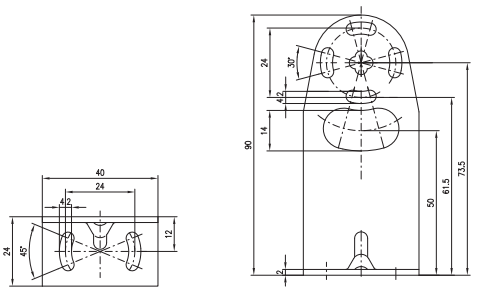
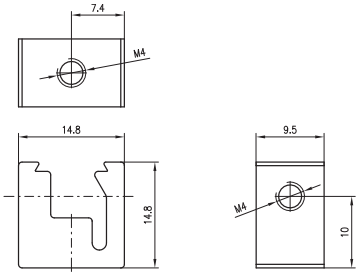
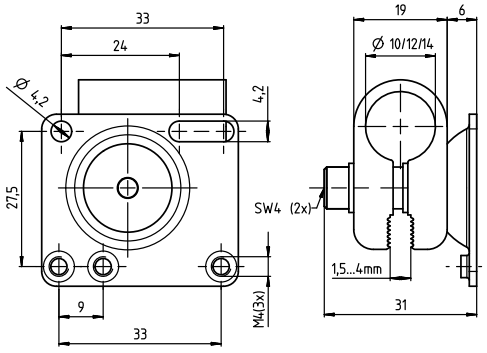
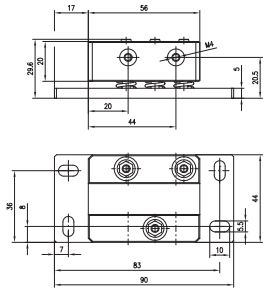
ACCESSORIES / MOUNTING SYSTEMS / OTHER

Dimensioned drawing	Part description Part No.:	Feature
Other 3B Series accessories		
	SAT 5 50109545	Sensorscope - mechanical-optical alignment aid, suitable for throughbeam- and safety-throughbeam photoelectric sensors
8 Series		
	**BT 8** 50036195	Mounting bracket
	**BT 8 - 0** 50036196	Mounting block for dovetail
	**BTU 300M - D10** 50117253	Through-hole mount for rod D = 10 mm or cheek 1.5 … 4 mm
	BTU 300M - D12 50117252	Through-hole mount for rod D = 12 mm or cheek 1.5 … 4 mm
	BTU 300M - D14 50117251	Through-hole mount for rod D = 14 mm or cheek 1.5 … 4 mm

ACCESSORIES / MOUNTING SYSTEMS / OTHER

Dimensioned drawing	Part description Part No.:	Feature
Other 8 Series accessories		
	**BT 8 - ARH** 50035030	Mounting/alignment system for laser sensors
	SAT 5 50109545	Sensorscope - mechanical-optical alignment aid, suitable for throughbeam- and safety-throughbeam photoelectric sensors

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Mounting systems
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Connection technology
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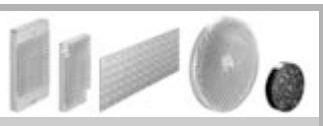
Reflectors
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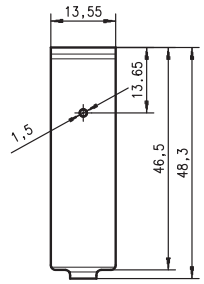
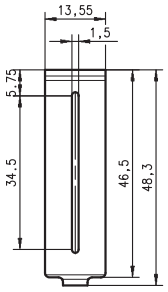
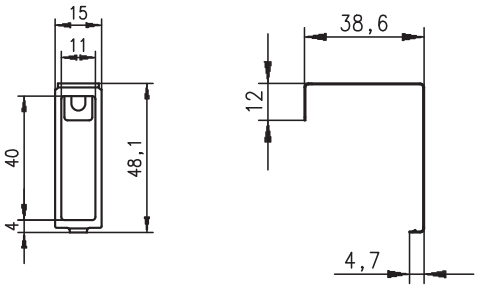
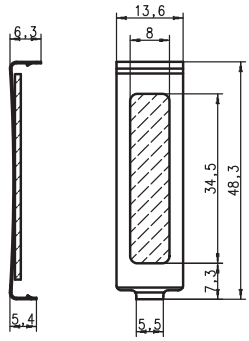
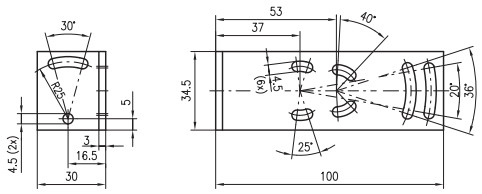
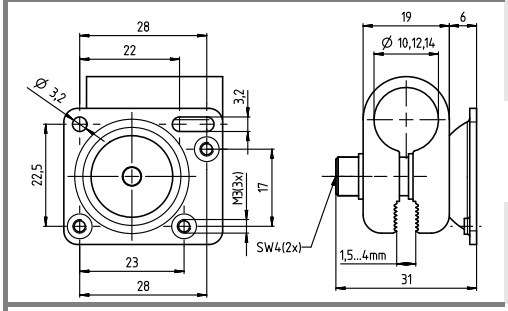
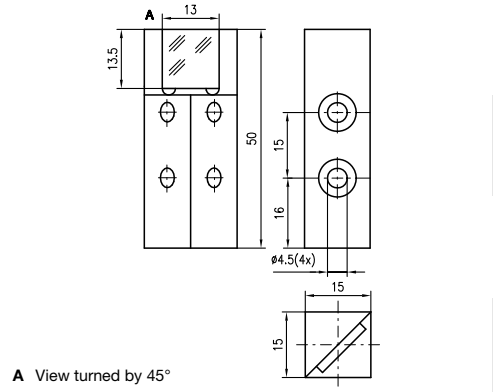
ACCESSORIES / MOUNTING SYSTEMS / OTHER

Dimensioned drawing	Part description Part No.:	Feature
Other 8 Series accessories		
	**BL 8** 50040279	Pin diaphragm
	**BL 8.1** 50040280	Slit diaphragm
	**BS 8** 50041067	Control guard
	**SG 8** 50113307	Protective glass, consisting of a metal frame with glass included, snap-in mounting

ACCESSORIES / MOUNTING SYSTEMS / OTHER

Dimensioned drawing	Part description Part No.:	Feature
18 Series		
	**BT 95** 50020833	Mounting bracket
	**BTU 200M - D10** 50117256	Through-hole mount for rod D = 10mm or cheek 1.5 … 4mm
	BTU 200M - D12 50117255	Through-hole mount for rod D = 12mm or cheek 1.5 … 4mm
	BTU 200M - D14 50117254	Through-hole mount for rod D = 14mm or cheek 1.5 … 4mm
 **A** View turned by 45°	**US 18** 50080987	90° deflection mirror

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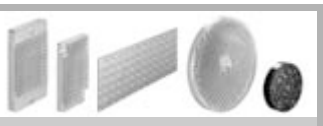
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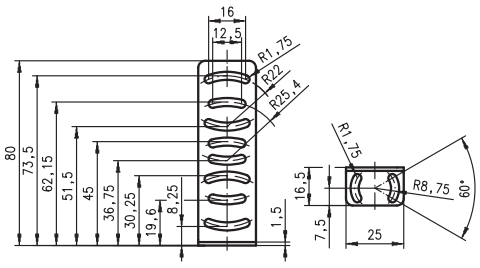
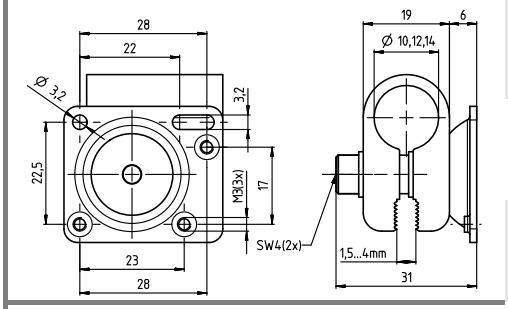
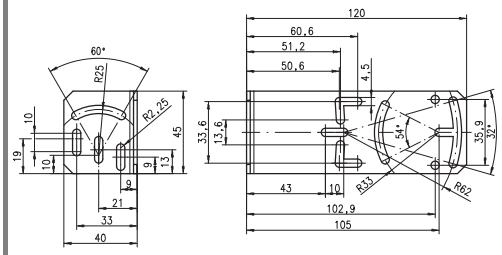
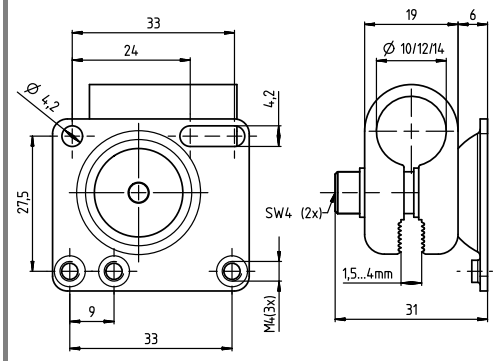
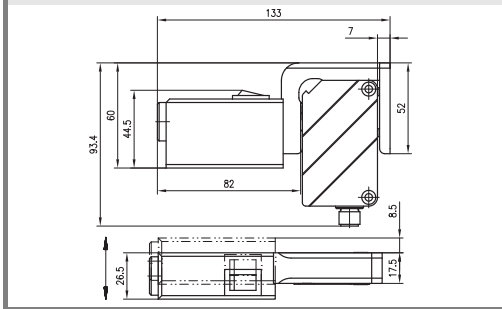
ACCESSORIES / MOUNTING SYSTEMS / OTHER

Dimensioned drawing	Part description Part No.:	Feature
25B Series		
	**BT 25** 50040269	Mounting bracket
	**BTU 200M - D10** 50117256	Through-hole mount for rod D = 10 mm or cheek 1.5 … 4 mm
	BTU 200M - D12 50117255	Through-hole mount for rod D = 12 mm or cheek 1.5 … 4 mm
	BTU 200M - D14 50117254	Through-hole mount for rod D = 14 mm or cheek 1.5 … 4 mm
	SAT 5 50109545	Sensorscope - mechanical-optical alignment aid, suitable for throughbeam- and safety-throughbeam photoelectric sensors

ACCESSORIES / MOUNTING SYSTEMS / OTHER

Dimensioned drawing	Part description Part No.:	Feature
46B Series		
	**BT 46** 50105315	Mounting bracket
	**BTU 300M - D10** 50117253	Through-hole mount for rod D = 10mm or cheek 1.5 … 4mm
	BTU 300M - D12 50117252	Through-hole mount for rod D = 12mm or cheek 1.5 … 4mm
	BTU 300M - D14 50117251	Through-hole mount for rod D = 14mm or cheek 1.5 … 4mm
Other 46B Series accessories		
	**ARH 46** 50040739	Alignment aid
	SAT 5 50109545	Sensorscope - mechanical-optical alignment aid, suitable for throughbeam- and safety-throughbeam photoelectric sensors

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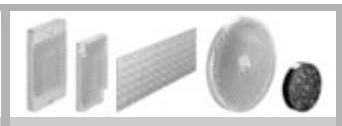
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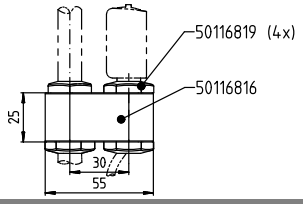
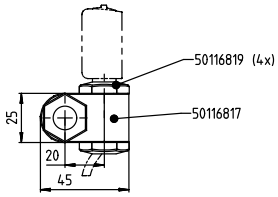
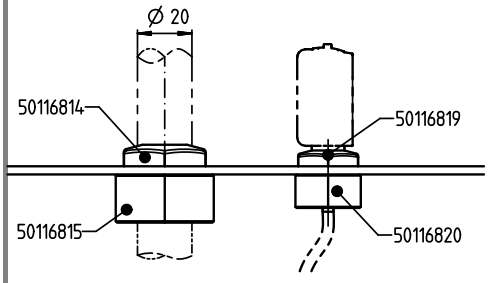
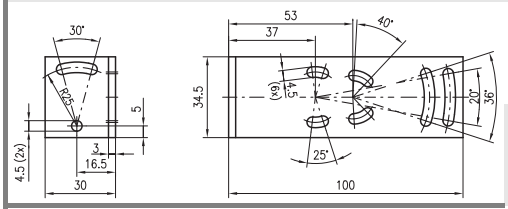
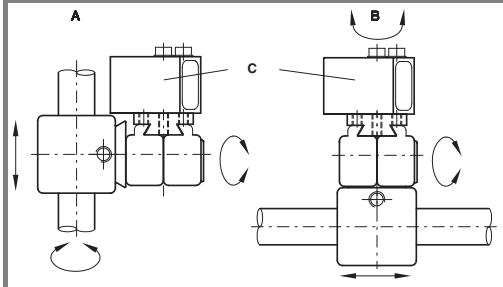
ACCESSORIES / MOUNTING SYSTEMS / OTHER

Dimensioned drawing	Part description Part No.:	Feature
53 Series		
	**BTU 053M.5F - D12 - A180** 50116816	Mounting system for D = 12mm rod for parallel connection of rod and sensor or of two stainless steel 316L rods
		Attention! Please include 4 x BTU 053M.5F-D12-SS interior clamping screws, part no. 50116819 in your order (see below)
	**BTU 053M.5F - D12 - A090** 50116817	Mounting system for D = 12mm rod for 90° connection of rod and sensor or of two stainless steel 316L rods
		Attention! Please include 4 x BTU 053M.5F-D12-SS interior clamping screws, part no. 50116819 in your order (see below)
 Sheet metal thickness: 1 … 6mm!	**BTU 053M.5F - D20 - SS** 50116814	M24x1.5 interior clamping screw for stainless steel 316L rod/pipe with D = 20mm, FPM/black double seal
	BTU 053M.5F - D20 - N 50116815	Lock nut for M24x1.5 interior clamping screw for stainless steel 316L rod/pipe with D = 20mm
	BTU 053M.5F - D12 - SS 50116819	M16x1.5 interior clamping screw for stainless steel 316L rod/BR53 sensor with D = 12mm, FPM/black double seal
	BTU 053M.5F - D12 - N 50116820	Lock nut for M16x1.5 interior clamping screw for stainless steel 316L rod/series 53 sensor with D = 12mm
Other 53 Series accessories		
	SAT 5 50109545	Sensorscope - mechanical-optical alignment aid, suitable for throughbeam photoelectric sensors

ACCESSORIES / MOUNTING SYSTEMS / OTHER

Dimensioned drawing	Part description Part No.:	Feature
95 Series		
	**BT 95** 50020833	Mounting bracket
	**UMS 96 - 95** 50080334	Mounting system
Other 95 Series accessories		
	SAT 5 50109545	Sensorscope - mechanical-optical alignment aid, suitable for throughbeam- and safety-throughbeam photoelectric sensors

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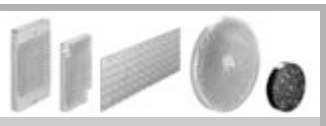
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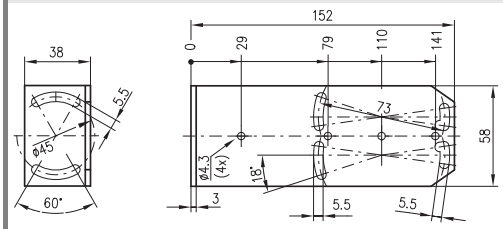
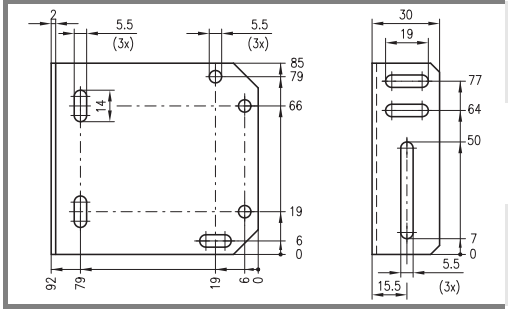
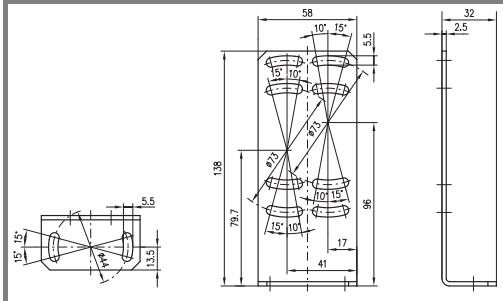
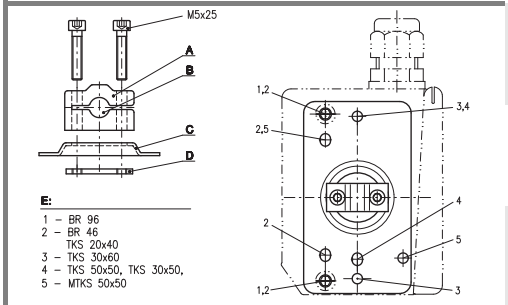
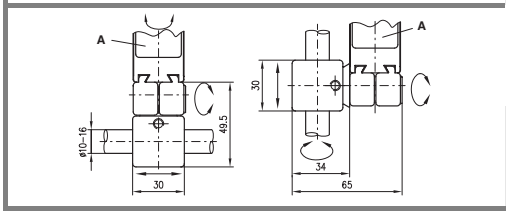
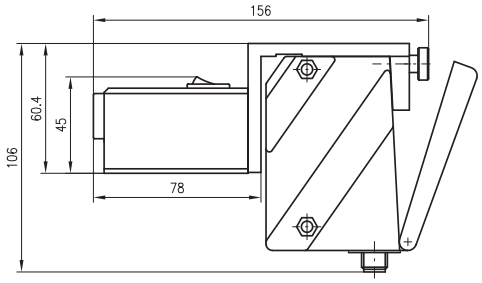
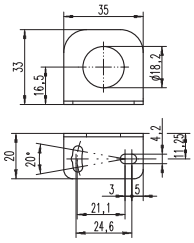
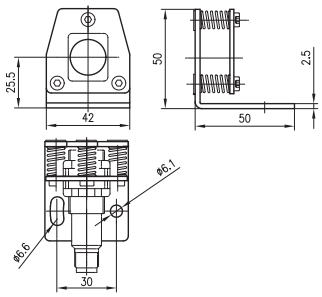
Dimensioned drawing	Part description Part No.:	Feature
96 Series		
	**BT 96** 50025570	Mounting bracket
	**BT 96.1** 50080614	Mounting device
	**BT 96.4** 50032319	Mounting bracket
	**BT 450.1 - 96** 50082084	Through-hole mount for rod D = 10 mm
	BT 450.3 - 96 50104897	Through-hole mount for rod D = 12 mm
	**UMS 96** 50026204	Universal mounting system

ACCESSORIES / MOUNTING SYSTEMS / OTHER

Dimensioned drawing	Part description Part No.:	Feature
Other 96 Series accessories		
	**ARH 96** 50080502	Laser alignment aid
	SAT 5 50109545	Sensorscope - mechanical-optical alignment aid, suitable for throughbeam- and safety-throughbeam photoelectric sensors
318 Series and 618 Series		
	**BT D18M.5** 50113548	Mounting bracket for M18 cylindrical devices
	**BT 318 - ARH** 50083189	Mounting/alignment system for laser sensors

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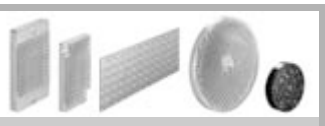
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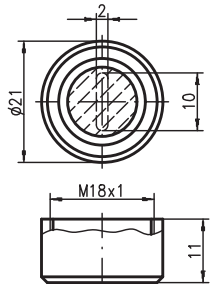
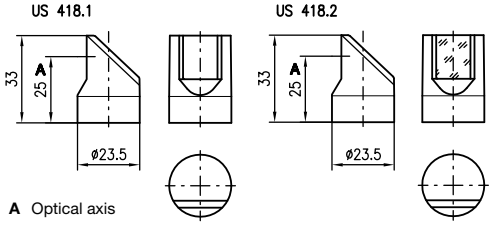
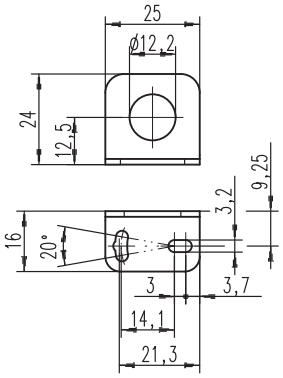
Dimensioned drawing	Part description Part No.:	Feature
Other 318 Series accessories		
	**BL 318.1** 50082008	Slit diaphragm for 318 Series
	**US 418.1** 50080130	90° deflector attachment (open version) for diffuse reflection scanners
	US 418.2 50080131	90° deflector attachment (closed version)
	SAT 5 50109545	Sensorscope - mechanical-optical alignment aid, suitable for throughbeam- and safety-throughbeam photoelectric sensors
412 Series		
	**BT D12M.5** 50113549	Mounting bracket for M12 cylindrical devices

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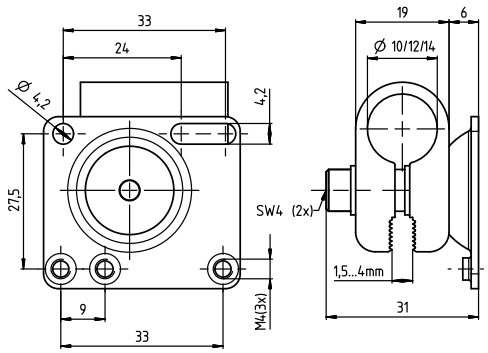
Dimensioned drawing	Part description Part No.:	Feature
Optical distance sensors ODSL 9		
	**BTU 300M - D10** 50117253	Through-hole mount for rod D = 10mm or cheek 1.5 … 4mm
	BTU 300M - D12 50117252	Through-hole mount for rod D = 12mm or cheek 1.5 … 4mm
	BTU 300M - D14 50117251	Through-hole mount for rod D = 14mm or cheek 1.5 … 4mm

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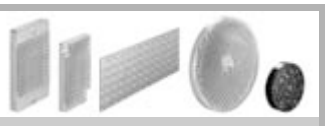
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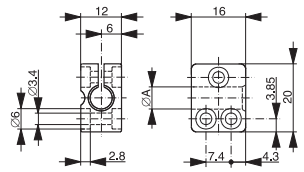
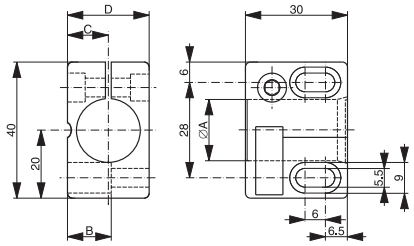
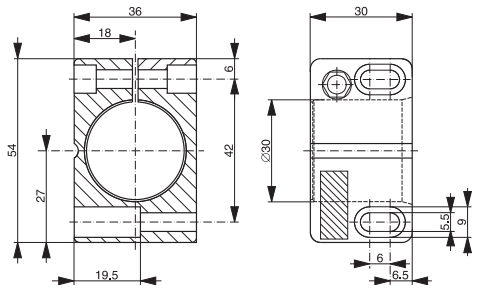
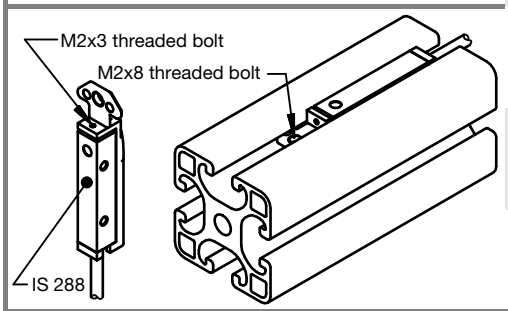
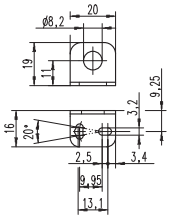
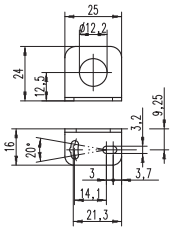
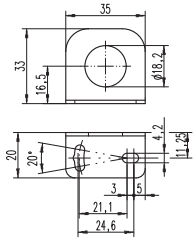
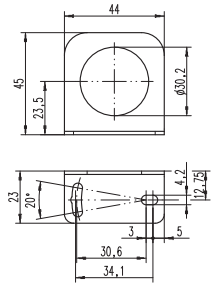
Dimensioned drawing	Part description Part No.:	Feature
Mounting clamps for inductive switches		
	**MC 006K** 50111496	Mounting clamp for inductive switches Ø 6.5mm, without limit stop, ØA = 6.5mm
	MC 008K 50111497	Mounting clamp for inductive switches M8 x 1, without limit stop, ØA = 8mm
	MC 008K - LS 50111498	Mounting clamp for inductive switches M8 x 1, with limit stop, ØA = 8mm
	**MC 012K** 50111499	Mounting clamp for inductive switches M12 x 1, without limit stop, ØA = 12mm, B = 9.75mm, C = 9mm, D = 18mm
	MC 012K - LS 50111500	Mounting clamp for inductive switches M12 x 1, with limit stop, ØA = 12mm, B = 9.75mm, C = 9mm, D = 18mm
	MC 018K 50111501	Mounting clamp for inductive switches M18 x 1, without limit stop, ØA = 18mm, B = 12.85mm, C = 12mm, D = 24mm
	MC 018K - LS 50111502	Mounting clamp for inductive switches M18 x 1, with limit stop, ØA = 18mm, B = 12.85mm, C = 12mm, D = 24mm
	**MC 030K** 50111503	Mounting clamp for inductive switches M30 x 1.5, without limit stop
	MC 030K - LS 50111504	Mounting clamp for inductive switches M30 x 1.5, with limit stop
	**BTC 088M - I40** 50115600	Mounting clamp for inductive switches from the IS 288 series for mounting into the groove of an ITEM profile with 40mm grid

ACCESSORIES / MOUNTING SYSTEMS / OTHER

Dimensioned drawing	Part description Part No.:	Feature
Mounting brackets for inductive switches		
	**BT D08M.5** 50113550	Mounting bracket for M8 inductive switches
	**BT D12M.5** 50113549	Mounting bracket for M12 inductive switches
	**BT D18M.5** 50113548	Mounting bracket for M18 inductive switches
	**BT D30M.5** 50113510	Mounting bracket for M30 inductive switches

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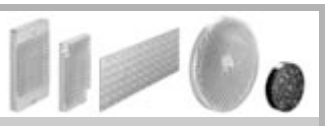
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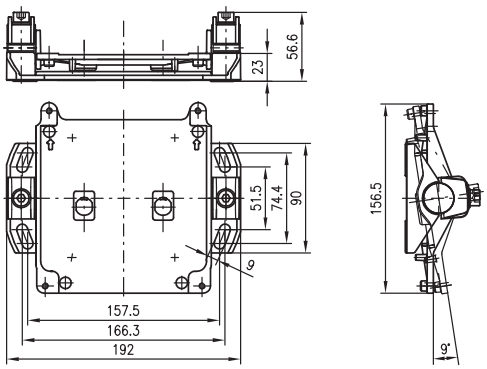
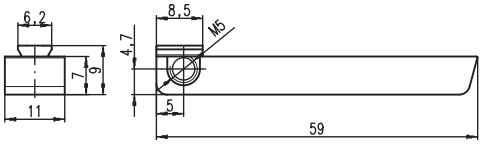
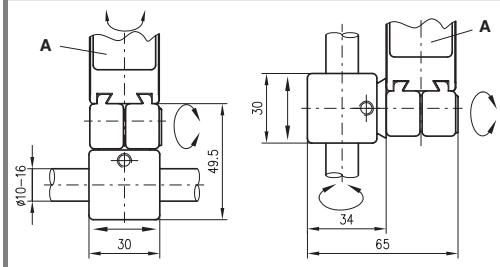
ACCESSORIES / MOUNTING SYSTEMS / OTHER

Dimensioned drawing	Part description Part No.:	Feature
ROD 4		
	**ROD 4 - MS** 50038066	Mounting system / mounting plate
Other accessories for optical forked sensors (I)GS 61 / 63		
	**BT - GS6X.L** 50112215	Mounting device for forked sensors (I)GS 61 / 63
Other accessories for ultrasonic forked sensors GSU 14C		
	FS 14BM.5 50114055	Replacement rail for standard design GSU 14B
	FS 14BML.5 50114056	Extended guide rail for GSU 14B, 260 mm long

ACCESSORIES / MOUNTING SYSTEMS / OTHER

Dimensioned drawing	Part description Part No.:	Feature
Contrast scanners		
	**UMS 96** 50026204	Universal mounting system
Other accessories for contrast scanners KRTG 20, KRTM 20 and color scanner CRTM 20		
	OB 12 - KRT 20 50034051	Optics 12 mm
	OB 20 - KRT 20 50034050	Optics 20 mm
	OB 50 - KRT 20 50034049	Optics 50 mm
	WZ - OB - KRT 20 50034118	Tool for changing lenses

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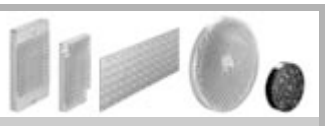
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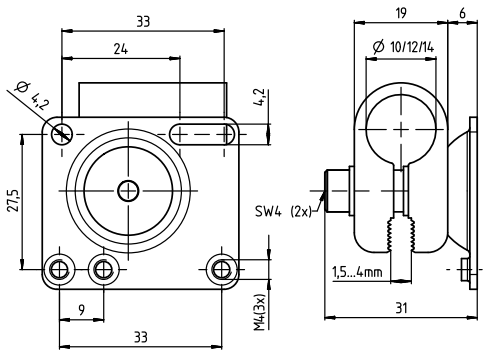
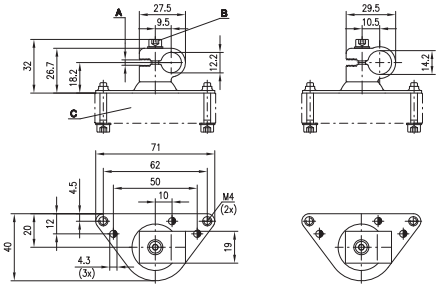
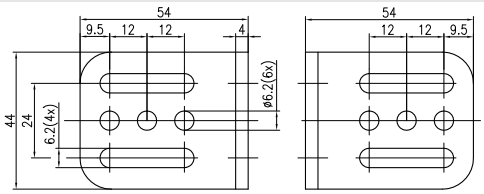
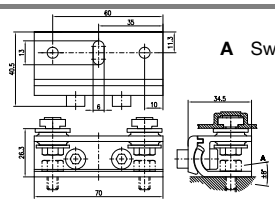
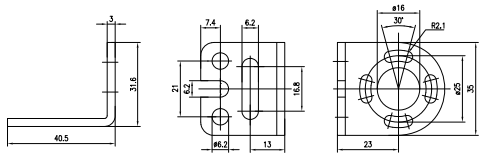
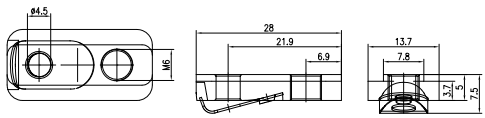
Dimensioned drawing	Part description Part No.:	Feature
Luminescence scanners LRT 8 and LRT 440		
	**BTU 300M - D10** [1] 50117253	Through-hole mount for rod D = 10mm or cheek 1.5 … 4mm
	BTU 300M - D12 [1] 50117252	Through-hole mount for rod D = 12mm or cheek 1.5 … 4mm
	BTU 300M - D14 [1] 50117251	Through-hole mount for rod D = 14mm or cheek 1.5 … 4mm
	**BT 46.1** 50030556	Mounting system for LRT 440, Mounting system for rod D = 12mm, steel/aluminum
	BT 46.2 50033785	Mounting system for LRT 440, Mounting system for rod D = 14mm, steel/aluminum

1) Additional mounting systems can be found under mounting systems for 8 Series on page 536

Mounting systems for optical distance sensors, ultrasonic sensors, fiber optic amplifiers, protective sensors and AS-interface sensors can be found with the mounting accessories for the respective standard sensors.

ACCESSORIES / MOUNTING SYSTEMS / OTHER

Dimensioned drawing	Part description Part No.:	Feature
KONTURflex light curtains		
	**BT - S** 560120	Mounting bracket
 **A** Swivel range ±8°	**BT - SSD** 560300	Swiveling bracket with vibration damper
	**BT - Kflex Standard** 345899	Standard mounting bracket (included in delivery contents)
	BT - Kflex long vers. 345907	Mounting bracket with extended bracket
	**BT - NC** 425720	Sliding block
	KONTURflex-480 diaphragm profile 345914	Pin diaphragm for KONTURflex, measurement field length 480 mm
	KONTURflex-640 diaphragm profile 345909	Pin diaphragm for KONTURflex, measurement field length 640 mm
	KONTURflex-1280 diaphragm profile 345915	Pin diaphragm for KONTURflex, measurement field length 1280 mm
	KONTURflex-1600 diaphragm profile 345916	Pin diaphragm for KONTURflex, measurement field length 1600 mm
	KONTURflex-1920 diaphragm profile 345919	Pin diaphragm for KONTURflex, measurement field length 1920 mm
	KONTURflex-2560 diaphragm profile 345925	Pin diaphragm for KONTURflex, measurement field length 2560 mm

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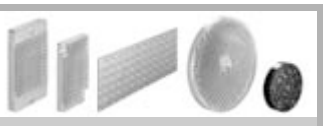
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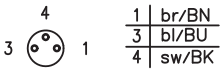
ACCESSORIES / CONNECTION TECHNOLOGY

Contact assignment	Part description Part No.:	Feature
Connection cables with M8 connector, 3-pin socket, open cable end		
	**K - D M8A - 3P - 2m - PVC** 50104520	Connection cable 2000 mm, M8 axial, 3-pin, PVC
	K - D M8W - 3P - 2m - PVC 50104521	Connection cable 2000 mm, M8 angular, 3-pin, PVC
	K - D M8A - 3P - 5m - PVC 50104522	Connection cable 5000 mm, M8 axial, 3-pin, PVC
	K - D M8W - 3P - 5m - PVC 50104523	Connection cable 5000 mm, M8 angular, 3-pin, PVC
	K - D M8A - 3P - 10m - PVC 50110556	Connection cable 10000 mm, M8 axial, 3-pin, PVC
	K - D M8W - 3P - 10m - PVC 50110559	Connection cable 10000 mm, M8 angular, 3-pin, PVC
	K - D M8A - 3P - 2m - PUR 50110555	Connection cable 2000 mm, M8 axial, 3-pin, PUR
	K - D M8W - 3P - 2m - PUR 50110557	Connection cable 2000 mm, M8 angular, 3-pin, PUR
	K - D M8A - 3P - 5m - PUR 50106691	Connection cable 5000 mm, M8 axial, 3-pin, PUR
	K - D M8W - 3P - 5m - PUR 50106692	Connection cable 5000 mm, M8 angular, 3-pin, PUR
	K - D M8A - 3P - 10m - PUR 50106693	Connection cable 10000 mm, M8 axial, 3-pin, PUR
	K - D M8W - 3P - 10m - PUR 50110558	Connection cable 10000 mm, M8 angular, 3-pin, PUR

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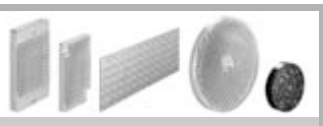
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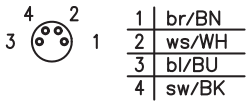
Contact assignment	Part description Part No.:	Feature
Connection cables with M8 connector, 4-pin socket, open cable end		
	**K - D M8A - 4P - 2m - PVC** 50104524	Connection cable 2000 mm, M8 axial, 4-pin, PVC
	K - D M8W - 4P - 2m - PVC 50104525	Connection cable 2000 mm, M8 angular, 4-pin, PVC
	K - D M8A - 4P - 5m - PVC 50104526	Connection cable 5000 mm, M8 axial, 4-pin, PVC
	K - D M8W - 4P - 5m - PVC 50104527	Connection cable 5000 mm, M8 angular, 4-pin, PVC
	K - D M8A - 4P - 10m - PVC 50104528	Connection cable 10000 mm, M8 axial, 4-pin, PVC
	K - D M8W - 4P - 10m - PVC 50104529	Connection cable 10000 mm, M8 angular, 4-pin, PVC
	K - D M8A - 4P - 20m - PVC 50115424	Connection cable 20000 mm, M8 axial, 4-pin, PVC
	K - D M8A - 4P - 2m - PUR 50104530	Connection cable 2000 mm, M8 axial, 4-pin, PUR
	K - D M8W - 4P - 2m - PUR 50104531	Connection cable 2000 mm, M8 angular, 4-pin, PUR
	K - D M8A - 4P - 5m - PUR 50104532	Connection cable 5000 mm, M8 axial, 4-pin, PUR
	K - D M8W - 4P - 5m - PUR 50104761	Connection cable 5000 mm, M8 angular, 4-pin, PUR
	K - D M8A - 4P - 10m - PUR 50104533	Connection cable 10000 mm, M8 axial, 4-pin, PUR
	K - D M8W - 4P - 10m - PUR 50104534	Connection cable 10000 mm, M8 angular, 4-pin, PUR

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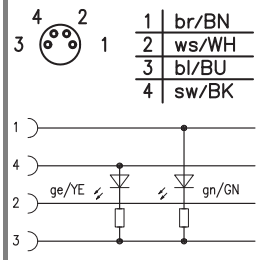
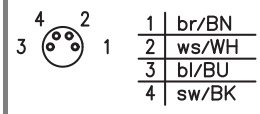
Contact assignment	Part description Part No.:	Feature
Connection cables with M8 connector, 4-pin socket, open cable end, with integrated LEDs		
	**K - D M8W - 4P - 2m - DP - PUR** 50104535	Connection cable 2000 mm, M8 angular, 4-pin, PUR, 2 integrated LEDs (PNP)
	K - D M8W - 4P - 5m - DP - PUR 50104536	Connection cable 5000 mm, M8 angular, 4-pin, PUR, 2 integrated LEDs (PNP)
Connection cables with M8 connector, 4-pin socket, open cable end, for the food and beverage industries		
	**K - D M8A - 4P - 2m - FAB** 50106152	Connection cable 2000 mm, M8 axial, 4-pin, PVC, Food & Beverage version
	K - D M8W - 4P - 2m - FAB 50106154	Connection cable 2000 mm, M8 angular, 4-pin, PVC, Food & Beverage version
	K - D M8A - 4P - 5m - FAB 50106153	Connection cable 5000 mm, M8 axial, 4-pin, PVC, Food & Beverage version
	K - D M8W - 4P - 5m - FAB 50106155	Connection cable 5000 mm, M8 angular, 4-pin, PVC, Food & Beverage version
	K - D M8A - 4P - 10m - FAB 50110274	Connection cable 10000 mm, M8 axial, 4-pin, PVC, Food & Beverage version
	K - D M8W - 4P - 10m - FAB 50110273	Connection cable 10000 mm, M8 angular, 4-pin, PVC, Food & Beverage version

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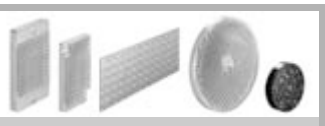
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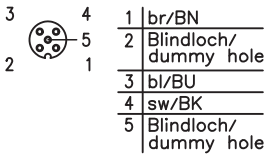
Contact assignment	Part description Part No.:	Feature
Connection cables with M12 connector, 3-pin socket, open cable end		
	**K - D M12A - 3P - 2m - PVC** 50104538	Connection cable 2000 mm, M12 axial, 3-pin, PVC
	K - D M12W - 3P - 2m - PVC 50104539	Connection cable 2000 mm, M12 angular, 3-pin, PVC
	K - D M12A - 3P - 5m - PVC 50104540	Connection cable 5000 mm, M12 axial, 3-pin, PVC
	K - D M12W - 3P - 5m - PVC 50104541	Connection cable 5000 mm, M12 angular, 3-pin, PVC

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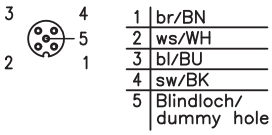
Contact assignment	Part description Part No.:	Feature
Connection cables with M12 connector, 4-pin socket, open cable end		
	**K - D M12A - 4P - 2m - PVC** 50104542	Connection cable 2000 mm, M12 axial, 4-pin, PVC
	K - D M12W - 4P - 2m - PVC 50104543	Connection cable 2000 mm, M12 angular, 4-pin, PVC
	K - D M12A - 4P - 5m - PVC 50104544	Connection cable 5000 mm, M12 axial, 4-pin, PVC
	K - D M12W - 4P - 5m - PVC 50104545	Connection cable 5000 mm, M12 angular, 4-pin, PVC
	K - D M12A - 4P - 10m - PVC 50104546	Connection cable 10000 mm, M12 axial, 4-pin, PVC
	K - D M12W - 4P - 10m - PVC 50104547	Connection cable 10000 mm, M12 angular, 4-pin, PVC
	K - D M12A - 4P - 20m - PVC 50104753	Connection cable 20000 mm, M12 axial, 4-pin, PVC
	K - D M12W - 4P - 20m - PVC 50113473	Connection cable 20000 mm, M12 angular, 4-pin, PVC

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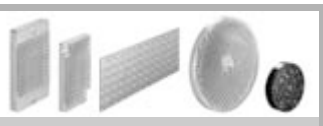
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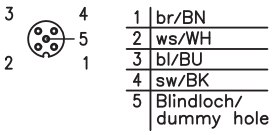
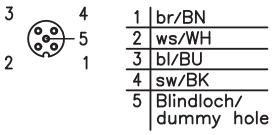
Contact assignment	Part description Part No.:	Feature
Connection cables with M12 connector, 4-pin socket, open cable end		
	**K - D M12A - 4P - 2m - PUR** 50104561	Connection cable 2000 mm, M12 axial, 4-pin, PUR
	K - D M12W - 4P - 2m - PUR 50104562	Connection cable 2000 mm, M12 angular, 4-pin, PUR
	K - D M12A - 4P - 5m - PUR 50104563	Connection cable 5000 mm, M12 axial, 4-pin, PUR
	K - D M12W - 4P - 5m - PUR 50104564	Connection cable 5000 mm, M12 angular, 4-pin, PUR
	K - D M12A - 4P - 10m - PUR 50104565	Connection cable 10000 mm, M12 axial, 4-pin, PUR
	K - D M12W - 4P - 10m - PUR 50104566	Connection cable 10000 mm, M12 angular, 4-pin, PUR
Connection cables for intrinsically safe circuits with M12 connector, 4-pin socket, open cable end		
	**BK7 KB - 092 - 5000 - 4A Ex** 50037783	Connection cable 5000 mm for intrinsically safe circuits, blue, M12 axial, 4-pin
	BK7 KB - 092 - 5000 - 4 Ex 50037784	Connection cable 5000 mm for intrinsically safe circuits, blue, M12 angular, 4-pin

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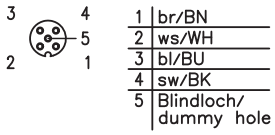
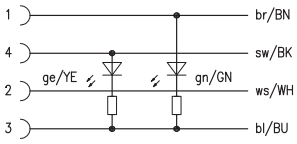
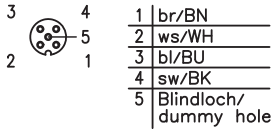
Contact assignment	Part description Part No.:	Feature
Connection cables with M12 connector, 4-pin socket, open cable end, with integrated LEDs		
	**K - D M12A - 4P - 2m - DP - PUR** 50104548	Connection cable 2000 mm, M12 axial, 4-pin, PUR, 2 integrated LEDs (PNP)
	K - D M12W - 4P - 2m - DP - PUR 50104549	Connection cable 2000 mm, M12 angular, 4-pin, PUR, 2 integrated LEDs (PNP)
	K - D M12A - 4P - 5m - DP - PUR 50104550	Connection cable 5000 mm, M12 axial, 4-pin, PUR, 2 integrated LEDs (PNP)
	**K - D M12W - 4P - 5m - DP - PUR** 50104551	Connection cable 5000 mm, M12 angular, 4-pin, PUR, 2 integrated LEDs (PNP)
	K - D M12A - 4P - 10m - DP - PUR 50104552	Connection cable 10000 mm, M12 axial, 4-pin, PUR, 2 integrated LEDs (PNP)
	K - D M12W - 4P - 10m - DP - PUR 50104553	Connection cable 10000 mm, M12 angular, 4-pin, PUR, 2 integrated LEDs (PNP)
Connection cables with M12 connector, 4-pin socket, open cable end, for the food and beverage industries		
	K - D M12A - 4P - 2m - FAB 50104570	Connection cable 2000 mm, M12 axial, 4-pin, PVC, Food & Beverage version
	K - D M12W - 4P - 2m - FAB 50104571	Connection cable 2000 mm, M12 angular, 4-pin, PVC, Food & Beverage version
	**K - D M12A - 4P - 5m - FAB** 50104572	Connection cable 5000 mm, M12 axial, 4-pin, PVC, Food & Beverage version
	K - D M12W - 4P - 5m - FAB 50104573	Connection cable 5000 mm, M12 angular, 4-pin, PVC, Food & Beverage version
	K - D M12A - 4P - 10m - FAB 50112960	Connection cable 10000 mm, M12 axial, 4-pin, PVC, Food & Beverage version
	K - D M12W - 4P - 10m - FAB 50112961	Connection cable 10000 mm, M12 angular, 4-pin, PVC, Food & Beverage version

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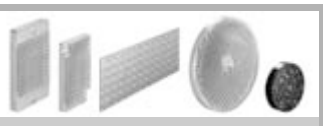
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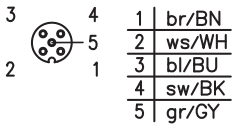
Contact assignment	Part description Part No.:	Feature
Connection cables with M12 connector, 5-pin socket, open cable end		
	**K - D M12A - 5P - 2m - PVC** 50104555	Connection cable 2000 mm, M12 axial, 5-pin, PVC
	K - D M12W - 5P - 2m - PVC 50104556	Connection cable 2000 mm, M12 angular, 5-pin, PVC
	K - D M12A - 5P - 5m - PVC 50104557	Connection cable 5000 mm, M12 axial, 5-pin, PVC
	K - D M12W - 5P - 5m - PVC 50104558	Connection cable 5000 mm, M12 angular, 5-pin, PVC
	K - D M12A - 5P - 10m - PVC 50104559	Connection cable 10000 mm, M12 axial, 5-pin, PVC
	K - D M12W - 5P - 10m - PVC 50104560	Connection cable 10000 mm, M12 angular, 5-pin, PVC
	K - D M12A - 5P - 2m - PUR 50104567	Connection cable 2000 mm, M12 axial, 5-pin, PUR
	K - D M12W - 5P - 2m - PUR 50104568	Connection cable 2000 mm, M12 angular, 5-pin, PUR
	K - D M12A - 5P - 5m - PUR 50104569	Connection cable 5000 mm, M12 axial, 5-pin, PUR
	K - D M12W - 5P - 5m - PUR 50104762	Connection cable 5000 mm, M12 angular, 5-pin, PUR

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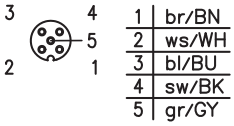
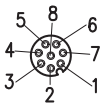
Contact assignment	Part description Part No.:	Feature
Connection cables with M12 connector, 5-pin socket, open cable end, for the food and beverage industries		
 1 br/BN 2 ws/WH 3 bl/BU 4 sw/BK 5 gr/GY	**K - D M12A - 5P - 2m - FAB** 50104574	Connection cable 2000 mm, M12 axial, 5-pin, PVC, Food & Beverage version
	K - D M12W - 5P - 2m - FAB 50104575	Connection cable 2000 mm, M12 angular, 5-pin, PVC, Food & Beverage version
	K - D M12A - 5P - 5m - FAB 50104576	Connection cable 5000 mm, M12 axial, 5-pin, PVC, Food & Beverage version
	K - D M12W - 5P - 5m - FAB 50104577	Connection cable 5000 mm, M12 angular, 5-pin, PVC, Food & Beverage version
Connection cables with M12 connector, 8-pin socket, open cable end		
 1 ws/WH 2 br/BN 3 gn/GN 4 ge/YE 5 gr/GY 6 rs/PK 7 bl/BU 8 rt/RD	**K - D M12A - 8P - 2m - PUR** 50104591	Connection cable 2000 mm, M12 axial, 8-pin, shielded, PUR
	K - D M12A - 8P - 5m - PUR 50104590	Connection cable 5000 mm, M12 axial, 8-pin, shielded, PUR
	K - D M12A - 8P - 10m - PUR 50106882	Connection cable 10000 mm, M12 axial, 8-pin, shielded, PUR

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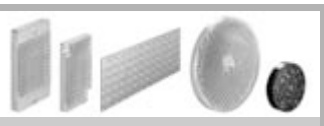
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Contact assignment	Part description Part No.:	Feature
Adapter cables with M8/M12 connector, 4-pin		
	K - DS M8A - M12A - 4P - 0.3m - PVC 50107276	Adapter line 300 mm, axial M8 socket, axial M12 connector, 4-pin, PVC. Simple connection of sensors with M8 connectors to M12 connection technology possible.
Extension cables with M12 connector, 4-pin		
 1 br/BN 2 ws/WH 3 bl/BU 4 sw/BK 5 Blindloch/ dummy hole	**K - DS M12A - M12A - 4P - 2m - PVC** 50110126	2 m extension cable, M12 axial socket, M12 axial connector, 4-pin, PVC
	K - DS M12A - M12A - 4P - 5m - PVC 50110125	5 m extension cable, M12 axial socket, M12 axial connector, 4-pin, PVC
	K - DS M12A - M12A - 4P - 10m - PVC 50113265	10 m extension cable, M12 axial socket, M12 axial connector, 4-pin, PVC
	K - DS M12A - M12A - 4P - 20m - PVC 50111729	20 m extension cable, M12 axial socket, M12 axial connector, 4-pin, PVC

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Contact assignment	Part description Part No.:	Feature
Connection cables ROD4 and ROD4plus		
	KB - ROD4PC - 3000 50038069	Connection cable between ROD 4 and PC 3000 mm
	KB - ROD4PC - 10000 50038070	Connection cable between ROD 4 and PC 10000 mm
	KB - ROD4 - CP - 5000 50108138	Connection cable 5000 mm for ROD 4-3x, with configuration memory (Config-Plug)
	KB - ROD4 - CP - 10000 50108139	Connection cable 10000 mm for ROD 4-3x, with configuration memory (Config-Plug)
	KB - ROD4 plus - 5000 50106881	Connection cable for ROD 4 plus 5000 mm
	KB - ROD4 plus - 10000 50106906	Connection cable for ROD 4 plus 10000 mm
	KB - ET - 2000 - SA - RJ45 50109880	Ethernet connection cable for ROD 4 plus 2000 mm, M12 axial D-coded to RJ45
	KB - ET - 5000 - SA - RJ45 50109881	Ethernet connection cable for ROD 4 plus 5000 mm, M12 axial D-coded to RJ45
	KB - ET - 10000 - SA - RJ45 50109882	Ethernet connection cable for ROD 4 plus 10000 mm, M12 axial D-coded to RJ45

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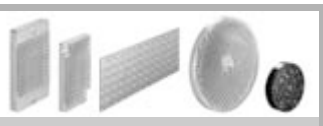
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Contact assignment	Part description Part No.:	Feature
Connection cable for KONTURflex light curtains		
	CB - M12 - 1000S - 5GF/GM 678031	QUATTRO-KT/KR connection cable, length 1 m, shielded
	CB - M12 - 2500S - 5GF/GM 678033	QUATTRO-KT/KR connection cable, length 2.5 m, shielded
	CB - M12 - 5000S - 5GF/GM 678035	QUATTRO-KT/KR connection cable, length 5 m, shielded
	CB - M12 - 10000S - 5GF/GM 678040	QUATTRO-KT/KR connection cable, length 10 m, shielded
	CB - M12 - 15000S - 5GF/GM 678045	QUATTRO-KT/KR connection cable, length 15 m, shielded
	CB - M12 - 20000S - 5GF/GM 678032	QUATTRO-KT/KR connection cable, length 20 m, shielded

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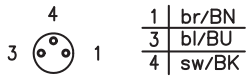
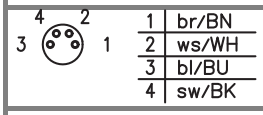
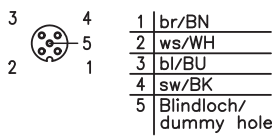
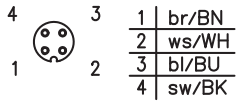
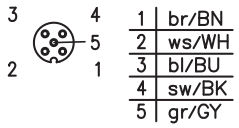
Contact assignment	Part description Part No.:	Feature
Connectors, user-configurable		
	**D M8A - 3P - SK** 50104582	Cable socket, M8 axial, 3-pin, insulation displacement connections, user-configurable
	**D M8A - 4P - SK** 50104583	Cable socket, M8 axial, 4-pin, insulation displacement connections, user-configurable
	**KD 095 - 4** 50031324	Cable socket, M12 angular, 4-pin, user-configurable
	KD 095 - 4A 50031323	Cable socket, M12 axial, 4-pin, user-configurable
	**KS 095 - 4A** 50040155	Cable plug, M12 axial, 4-pin, user-configurable
	**KD 095 - 5** 50020502	Cable socket, M12 angular, 5-pin, user-configurable
	KD 095 - 5A 50020501	Cable socket, M12 axial, 5-pin, user-configurable
	KD 095 - 5A - PG9 50081461	Cable socket, M12 axial, 5-pin, user-configurable, with PG9 screwed cable gland
	KD - ROD4 - X1 - Set 50038072	Connector X1 for ROD 4, 15-pin
	KD - ROD4 - X2 - Set 50038073	Connector X2 for ROD 4, 9-pin
	D - ET1 50108991	RJ45 plug for user-configuration

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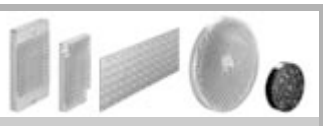
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Contact assignment	Part description Part No.:	Feature
RS 232 connection cables for connecting to MA 2xx fieldbus gateways		
	K-DS M12A-MA-5P-3m-S-PUR 50115049	Interface cable for connection of ODS…/D26… optical distance sensors with RS 232 interface to the MA 2xx*i* connector units
	K-DS M12A-MA-8P-3m-S-PUR 50115050	Interface cable for connection of ODSL 30/D232… optical distance sensors with RS 232 interface to the MA 2xx*i* connector units
	K-DS M12A-MA-5P-3m-1S-PUR 50116791	Interface cable for connection of the KONTURflex QUATTRO-RSX/M12 control device with RS 232 interface to the MA 2xx*i* connector units
Connector units for connecting RS 232 to fieldbus		
 Detailed information in the **Identification systems / Data transmission systems / Distance measuring system** catalog or at *www.leuze.com*	**MA 204i** 50112893	Modular connector unit for connecting devices with RS 232 interfaces to PROFIBUS
	MA 208i 50112892	Modular connector unit for connecting devices with RS 232 interfaces to Ethernet TCP/IP
	MA 235i 50114154	Modular connector unit for connecting devices with RS 232 interfaces to CANopen
	MA 238i 50114155	Modular connector unit for connecting devices with RS 232 interfaces to EtherCAT
	MA 248i 50112891	Modular connector unit for connecting devices with RS 232 interfaces to PROFINET-IO (RT)
	MA 255i 50114156	Modular connector unit for connecting devices with RS 232 interfaces to DeviceNet
	MA 258i 50114157	Modular connector unit for connecting devices with RS 232 interfaces to EtherNet/IP

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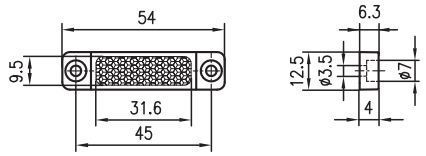
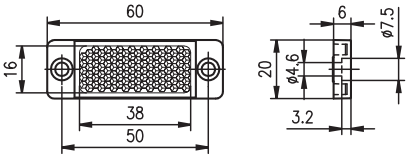
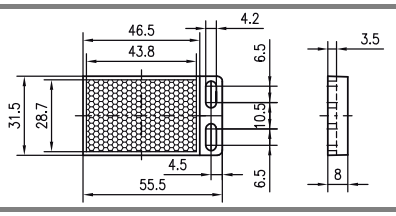
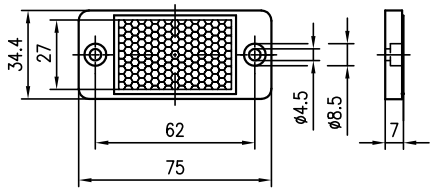
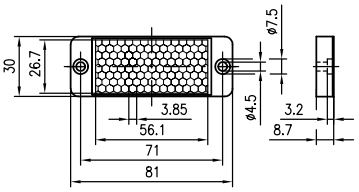
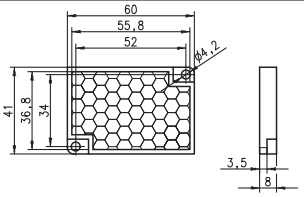
Dimensioned drawing	Part description Part No.:	Feature
Plastic reflectors, rectangular, screw type and adhesive types		
	**TKS 10 x 32** 50110282	Adhesive, screw type
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TKS 20 x 40** 50081283	Adhesive, screw type
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TKS 30 x 45** 50114617	Screw type
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TKS 30 x 50** 50023525	Adhesive, screw type
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TKS 30 x 60** 50030433	Adhesive, screw type
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TKS 40 x 60** 50040820	Screw type
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C

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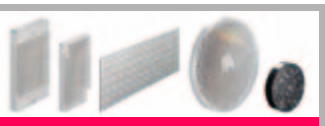
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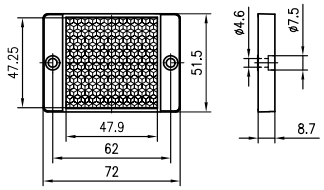
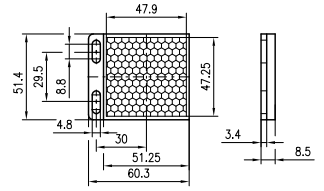
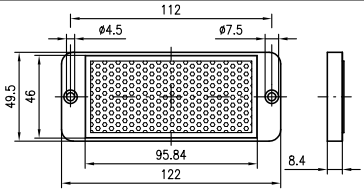
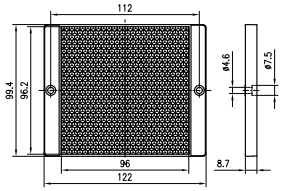
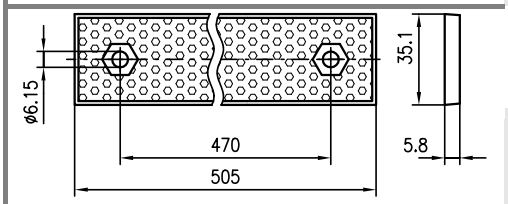
Dimensioned drawing	Part description Part No.:	Feature
Plastic reflectors, rectangular, screw type and adhesive types		
	**TKS 50 x 50** 50022814	Adhesive, screw type
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TKS 50 x 50.1** 50105153	Adhesive, screw type
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TKS 50 x 100** 50022815	Adhesive, screw type
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TKS 100 x 100** 50022816	Adhesive, screw type
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TKS 30 x 500** 50027097	Screw type
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C

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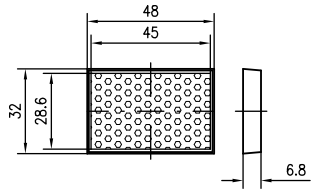
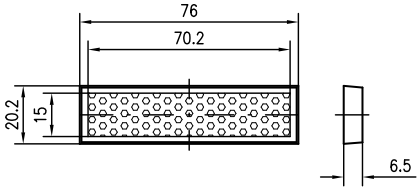
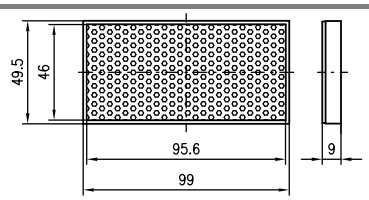
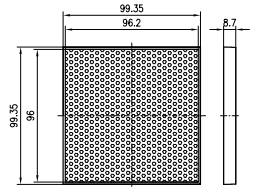
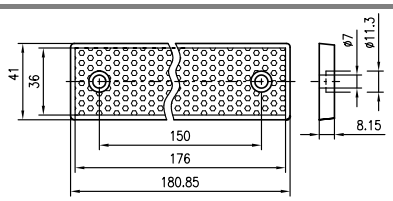
Dimensioned drawing	Part description Part No.:	Feature
Plastic reflectors, rectangular, adhesive		
	**TK 30 x 50** 50003189	Adhesive
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TK 20 x 75** 50003188	Adhesive
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TK 50 x 100** 50003191	Adhesive, screw type with BT 910M
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TK 100 x 100** 50003192	Adhesive, screw type with BT 910M
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TK 40 x 180** 50003190	Adhesive, screw type
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C

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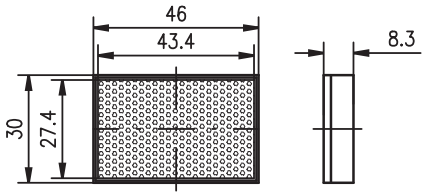
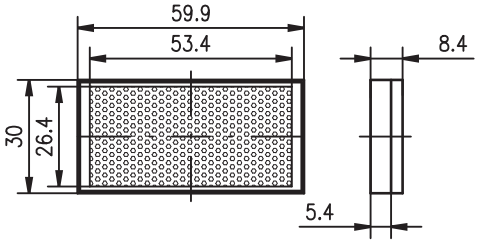
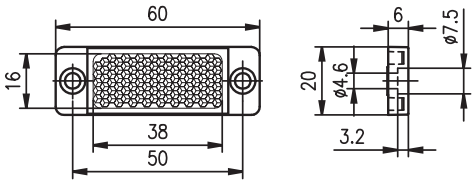
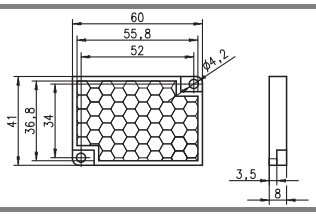
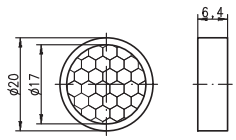
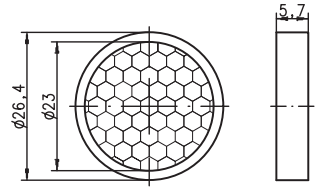
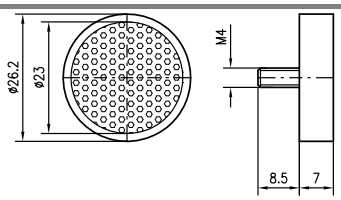
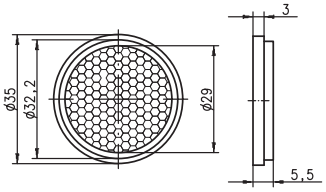
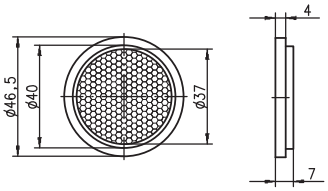
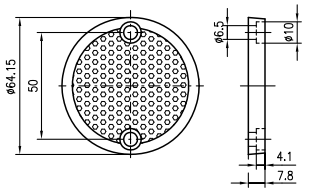
Dimensioned drawing	Part description Part No.:	Feature
Plastic reflectors, rectangular, self-adhesive		
	**TKA 30 x 46** 50108216	Self-adhesive Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TKA 30 x 60** 50108215	Self-adhesive Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
Plastic reflectors, rectangular, for use in the pharmaceutical industry		
	**TKS 20 x 40.P** 50106960	Screw type, resistant to cleaning with alcohol and hydrogen peroxide Protection class IP 67 Temperature range -40 °C … +70 °C
	**TKS 40 x 60.P** 50106957	Screw type, resistant to cleaning with alcohol and hydrogen peroxide Protection class IP 67 Temperature range -40 °C … +70 °C

ACCESSORIES / REFLECTORS

Dimensioned drawing	Part description Part No.:	Feature
Plastic reflectors, round		
	**TK 20.1** [1] 50041471	Adhesive
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TK 25.1** [1] 50041355	Adhesive
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TKS 25** [1] 50027696	Screw type, threaded bolt
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TK 35.1** [1] 50101867	Adhesive
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TK 45.1** [1] 50105990	Adhesive
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**TK 60** [1] 50003186	Adhesive, screw type
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C

1) Dimensional tolerance for all specified dimensions: ± 0.2 mm

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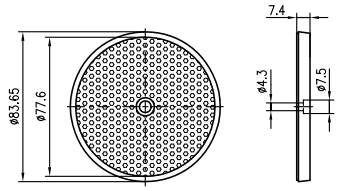
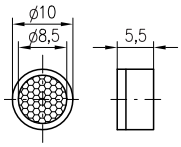
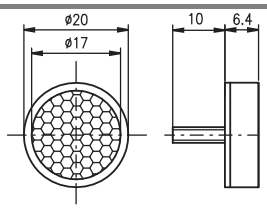
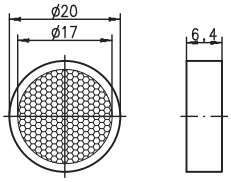
Dimensioned drawing	Part description Part No.:	Feature
Plastic reflectors		
	**TK 82.2** 50024127	Screw type, flat surface, (dimensional tolerance for all specified dimensions: ± 0.2 mm)
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	TK 82.AF 50111375	Screw type, flat surface, with anti-fogging coating (dimensional tolerance for all specified dimensions: ± 0.2 mm)
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
Plastic reflectors, round, for use in the pharmaceutical industry		
	**TK 10.P** 50116939	Adhesive, resistant to cleaning with alcohol and hydrogen peroxide
		Protection class IP 67 Temperature range -40 °C … +70 °C
	**TKS 20.P** 50106958	Screw type, resistant to cleaning with alcohol and hydrogen peroxide
		Protection class IP 67 Temperature range -40 °C … +70 °C
Plastic reflectors with micro triple structure, round		
	**MTK 20** 50109828	Micro triple, adhesive
		Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C

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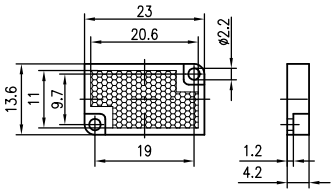
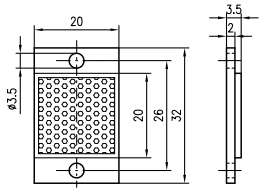
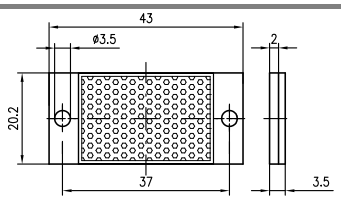
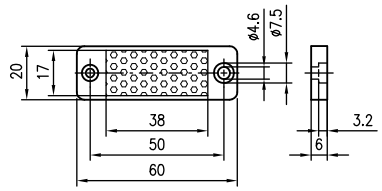
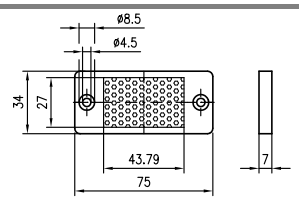
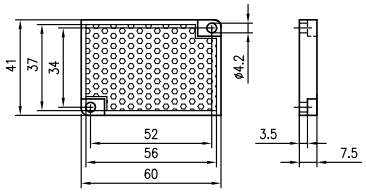
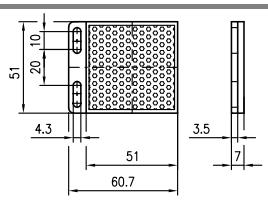
Dimensioned drawing	Part description Part No.:	Feature
Plastic reflectors with micro triple structure, rectangular		
	**MTKS 14 x 23** 50106209	Micro triple, screw type Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**MTKS 20 x 20** 50040895	Micro triple, screw type Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**MTKS 20 x 30** 50040894	Micro triple, screw type Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**MTKS 20 x 40.1** 50104130	Micro triple, screw type Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**MTKS 30 x 50.1** 50104132	Micro triple, screw type Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**MTKS 40 x 60.1** 50104131	Micro triple, screw type Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C
	**MTKS 50 x 50** 50036188	Micro triple, screw type Plastic PMMA 8N, protection class IP 67 Temperature range -40 °C … +70 °C

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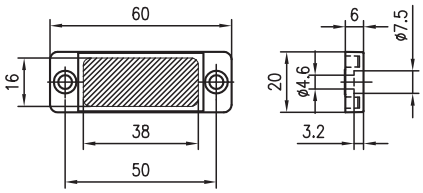
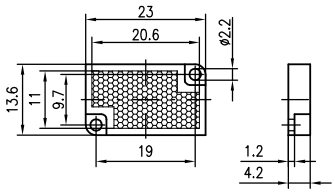
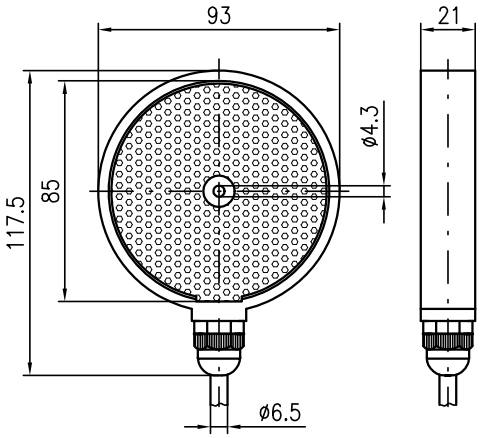
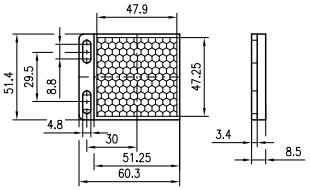
Dimensioned drawing	Part description Part No.:	Feature
Plastic reflectors with micro triple structure, rectangular		
	**REF 6 - S - 20 x 40** 50114185	Reflector with maximum homogeneity based on reflective tape no. 6
		Screw type, protection class IP 67 Temperature range -40°C … +70°C
Plastic reflectors with micro triple structure, for use in the pharmaceutical industry		
	**MTKS 14 x 23.P** 50106961	Micro triple, screw type resistant to cleaning with alcohol and hydrogen peroxide
		Protection class IP 67 Temperature range -40°C … +70°C
Heatable plastic reflectors		
	**HTK 82** 50000068	Screw type, 230VAC, cable length 2m, Cable cross-section 2x0.75mm²
		Power consumption 3.4W Temperature range -40°C … +70°C
	HTK 82 - 24V 50000071	Screw type, 24VAC/DC, cable length 2m, cable cross-section 2x0.75mm²
		Power consumption 2.8W Temperature range -40°C … +70°C
High-temperature reflector		
	**TKS 50 x 50.1.HT** 50113309	High-temperature reflector, plastic, protection class IP 40, temperature range -40°C … +120°C
		IP 69K

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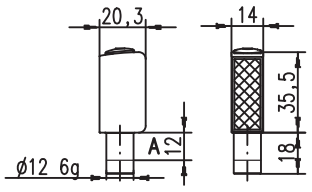
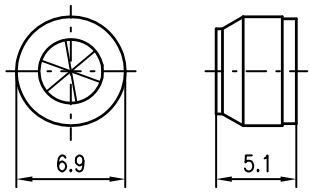
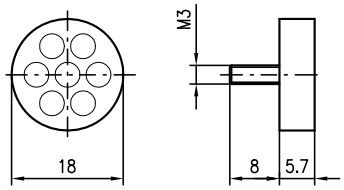
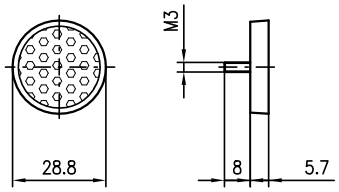
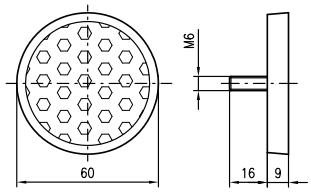
Dimensioned drawing	Part description Part No.:	Feature
Special reflector for use in food + beverage sector		
	**TK BR 53** 50112142	Special reflector in the housing of the 53 series, A = permissible clamping range
		Protection class IP 67, IP 69K Temperature range -30°C … +70°C
Glass reflectors, round		
	**TG 6** 50003176	Adhesive, pressable
		Temperature range -20°C … +120°C
	**TG 15** 50003177	Threaded bolt
		Temperature range -20°C … +120°C
	**TG 29** 50009374	Threaded bolt
		Temperature range -20°C … +120°C
	**TG 60** 50003179	Threaded bolt
		Temperature range -20°C … +120°C

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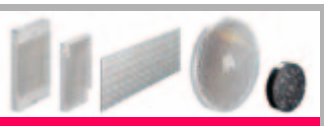
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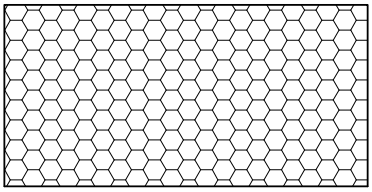
Dimensioned drawing	Part description Part No.:	Feature
Reflective tape no. 4, self-adhesive, direction-independent adhesive mounting		
	**Refl. tape No. 4 / 20 x 20 mm** 50107057	For polarized retro-reflective sensors, temperature range -40 °C … +80 °C
	Refl. tape No. 4 / 25 x 1000 mm 50102604	For polarized retro-reflective sensors, temperature range -40 °C … +80 °C
	Refl. tape No. 4 / 50 x 50 mm 50108300	For polarized retro-reflective sensors, temperature range -40 °C … +80 °C
	Refl. tape No. 4 / 50 x 1000 mm 50038060	For polarized retro-reflective sensors, temperature range -40 °C … +80 °C
	Refl. tape No. 4 / 100 x 100 mm 50106119	For polarized retro-reflective sensors, temperature range -40 °C … +80 °C
	Refl. tape No. 4 / 920 x 749 mm 50038117	For polarized retro-reflective sensors, temperature range -40 °C … +80 °C
	Refl. tape No. 4 / 25 mm roll 50041876	For polarized retro-reflective sensors, width 25 mm, length 22.8 m, temperature range -40 °C … +80 °C
	REF 4 - A - 50 x 45700 50111772	For polarized retro-reflective sensors, width 50 mm, length 45.7 m, temperature range -40 °C … +80 °C
	Refl. tape No. 4 / 100 mm roll 50104657	For polarized retro-reflective sensors, width 100 mm, length 45.7 m, temperature range -40 °C … +80 °C

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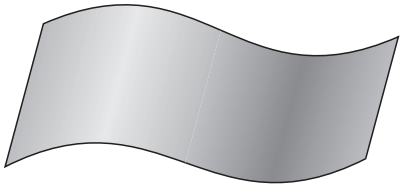
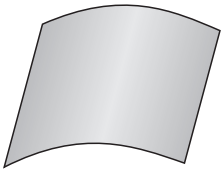
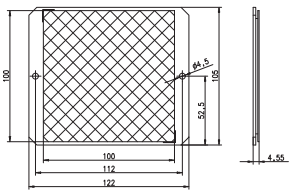
Dimensioned drawing	Part description Part No.:	Feature
Reflective tape no. 6, self-adhesive, maximum return-beam power and homogeneity, adhesive mounting is <u>not</u> direction-independent (side edge of sensor must be aligned parallel to foil edge)		
	**Refl. tape No. 6 / 25 x 25 mm** 50110191	For polarized retro-reflective sensors, PMMA, temperature range -40 °C … +70 °C
	Refl. tape No. 6 / 50 x 50 mm 50110192	For polarized retro-reflective sensors, PMMA, temperature range -40 °C … +70 °C
	REF 6-A-77x77 50111829	For polarized retro-reflective sensors, PMMA temperature range -40 °C … +70 °C
High-gain reflective tape no. 7, self-adhesive, direction-independent adhesive mounting, for ODKL 96B distance sensors		
	**REF 7 - A - 100 x 100** 50111527	For distance sensors ODKL 96B, width 100 mm, length 100 mm temperature range -40 °C … +70 °C
Cooperative Targets for Optical Laser Distance Sensors ODSL 30		
	**CTS 100 x 100** 50104599	Screw type, diffuse target reflection approx. 90 %, ceramics on galvanized sheet steel, for ODSL 30 measurement modes with object luminosity coefficient of 50 % … 90 %

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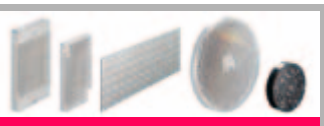
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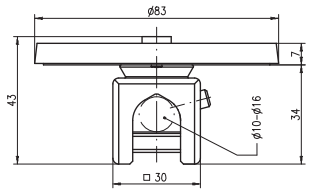
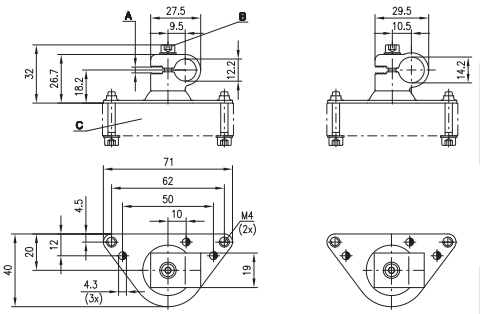
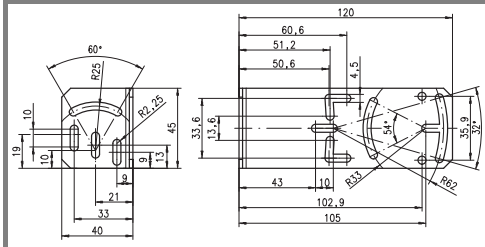
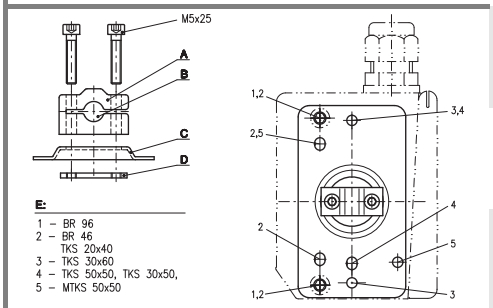
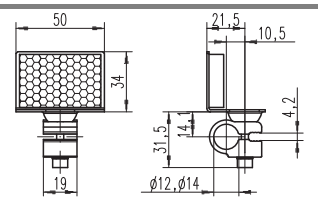
Mounting systems for reflectors		
	**UMS 96 - 82** 50027191	Rod mount with reflector TK 82 for rod D = 10 mm … 16 mm
	**BT 46.1** 50030556	Mounting system for 46 series, LRT 440 and reflectors TKS 20x40, MTKS 20x40.1, TK 60, dia. = 12 mm, Material: steel/aluminum
	BT 46.1.5 50082104	Mounting system for 46 series, LRT 440 and reflectors TKS 20x40, MTKS 20x40.1, TK 60, dia. = 12 mm, Material: stainless steel
	BT 46.2 50033785	Mounting system for 46 series, LRT 440 and reflectors TKS 20x40, MTKS 20x40.1, TK 60, dia. = 14 mm, Material: steel/aluminum
		Through-hole mounts for rods D = 12 mm or D = 14 mm, clamp-mounting on cheeks/sheet metal
	**BT 46** 50105315	Mounting bracket for 46 series and reflectors MTKS 20x20, (M)TKS 30x50, TKS 30x60, (M)TKS 40x60, (M)TKS 50x50, TK 82.2
	**BT 450.1-96** 50082084	Mounting system for reflectors TKS 20x40, TKS 30x50, TKS 30x60, TKS 50x50, MTKS 50x50 Mounting on rod D = 10 mm
	BT 450.3-96 50104897	Mounting system for reflectors TKS 20x40, TKS 30x50, TKS 30x60, TKS 50x50, MTKS 50x50 Mounting on rod D = 12 mm
	UMS 25.2 - D12 50110639	Through-hole mount for rod D = 12 mm or cheek, with self-adhesive reflector TKA 30x46
	**UMS 25.2 - D14** 50108129	Through-hole mount for rod D = 14 mm or cheek, with self-adhesive reflector TKA 30x46

REFLECTOR SELECTION 2 SERIES

Retro-reflective sensor Type	with reflector	Operating range [m] Typ. op. range limit [m] TK 100 x 100 TKS 100 x 100	MTKS 50 x 50	TKS 40 x 60	MTKS 20 x 40.1	TKS 20 x 40	MTKS 20 x 30	Tape 4 50 x 50
PRK 2 / 42 …		0.07 … 3.5 0.07 … 4.0		0.07 … 2.5 0.07 … 2.9		0.02 … 1.3 0.02 … 1.5		0.12 … 0.9 0.12 … 1.1

REFLECTOR SELECTION 3B SERIES

Retro-reflective sensor Type	with reflector	Operating range [m] Typ. op. range limit [m] TK 100 x 100 TKS 100 x 100	MTKS 50 x 50	TKS 40 x 60	MTKS 20 x 40.1	TKS 20 x 40	MTKS 20 x 30	Tape 4 50 x 50
RKR 3B / 6.42 …		0.0 … 1.5 0.0 … 1.8	0.0 … 1.0 0.0 … 1.2	0.0 … 1.0 0.0 … 1.2		0.0 … 0.5 0.0 … 0.6		
PRK 3B / 6.7 … PRK 3B / 66 …		0.02 … 5.0 0.02 … 6.0		0.02 … 3.0 0.02 … 3.6		0.02 … 1.5 0.02 … 2.0		0.1 … 1.2 0.1 … 1.6
PRK 3B / 6.22 …		0.0 … 4.0 0.0 … 5.0		0.0 … 3.0 0.0 … 3.6		0.0 … 1.3 0.0 … 1.5		0.0 … 0.7 0.0 … 1.0
PRKL 3B / 6.22 …			0.0 … 2.0 0.0 … 3.0		0.0 … 1.0 0.0 … 1.5		0.0 … 1.6 0.0 … 2.2	

REFLECTOR SELECTION 8 SERIES

Retro-reflective sensor Type	with reflector	Operating range [m] Typ. op. range limit [m] TK 100 x 100 TKS 100 x 100	MTKS 50 x 50	TK 30 x 50 TKS 30 x 50	TKS 20 x 40	Tape 4 100 x 100
PRK 8 / 44 … PRK 8 / 66 …		0.10 … 6.4 0.05 … 8.0	0.12 … 4.8 0.12 … 6.0	0.10 … 2.8 0.10 … 3.5	0.13 … 2.4 0.13 … 3.0	0.15 … 2.8 0.15 … 3.5
PRK 8 / 66.11 - S12		0.0 … 5.0 0.0 … 7.0	0.0 … 3.5 0.0 … 4.5	0.0 … 2.0 0.0 … 2.4	0.0 … 1.5 0.0 … 2.0	0.0 … 1.0 0.0 … 1.3
PRK 8 / 66.41 - S12 PRK 8 / 66.42 - S12		0.0 … 2.0 0.0 … 2.4	0.0 … 1.5 0.0 … 1.8	0.0 … 0.6 0.0 … 0.8	0.0 … 0.6 0.0 … 0.8	0.0 … 0.3 0.0 … 0.5

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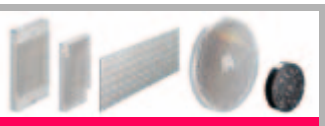
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REFLECTOR SELECTION 18 SERIES

Retro-reflective sensor Type	with reflector	Operating range [m] Typ. op. range limit [m] TK 100 x 100 TKS 100 x 100	MTKS 50 x 50	TK 30 x 50 TKS 30 x 50	TKS 20 x 40	Tape 4 100 x 100
RK(R) 18 / 4 DL … PRK 18 / 4 DL.4 PRK 18 / 2 DL.4		0.0 … 2.4 0.0 … 3.0	0.0 … 2.0 0.0 … 2.5	0.0 … 0.8 0.0 … 1.0	0.0 … 0.8 0.0 … 1.0	0.0 … 0.4 0.0 … 0.6
RKR 18 / 4 … PRK 18 / 4 …		0.0 … 4.0 0.0 … 5.0	0.0 … 3.5 0.0 … 4.5	0.0 … 2.0 0.0 … 2.5	0.0 … 1.5 0.0 … 2.0	0.0 … 0.8 0.0 … 1.1
PRK 18 / 24 DL … IPRK 18 / 4 DL …		0.0 … 3.0 0.0 … 4.0	0.0 … 2.4 0.0 … 3.0	0.0 … 1.6 0.0 … 2.0	0.0 … 1.4 0.0 … 1.8	0.0 … 0.6 0.0 … 0.8

REFLECTOR SELECTION 25 SERIES

Retro-reflective sensor Type	with reflector	Operating range [m] Typ. op. range limit [m] TK 100 x 100 TKS 100 x 100	TK 82.2	MTKS 50 x 50	TK 30 x 50 TKS 30 x 50	TKS 20 x 40	Tape 4 100 x 100
PRK 25 / 66.2 …		0.0 … 4.5 0.0 … 5.0	0.0 … 2.5 0.0 … 3.0	0.0 … 3.0 0.0 … 3.5	0.0 … 1.7 0.0 … 2.0	0.0 … 1.5 0.0 … 1.7	0.0 … 0.7 0.0 … 0.9
PRK 25 / 66.41 …		0.0 … 1.7 0.0 … 2.0		0.0 … 1.2 0.0 … 1.4	0.0 … 0.9 0.0 … 1.1	0.0 … 0.7 0.0 … 0.8	0.0 … 0.2 0.0 … 0.25

REFLECTOR SELECTION 25B SERIES

Retro-reflective sensor Type	with reflector	Operating range [m] Typ. op. range limit [m] TK 100 x 100 TKS 100 x 100	MTKS 50 x 50	TKS 40 x 60	TKS 20 x 40	MTKS 20 x 20	Tape 4 50 x 50
(I)PRK 25B / 4 … PRK 25B / 66 …		0.05 … 8.0 0.05 … 10.0		0.05 … 4.0 0.05 … 5.0	0.05 … 2.5 0.05 … 3.0		0.05 … 3.0 0.05 … 3.5
PRK 25B / ….3 …		0.05 … 6.0 0.02 … 8.0		0.05 … 3.0 0.02 … 4.0	0.05 … 2.0 0.02 … 3.0		0.15 … 2.0 0.15 … 2.1
PRKL 25B / …		0.3 … 12.0 0.3 … 15.0	0.05 … 12.0 0.05 … 15.0			0.05 … 6.0 0.05 … 7.0	0.1 … 1.7 0.1 … 1.9

REFLECTOR SELECTION 46B SERIES

Retro-reflective sensor Type / with reflector	Operating range [m] Typ. op. range limit [m] TK 100 x 100 TKS 100 x 100	TKS 50 x 50	TKS 40 x 60	TKS 30 x 50	TKS 20 x 40	Tape 4 50 x 50
IPRK 46B / 4 - S12 PRK 46B / 44 - S12 PRK 46B / 6, 200 - S12 PRK 46B / 66 - S12 PRK 46B / 66.01 - S12 PRK 46B / 66, 200 - S12 PRK 46B / 7D - S12	0.05 … 15.0 0.05 … 18.0	0.05 … 10.0 0.05 … 12.0	0.05 … 8.0 0.05 … 10.0	0.05 … 5.0 0.05 … 6.0	0.05 … 3.0 0.05 … 5.0	0.2 … 2.0 0.2 … 3.0
PRK 46B / 4.82 - S12 PRK 46B / 4D.2 - S12 IPRK 46B / 4.2 - S12 PRK 46B / 44.2 - S12 PRK 46B / 6.2 - S12 PRK 46B / 66.2 - S12 PRK 46B / 66.2, 200 - S12	0.1 … 8.0 0.1 … 10.0	0.1 … 5.0 0.1 … 6.0	0.1 … 4.0 0.1 … 5.0	0.1 … 2.5 0.1 … 3.0	0.1 … 2.0 0.1 … 3.0	0.3 … 1.0 0.3 … 1.5

REFLECTOR SELECTION 53 SERIES

Retro-reflective sensor Type / with reflector	Operating range [m] Typ. op. range limit [m] TK 100 x 100 TKS 100 x 100	MTKS 50 x 50	TKS 40 x 60	MTKS 20 x 40.1	TKS 20 x 40	Tape 4 50 x 50
RKR 53 / 6.42 …	0.0 … 1.5 0.0 … 1.8	0.0 … 1.0 0.0 … 1.2	0.0 … 1.0 0.0 … 1.2		0.0 … 0.5 0.0 … 0.6	
PRK 53 / 6.22 …	0.0 … 4.0 0.0 … 5.0		0.0 … 2.6 0.0 … 3.2		0.0 … 1.3 0.0 … 1.5	0.0 … 0.7 0.0 … 1.0
PRKL 53 / 6.22 …		0.0 … 2.0 0.0 … 3.0		0.0 … 1.0 0.0 … 1.5		

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REFLECTOR SELECTION 55 SERIES

Retro-reflective sensor Type	with reflector	Operating range [m] Typ. op. range limit [m] TK 100 x 100 TKS 100 x 100	MTKS 50 x 50	TKS 40 x 60	MTKS 20 x 40.1	TKS 20 x 40	Tape 4 50 x 50
RKR 55 / 6.42 …		0.0 … 1.5 0.0 … 1.8	0.0 … 1.0 0.0 … 1.2	0.0 … 1.0 0.0 … 1.2		0.0 … 0.5 0.0 … 0.6	
PRK 55 / 66 …		0.02 … 5.0 0.02 … 6.0		0.02 … 3.0 0.02 … 3.6		0.02 … 1.5 0.02 … 2.0	0.1 … 1.2 0.1 … 1.6
PRK 55 / 6.22 …		0.0 … 4.0 0.0 … 5.0		0.0 … 2.6 0.0 … 3.2		0.0 … 1.3 0.0 … 1.5	0.0 … 0.7 0.0 … 1.0
PRKL 55 / 6.22 …			0.0 … 2.0 0.0 … 3.0		0.0 … 1.0 0.0 … 1.5		

REFLECTOR SELECTION 95 SERIES

Retro-reflective sensor Type	with reflector	Operating range [m] Typ. op. range limit [m] TK 100 x 100 TKS 100 x 100	MTKS 50 x 50	TK 30 x 50 TKS 30 x 50	TKS 20 x 40	Tape 4 100 x 100	Tape 4 10 x 10
PRK 95 / 44 L IPRK 95 / 44 L.5		0.2 … 6.0 0.2 … 9.0	0.2 … 4.2 0.2 … 7.1	0.2 … 2.5 0.2 … 4.1	0.2 … 1.9 0.2 … 3.2	0.2 … 2.4 0.2 … 4.0	
IPRK 95 / 4.8 L.2 IPRK 95 / 44 L.2 …		0.0 … 4.2 0.0 … 6.0	0.0 … 3.2 0.0 … 5.4	0.0 … 1.8 0.0 … 3.0	0.0 … 1.7 0.0 … 2.9	0.0 … 1.2 0.0 … 1.7	
PRK 95 / 22 L.4 PRK 95 / 44 L.4		0.0 … 1.8 0.0 … 3.0	0.0 … 1.8 0.0 … 3.0	0.0 … 1.1 0.0 … 1.8	0.0 … 1.0 0.0 … 1.7	0.0 … 0.4 0.0 … 0.7	
IPRK 95 / 44 L.3		0.0 … 2.2 0.0 … 3.7	0.0 … 1.7 0.0 … 2.9	0.0 … 1.0 0.0 … 1.7	0.0 … 0.8 0.0 … 1.6	0.0 … 0.6 0.0 … 1.0	0.0 … 0.3 0.0 … 0.3

Additional reflectors and the dimensioned drawings for the reflectors can be found from page 570 onwards.

REFLECTOR SELECTION

96 SERIES / DC

Retro-reflective sensor Type with reflector	Operating range [m] Typ. op. range limit [m] TK 100 x 100 TKS 100 x 100	TK 82	MTKS 50 x 50	TK 30 x 50 TKS 30 x 50	TKS 20 x 40	Tape 4 100 x 100
RK 96 M/P - 1440 - 21	0.3 … 15.0 0.1 … 18.0	0.3 … 11.0 0.1 … 12.0	0.3 … 11.0 0.1 … 12.0	0.3 … 6.0 0.1 … 7.1	0.3 … 5.0 0.1 … 6.0	0.3 … 6.0 0.1 … 8.0
PRK 96 M/P - 3380 - 41 PRK 96 M/P - 3360 - 21 PRK 96 M/N - 3366 - 27	0.3 … 15.0 0.1 … 18.0	0.3 … 11.0 0.1 … 11.5	0.3 … 11.0 0.1 … 12.0	0.3 … 6.0 0.1 … 7.5	0.3 … 5.0 0.1 … 6.0	0.3 … 6.0 0.1 … 7.5
PRK 96 M/P - 1361 - 47 PRK 96 M/P - 1362 - 47 PRK 96 M/P - 1370 - 22 PRK 96 M/P - 1370 - 42 PRK 96 M/P - 1400 - 22 PRK 96 M/P - 1400 - 42 PRK 96 K/P - 1360 - 41 PRK 96 K/P - 1360.1 - 41 PRK 96 K/P - 1365 - 45 PRK 96 K/P - 1380 - 41 PRK 96 K/P - 1360 - 21 PRK 96 K/P - 1361 - 29 PRK 96 K/P - 1363 - 29 PRK 96 K/N - 1380 - 46	0.3 … 8.0 0.1 … 10.0	0.3 … 6.0 0.1 … 7.5	0.3 … 7.0 0.1 … 8.5	0.3 … 4.5 0.1 … 5.0	0.3 … 3.0 0.1 … 4.0	0.3 … 4.0 0.1 … 5.5
PRK 96 M/P - 1838 - 21 PRK 96 M/P - 1838 - 41 PRK 96 M/P - 2838 - 28	0.0 … 7.0 0.0 … 8.5	0.0 … 5.0 0.0 … 6.0	0.0 … 6.0 0.0 … 7.5	0.0 … 4.0 0.0 … 5.0	0.0 … 3.5 0.0 … 4.0	0.0 … 3.0 0.0 … 3.5
PRK 96 K/P - 3368 - 41	0.3 … 26.0 0.1 … 28.0	0.3 … 19.0 0.1 … 21.0	0.3 … 18.0 0.1 … 19.0	0.3 … 10.0 0.1 … 12.0	0.3 … 6.0 0.1 … 8.0	0.3 … 6.5 0.1 … 7.0
PRK 96 M/P - 1830 - 21 PRK 96 M/P - 1830 - 41	0.0 … 1.5 0.0 … 1.85		TK(S) 50 x 50: 0.0 … 1.5 0.0 … 1.85	0.0 … 1.5 0.0 … 1.85		

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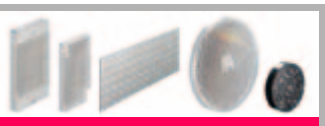
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REFLECTOR SELECTION

96 SERIES / AC-DC

Retro-reflective sensor Type / with reflector	Operating range [m] Typ. op. range limit [m] TK 100 x 100 TKS 100 x 100	TK 82	MTKS 50 x 50	TK 30 x 50 TKS 30 x 50	TKS 20 x 40	Tape 4 100 x 100
RK 96 K/R - 1560 - 25	0.3 … 15.0 0.1 … 18.0	0.3 … 11.0 0.1 … 12.0	0.3 … 11.0 0.1 … 12.0	0.3 … 6.0 0.1 … 7.1	0.3 … 5.0 0.1 … 6.0	0.3 … 6.0 0.1 … 8.0
PRK 96 M/R - 3420 - 25 PRK 96 M/R - 3430 - 25	0.3 … 15.0 0.1 … 18.0	0.3 … 11.0 0.1 … 11.5	0.3 … 11.0 0.1 … 12.0	0.3 … 6.0 0.1 … 7.5	0.3 … 5.0 0.1 … 6.0	0.3 … 6.0 0.1 … 7.5
PRK 96 M/R - 1858 - 25	0.0 … 7.0 0.0 … 8.5	0.0 … 5.0 0.0 … 6.0	0.0 … 6.0 0.0 … 7.5	0.0 … 4.0 0.0 … 5.0	0.0 … 3.5 0.0 … 4.0	0.0 … 3.0 0.0 … 3.5
PRK 96 M/R - 1850 - 25	0.0 … 1.5 0.0 … 1.85		TK(S) 50 x 50: 0.0 … 1.5 0.0 … 1.85	0.0 … 1.5 0.0 … 1.85		
PRK 96 K/R - 3428 - 25	0.3 … 20.0 0.1 … 24.0	0.3 … 15.0 0.1 … 17.0	0.3 … 15.0 0.1 … 16.0	0.3 … 10.0 0.1 … 12.0	0.3 … 8.0 0.1 … 9.0	0.3 … 10.0 0.1 … 12.0
PRK 96 K/R - 1420 - 25 PRK 96 K/R - 1430 - 25	0.3 … 8.0 0.1 … 10.0	0.3 … 6.0 0.1 … 7.5	0.3 … 7.0 0.1 … 8.5	0.3 … 4.5 0.1 … 5.0	0.3 … 3.0 0.1 … 4.0	0.3 … 4.0 0.1 … 5.5

Additional reflectors and the dimensioned drawings for the reflectors can be found from page 570 onwards.

REFLECTOR SELECTION 318 SERIES

Retro-reflective sensor Type with reflector	Operating range [m] Typ. op. range limit [m] TK 100 x 100 TKS 100 x 100	MTKS 50 x 50	TK 30 x 50 TKS 30 x 50	TKS 20 x 40	Tape 4 100 x 100
RK 318 M/... - S12 RK 318 M/... RK 318 K/... - S12 RK 318 K/...	0.03 ... 4.6 0.03 ... 6.0	0.02 ... 4.0 0.02 ... 5.4	0.03 ... 2.2 0.03 ... 3.2	0.06 ... 1.9 0.06 ... 2.9	0.15 ... 2.5 0.15 ... 3.5
RK 318 WM/... - S12 RK 318 WM/... RK 318 WK/... - S12 RK 318 WK/...	0.05 ... 3.7 0.05 ... 4.8	0.05 ... 3.2 0.05 ... 4.3	0.05 ... 1.8 0.05 ... 2.6	0.24 ... 1.5 0.24 ... 2.3	0.36 ... 2.0 0.36 ... 2.8
PRK 318 M/... - S12 PRK 318 M/... PRK 318 K/... - S12 PRK 318 K/...	0.03 ... 4.6 0.03 ... 6.0	0.02 ... 3.2 0.02 ... 4.6	0.03 ... 2.2 0.03 ... 3.2	0.06 ... 1.9 0.06 ... 2.9	0.24 ... 2.0 0.24 ... 3.1

REFLECTOR SELECTION 318B SERIES

Retro-reflective sensor Type with reflector	Operating range [m] Typ. op. range limit [m] TK 100 x 100 TKS 100 x 100	TKS 40 x 60	TK 82.2	TK 30 x 50 TKS 30 x 50	TKS 20 x 40	Tape 4 50 x 50
PRK 318B / ...	0.02 ... 4.5 0.02 ... 6.0	0.02 ... 3.0 0.02 ... 4.0	0.05 ... 3.6 0.05 ... 4.5	0.03 ... 1.9 0.03 ... 2.5	0.04 ... 1.6 0.04 ... 2.2	0.08 ... 1.4 0.08 ... 2.0
PRK 318B.W / ...	0.02 ... 4.0 0.02 ... 5.0	0.02 ... 2.6 0.02 ... 3.5	0.05 ... 3.3 0.05 ... 4.0	0.05 ... 1.6 0.05 ... 2.0	0.04 ... 1.5 0.04 ... 2.0	0.10 ... 1.3 0.10 ... 1.8

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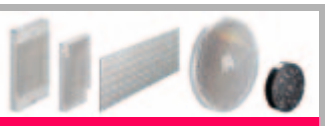
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REFLECTOR SELECTION 412 SERIES

Retro-reflective sensor Type	with reflector	Operating range [m] Typ. op. range limit [m] TK 100 x 100 TKS 100 x 100	MTKS 50 x 50	TK 30 x 50 TKS 30 x 50	TKS 20 x 40	Tape 4 100 x 100
PRK 412 M/P - S12		0.15 … 1.3	0.15 … 0.8	0.15 … 0.6	0.15 … 0.5	0.15 … 0.5
PRK 412 M/P		0.05 … 1.6	0.05 … 1.1	0.05 … 0.8	0.05 … 0.6	0.05 … 0.6

REFLECTOR SELECTION 618 SERIES

Retro-reflective sensor Type	with reflector	Operating range [m] Typ. op. range limit [m] TK 100 x 100 TKS 100 x 100	MTKS 50 x 50	TK 30 x 50 TKS 30 x 50	TKS 20 x 40	Tape 4 100 x 100
PRK 618 / 4 - S12		0.0 … 5.0	0.0 … 2.3	0.03 … 2.1	0.0 … 1.7	0.05 … 2.0
		0.0 … 7.0	0.0 … 3.3	0.03 … 3.0	0.0 … 2.4	0.05 … 2.8

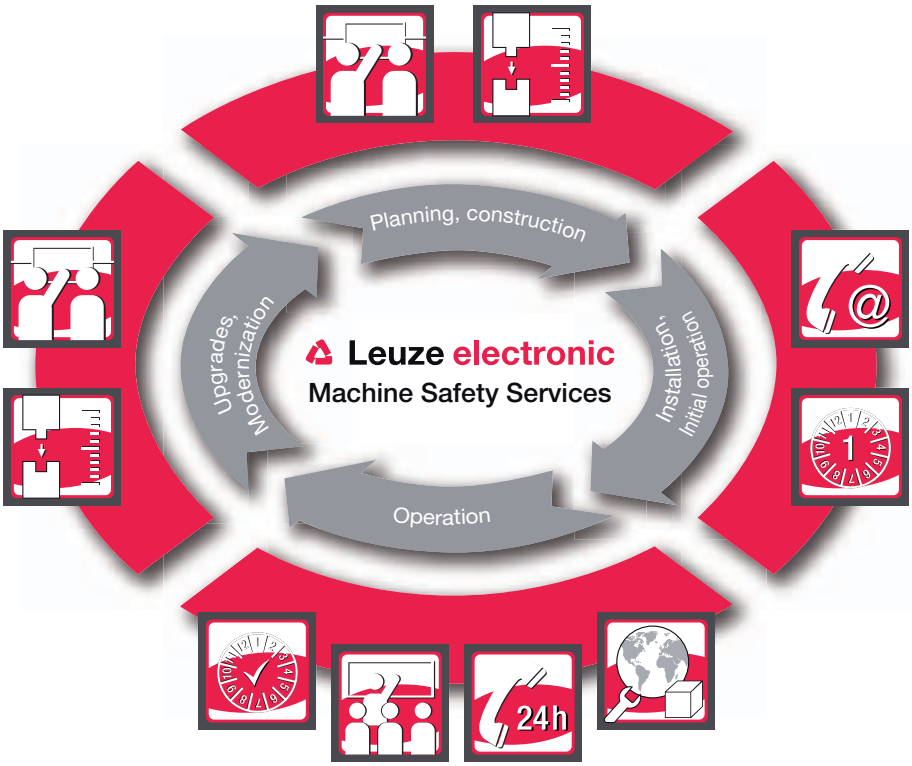
Additional reflectors and the dimensioned drawings for the reflectors can be found from page 570 onwards.

SERVICES

Overview

Our services – Your benefits, at a glance

Whether it's planning, engineering, commissioning or repair, the use of complex industrial automation technology requires a keen intellectual grasp and well-established expertise.



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SERVICES

Part description Part No.	Feature
Services on-site in Germany and abroad	
LOS daily rate S50000100	includes up to 10 hours, plus expenses/travel costs
LOS labor per hour S50000101	
LOS travel time per hour S50000102	
LOS price per km for travel by car S50000103	plus toll charges, vignettes, etc.
LOS flight costs S50000104	invoicing according to expenditure
LOS accommodation expenses S50000105	invoicing according to expenditure

Service calls on Saturdays, Sundays and holidays will incur a surcharge of a factor of 1.5.

Service work, such as fault analysis, fault rectification, installation and fine adjustment, test installations etc. are invoiced on a time and material cost basis.

Software adjustments, creation of customer-specific software, log adjustments etc. are calculated according to time and effort. Prices on request.

Optical Sensor ABC

Introduction

The optical sensor ABC shall assist you in selecting the right sensor.

You will find here explanations on the different optical sensor types, the additional functions and a lot of information for the practitioner.

Optical sensor types

The wide variety of photoelectric sensors with their varying function characteristics solves almost every "detection problem". The following explanations shall assist you in making the right selection for the corresponding application.

The following symbols are used for easy selection of the different optical sensors.

Throughbeam sensors	LS…
Protective throughbeam sensors	SLS…
Forked sensors	GS…
Retro-reflective sensors	RK…
Retro-reflective sensors with polarisation filter	PRK…
Diffuse reflection scanners	RK…
energetic	RT…
Diffuse reflection scanners	FRK…
with background suppression	HRT…
with fading	RTF…
Light curtains	VT…, VR…
	KT…, KR…
Optical distance sensors	ODS…
Ultrasonic distance sensors	HRTU…
	VRTU…
Contrast scanners	KRT…
Color sensors	CRT…
Luminescence scanners	LRT…
Fiber optic control devices	LVS …
Glass fiber optics	GF…
Plastic fiber optics	KF…

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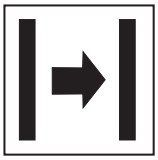
OPERATING PRINCIPLES

Throughbeam sensors



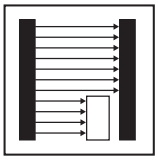
Throughbeam sensors consist of transmitter and receiver, which are contained in separate housings. The beam of the transmitter travels the whole light path only once, therefore, long operating ranges are possible when using throughbeam sensors. If choosing the correct device, throughbeam sensors are especially suited for applications under difficult conditions, e.g. if heavy contamination occurs or out in the open.

The installation is more extensive than with retro-reflective sensors as both the transmitter and the receiver must be electrically wired.

Forked sensors also belong to the group of throughbeam sensors.

Because both transmitter and receiver are integrated in the "fork", an alignment of the optical axis is not necessary.

Light curtains



Light curtains also function according to the principle of the throughbeam photoelectric sensors. In this case, the transmitter and receiver consist of multiple elements which are positioned in a specific beam-spacing grid and which are secured in aluminium profiles. These elements are cyclically controlled one after another and analysed.

The switching light curtains are typically used if the objects to be detected have various dimensions or shapes or the point of incidence in the horizontal plane cannot be predicted.

Measuring light curtains are another variant. These facilitate a cyclical analysis with beam precision, and can thus be used to detect 2- or 3-dimensional contours.

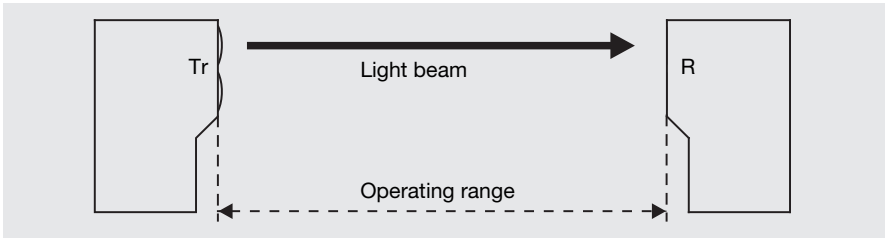
Retro-reflective sensors

With retro-reflective sensors, the transmitter and receiver are combined in one housing. The beam of the transmitter meets the reflector and is redirected to the receiver of the sensor. The electrical wiring is therefore only required on one end of the light path.

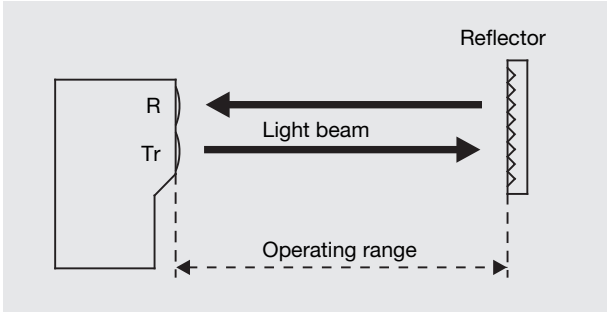
Retro-reflective sensors with polarisation filter

Highly reflective objects, such as mirror-like metal parts could cause switching errors if using standard sensors. If retro-reflective sensors work with polarised light, those problems are avoided.

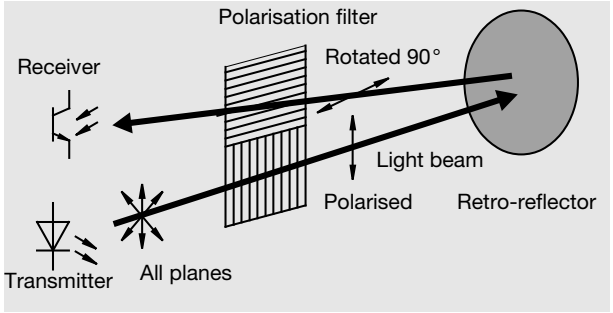
The polarised light of the transmitter meets the reflector, which "rotates" the plane of polarisation by 90°. The receiver recognises only this light from the reflector. The receiver is not tricked by "false" light reflected directly by the object because its plane of polarisation was not changed.



With throughbeam sensors, the beam of the transmitter travels the whole light path only once.



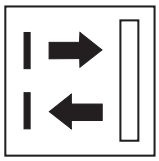
Retro-reflective sensor: transmitter and receiver are located in one housing. The reflector returns the transmitted light to the receiver.



Retro-reflective sensor with polarised optics, the receiver only recognises the light rotated 90° by the reflector.

OPERATING PRINCIPLES

Energetic diffuse reflection scanners



With diffuse reflection scanners, as well as with retro-reflective sensors, transmitter and receiver are located in one housing.

The transmitter's beam however, is returned by the surface to be scanned itself. The scanning range of such a sensor is depending on its performance abilities and the reflection properties of the scanned surface.

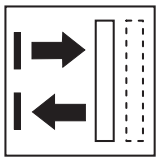
An energetic diffuse reflection scanner can detect a bright, reflective surface over a greater distance than it can detect a dark, poorly reflective one.

When choosing a device, the user should be aware of the fact that the scanning range as mentioned in the data sheet refers to the maximum possible working range based on white paper.

Diffuse reflection scanners are used primarily where neither a receiver nor a transmitter can be mounted.

Another application area for diffuse reflection scanners is the detection of objects with different reflective properties, e.g. dark print-marks on light background.

Diffuse reflection light scanners with fading



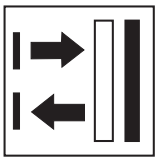
For diffuse reflection light scanners with fading, background suppression is achieved through the use of a mechanical diaphragm in front of the receiving element. Aside from this, the functionality corresponds to that of the energetic diffuse reflection light scanner.

The scanner is set to the respective scanning plane electronically. The distance between the object to be detected and the background which is to be suppressed must be large enough to ensure reliable object detection. The background should not change with respect to distance and diffuse reflection.

The black/white behaviour is somewhere between that of the energetic diffuse reflection light scanner and that of the light scanner with background suppression.

The preferred areas of use for the diffuse reflection light scanner with fading are in storage/materials handling applications for the detection of storage and transport containers on conveyor belts and in packaging technology applications.

Diffuse reflection scanners with background suppression



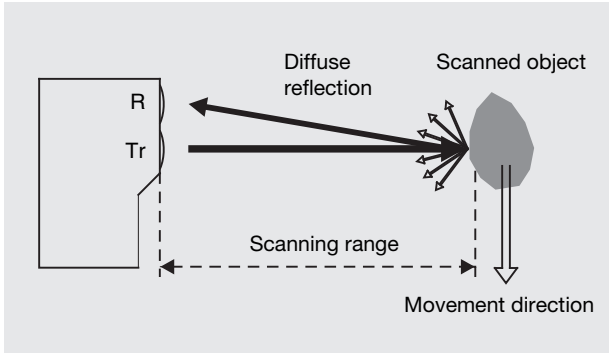
The construction of diffuse reflection scanners with background suppression uses multiple receiver elements and thus takes into account the relation between transmitter and receiver elements.

The geometric relation created makes these sensors less susceptible to varying object and background colors.

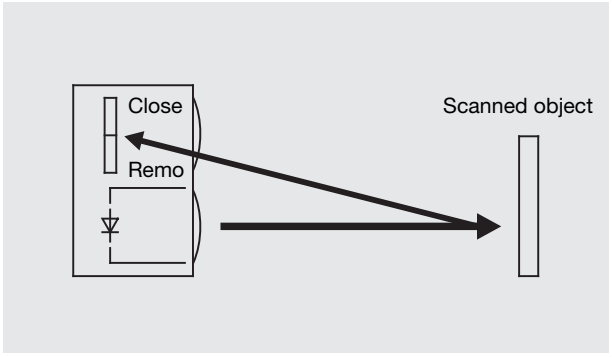
The scanner is set to the respective scanning plane electronically or mechanically and then recognises only objects in front of this scanning plane.

Even the smallest objects < 1 mm can be reliably detected through the use of laser transmitter diodes.

When using diffuse reflection scanners with background suppression, the mounting position has to be taken into consideration. Moving and shining objects in the background can cause interference. This interference can be minimised by mounting the sensors in an inclined position.



Energetic diffuse reflection scanner: the transmitted light is directly reflected from the surface.



Diffuse reflection scanners with background suppression

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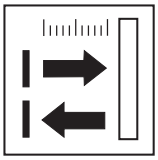
Optical distance sensors



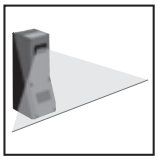
These sensors function with red, infrared or laser light.

Through the use of various receiving elements, such as CCD lines or a PSD element, the performance of the sensor can be adapted to the application or the given requirements.

With these devices, various measurement techniques are used for distance determination. These include, among others: triangulation, phase measurement and the pulse propagation time technique. The accuracy of the measurement result is almost completely independent of differences in object color. All systems can be adapted to a given application using configuration software.

The switching signals or distances are made available via digital, analog or serial outputs of the machine controller. Connection to a fieldbus system is also possible.

Light section sensors



Light section sensors work according to the triangulation principle. Using transmission optics a laser beam is expanded to a line and aimed at a measurement object. The light remitted by the object is monitored by a position sensitive planar detector (CMOS camera).

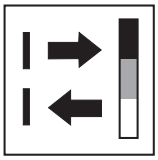
Depending on the distance of the measurement object the laser line is projected to a different position on the planar detector. By means of this position the distance of the measurement object can be calculated.

The sensor outputs 2D measurement values. It is possible to produce 3D profile data by including the movement of the measurement object.

Ultrasonic distance sensors

With these sensors, acoustic waves are transmitted and are reflected by the objects which are to be detected. The propagation time of the acoustic waves reflected back to the sensor is measured and the distance to the object calculated. This physical principle is particularly well suited for the detection of fluid-, powder-, and transparent media. The switching signals and distance information are available via digital or analog outputs. Application-specific parameters can be set directly on the sensor using programming software.

Contrast scanners

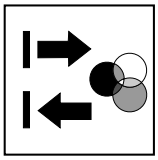


Contrast scanners are high-resolution, energetic diffuse reflection scanners which differentiate between objects and/or object colors by grey values. This means that the brightness and shininess of the object or object color strongly affect the measurement result. Contrast scanners have focusing optics and a special light-spot geometry. In order to detect slight variations in grey value, the distance to the object must not change. The resolution decreases with increasing scanning range.

If different object colors are illuminated with the same transmitter color, these may return the same grey value. In this case, positive differentiation is not possible. To avoid this, various, automatically switching transmitter colors are used.

With these characteristics, it is possible to, for example, detect any markings on any background.

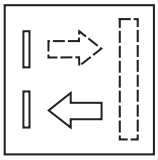
Color sensors



Color sensors are diffuse reflection scanners which break down object colors into their different spectral components using a special combination of transmitter light. The different spectral composition of the received light is analysed by the sensor and compared with values stored previously in the sensor. If all spectral components match, the color is considered detected.

This process can be used for opaque as well as transparent objects. For shiny objects, the sensor must be oriented at an angle of 10 … 15° to the object.

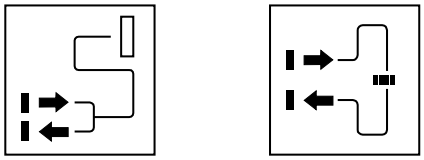
Luminescence scanners



Luminescence scanners are energetic diffuse reflection scanners which illuminate luminescing materials by means of their special UV transmission light. The resulting visible light is detected by the luminescence sensor. Some of these luminescent materials are invisible and are available in a variety of solid and fluid forms. These can be used to make markings which are invisible under normal lighting conditions.

OPTIONS

Fiber optic control devices



A speciality of modern optical electronics are fiber optic sensors. The complete functionality of the photoelectric sensor is located in one controlling device.

This determines the electrical key data of the system. The special thing about fiber optic control devices is that the light of the transmitter element is transported to the place to be scanned and back to the receiver element (both in the control unit) through the fiber optics.

The transporting effect of the light is based on a total reflection. This happens always when light comes in contact with a medium having a lower optical density than the medium in which it is travelling. In a cylindrical fiber, the light undergoes total reflection as it is reflected back and forth. As a result, the light can follow the bends of the curved fiber optics.

Fiber optics made of glass as well as plastic are available, functioning on the throughbeam and scanning principle. Depending on the application requirements and the environmental conditions at the place of application, a selection from the extensive range of products should be made.

Mini sensors

The mini sensors are well suited for installation locations with limited space. These are commonly known as "conventional", photoelectric sensors without amplifiers in miniature format. Their small construction and the extremely small bending radius of the connection cables facilitate installation even in places which are difficult to access.

Through the possibility to choose from a number of amplifiers of different sizes and functions, adaptation to any kind of application is especially easy.

Optical sensors with additional functionality

Today, optical sensors can do much more than just detect objects. The advances in electronics and microelectronics have also left their footprints in photoelectric sensor technology. As a result the sensors have become "intelligent" and offer numerous useful options. These functions simplify sensor use and have created entirely new application possibilities.

Protective sensors

A contactless active protective device (AOPD) is designed for machines with possible risk of injury. It offers protection by telling the machine to move into a safe operating state before a person can get into a dangerous situation.

To choose the right protective device, the following has to observed:

- the possible state of injury
- the duration of time spent by a person in the hazardous area
- the possibility to prevent dangers

Depending on the safety requirements, two different categories are possible:

- Contactless active protective device with testing function: Category 2. On these systems, the functional safety is checked through cyclically reoccurring, external testing pulses.
- Contactless active protective device with self-monitoring: Category 4 On these systems, the functional safety is permanently checked through self-monitoring.

It is the responsibility of the machine manufacturer and/or user to determine with which standard the respective application is to be measured.

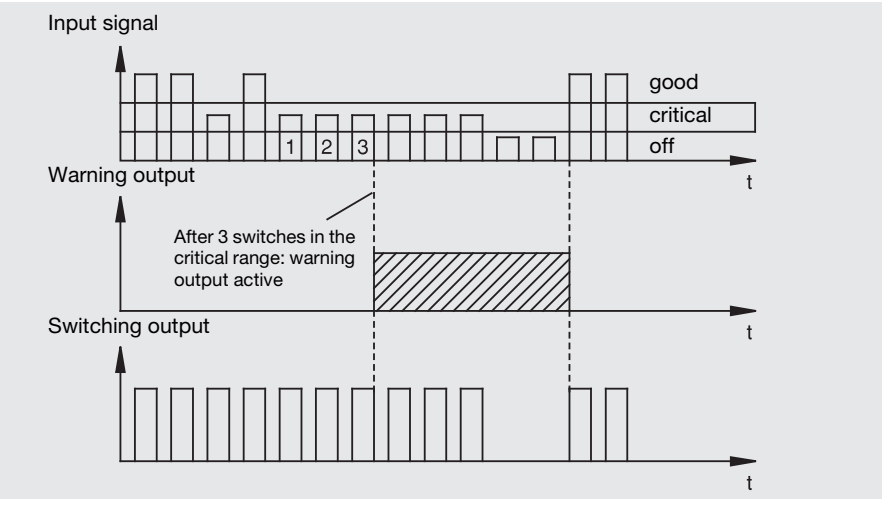
Automatic contamination control: autoControl

Though optical sensors function reliably, they are not immune to damage, misalignment or contamination of their optics.

Monitoring circuits protect against such "accidents" by warning the user in good time. Such a warning signal has many advantages in practical life. It indicates interference before an error can occur. Therefore, precise maintenance work is possible; unnecessary procedures are avoided. It is possible to differentiate between two operating principles: time dependent and counting.

With time-dependent monitoring, an integrated monitoring circuit measures the time the signal spends in the critical brightness range and triggers the warning signal as required.

This time-dependent method, however, is only suitable for static applications. Dynamic processes can cause "false" error messages. For this purpose, a testing circuit, which works on a counting basis is better suited.



Counting operating principle (autoControl)

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The patented autoControl testing circuit monitors the input pulse and detects possible impairment by counting the reduced incoming signals. If the incoming light signal is at a reduced level for three consecutive switching cycles, this critical function status is evaluated as a negative trend and the warning signal output is activated.

At this point in time, the switching function of the optical sensor is not yet impaired. Therefore, targeted maintenance measures can be taken before a complete system failure occurs. If the signal is within limits again, the warning output is reset automatically. During short-term interference, this means if the light reception is reduced less than three times, the warning output is not activated.

AS-interface

The AS-interface is an optimised bus system for the lowest field level of the automation technology

Aim of the AS-interface is the cost saving connection of binary sensors and actuators to a primary controller. Voltage supply and data exchange pass through the same (unshielded) two-wire connection. Bus-compatible sensors with integrated AS-i chip can be connected directly to the bus; connection of common sensors is possible through so-called coupling modules.

The tree structure of the AS-i bus system as well as the technical key features enable a considerable reduction of expenditures during wiring and installation. The AS-interface is therefore a future-oriented alternative to standard parallel wiring.

Housing

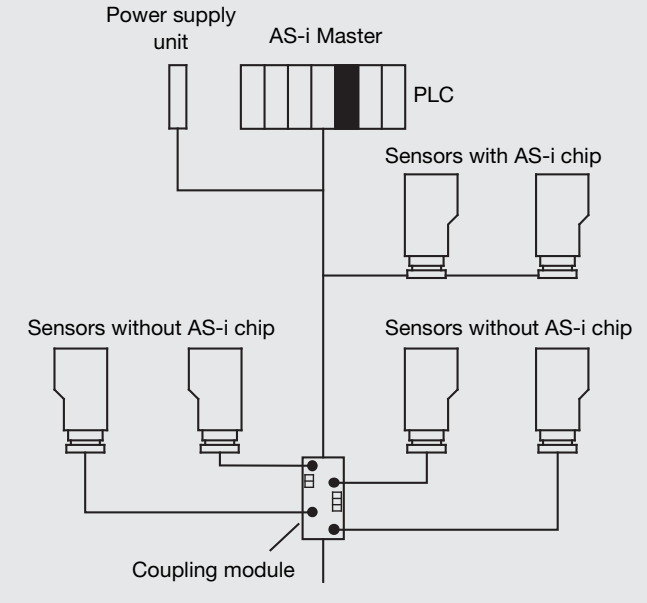
Photoelectric sensors are located in either a robust plastic or metal housing.

Especially under rough operating conditions, the use of metal-type devices which offer special protection against mechanical and chemical influences is recommended.

IP protection classes

In order to make the protection of housings against foreign objects and water comparable, the protection classes have been defined in DIN 40050. The first digit refers to the protection against foreign objects, the second to water protection.

Almost every sensor is dustproof and protected against immersion.



AS-interface: bus coupling

1st digit	Contact protection and foreign object protection	2nd digit	Water protection
0	No special protection	0	No special protection
1	Against large foreign objects, dia. >50mm	1	Against vertically falling water drops
2	Against medium foreign objects, dia. >12mm	2	Against angled falling water drops (up to 15° from vertical)
3	Against small foreign objects, dia. > 2.5mm	3	Against sprayed water (up to 60° from the vertical)
4	Against corn-formed foreign objects, dia. > 1mm	4	Against splashed water from all directions
		5	Against water jets from a nozzle from all directions
5	Dust protected; dust deposits permitted but not in quantities which interfere with the function of the device	6	Against strong water jets
		7	Against intermittant submerging
		8	Against permanent submerging
6	Dust proof	9K	For high-pressure / steam-jet cleaning

IP Protection classes acc. to IEC 529 and/or DIN 40050

EQUIPMENT

Optics

The light outlet surface of a photoelectric sensor is, depending on the model, made of plastic or glass. Covers or optics made of hard glass fulfil the highest requirements. They are resistant against detergents, chemicals and scratching.

To increase the effectiveness of the optics and to reduce the effects of possible contamination, glass as well as plastic optics have the largest possible surface area.

Diaphragms

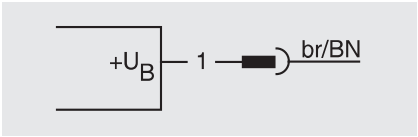
In order to detect small objects over great distances, appropriate pin or slit diaphragms, which are fitted on the transmitter and receiver, are offered for some throughbeam sensors.

As a result e.g. drilling bits can be safely detected even at a distance of several meters. The size of the diaphragm is dependent on the size of the object and the required range.

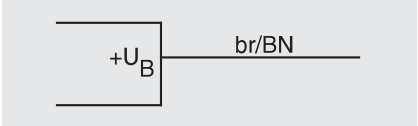
Connection types

There are three common types of connection for optical electronic sensors: plug, cable or terminals.

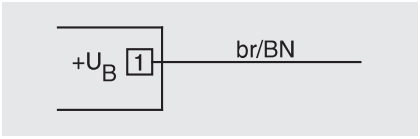
The three different possibilities can be easily identified in the connection illustrations of the individual devices.



Devices with this connection diagram are connectable via plugs. Ready-made connection cables with fitting connectors are available for almost every sensor.



These devices have a cable connection, usually with a 2m cable. Special cable lengths are available upon request.



Devices with this connection diagram are equipped with screw terminals. Cables are fed through screw fittings.

Switching delay

Photoelectric sensors or amplifiers with integrated switching delay work with slow operation and/or slow release. Slow operation is used if short events need to be suppressed. Slow release prolongs the duration of the output signals which is often necessary for control purposes.

Outputs

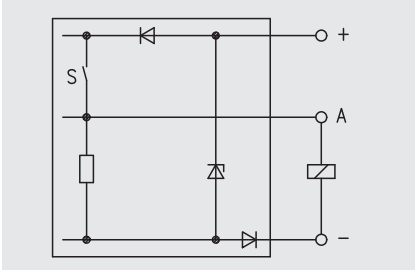
Optical electronic sensors are most commonly offered with relay or transistor output. Relay outputs with changeover contacts are the most universal, however, they also have their disadvantages: relays require a large amount of space, their time delays cannot be accepted in every application, and, due to their moving parts, their operating life is limited.

The user can choose between NPN, PNP and push-pull type transistor outputs. It is therefore optimally compatible with the respective control system to be connected.

PNP transistor outputs

The PNP transistor output is a high-impedance switching output with open collector. It switches positive potential to the connected load.

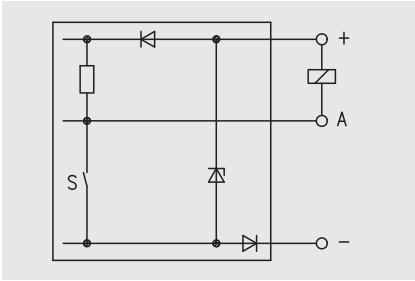
Indicated in connection drawing by:



NPN transistor outputs

The NPN transistor output is a high-impedance switching output with open collector. It switches GND to the connected load.

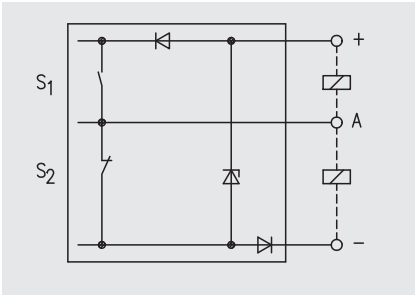
Indicated in connection drawing by:



Push-pull transistor output

This type of transistor output has a low impedance and is immune to interference (push-pull technology). The outputs can be used in connection with both, PNP and NPN control systems. Symmetric response behaviour is a further advantage. Push-pull outputs must not be connected in parallel.

Indicated in connection drawing by:



Short-circuit protection

Transistor outputs are usually short-circuit proof. This is achieved by monitoring the output current and, should it exceed a certain level, cutting off the supply to the transistor.

The information on the maximum current given on the data sheet have to be observed despite the short-circuit protection.

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Sensors with laser transmitter

(LASER = **L**ight **A**mplification by **S**timulated **E**mission of **R**adiation)

Laser diodes as sensor light source enable the realisation of higher operating and scanning ranges with small beam geometries.

Red light laser diodes offer the advantage of fast function control and alignment. The beam output is expressed by the laser class. On sensors of the laser class 1 or 2, no additional protective measures are specified.

Laser safety classes

Laser-specific regulations are included in the European Standard EN 60825-1 - Safety of Laser Devices (corresponds to IEC 60825-1).

The products are divided into danger classes according to the intensity of the laser radiation.

Class 1:

The accessible laser radiation is not dangerous - integrated safety by means of constructive measures such as laser power monitoring.

Class 1M:

Same as class 1, however the use of optical instruments may pose a threat.

Class 2:

Due to low transmitting power, the accessible laser radiation is usually not dangerous. Natural reflex reaction (eyelid closure) is usually adequate eye protection. Avoid prolonged, direct eye exposure to the beam, however.

Class 2M:

Same as class 2, however the use of optical instruments may pose a threat.

Class 3R:

Looking directly into the laser beam with optical aides, such as a telescope or magnifying glass, may be dangerous.

Class 3B:

Looking directly into the beam is dangerous

Class 4:

High laser power - even diffuse reflection may be dangerous, e.g. for skin and eyes.

Laser security

For the use of laser products of Leuze electronic, the standard IEC 60825-1 applies: Do not stare into the beam - not even with optical instruments.

In connection with visible beams, eye-protection is usually guaranteed through the eye lid closing reflex. The standard prescribes that the laser beam path should be closed at the end of its purpose-oriented way, where this is practically and responsibly possible. Do not point the laser at people (head level).

Application of laser optical sensors

All laser sensors work with small light spots. Through this, a corresponding object resolution and exact positioning is achieved.

In order to use these advantages, throughbeam and retro-reflective sensors are equipped with a mechanical focus adjustment (collimator). Through this, the light spot can be optimally adjusted to the application over the complete working distance.

CDRH

Laser products which are imported into the USA are to be specified by the manufacturer to the CDRH (**C**enter for **D**evices and **R**adiological **H**ealth), a branch of the FDA. Verification of conformity with the applicable US rules for laser products (21 CFR 1040.10 and, if applicable, 1040.11 including the applicable laser notices, issued by the CDRH) is to be documented and an appropriate certification attached to the products.

Products with the CDRH certification in the catalog or to which the certification label has been attached fulfil the specified rules.

APPLICATION

Parallel and serial connection

A direct logical linking is possible on optical sensors with PNP or NPN transistor outputs. Through internal protective circuits, up to ten sensors with equal output potential (PNP or NPN) can be connected to a parallel circuit. This can be useful for, among other things, collective messages (e.g. from warning outputs).

An activation input is needed in order to connect several sensors in series.

That means that, for example, the PNP output of the first device has to be connected to a "positively" activated input of the second device etc.

Both parallel and serial connection can be performed directly on the devices with PNP or NPN transistor outputs. This reduces wiring requirements and PLC capacity in the form of inputs and outputs.

Parallel connection of optical sensors with push-pull transistor output is not permitted.

Alignment of optical sensors

The optimal alignment is absolutely required for fault-free function characteristics.

With throughbeam sensors, the transmitted beam should meet the receiver's optics as centrally as possible. For this purpose, the light beam is to be corner-cut from all four directions, e.g. with a piece of cardboard.

When optimally aligned, the receiver switches with symmetric shadowing. In connection to large ranges, a laser alignment device simplifies the adjustment. For some devices, special alignment and mounting parts with three-point adjustment are available.

There are two possibilities for adjusting a retro-reflective sensor: the user can cover all four sides of the reflector with an object until the sensor output switches. The forward switching points are symmetric if the alignment is optimal. The second possibility involves covering the outer area of the reflector with non-reflective material, then aligning the sensor (the material is removed upon conclusion of the procedure). When mounting the reflector, it is essential to observe that it is fixed at right angles towards the light axis. However, variations of up to 15° are unproblematic.

Sensors with red light LED or red light lasers offer simple function control and in addition to that fast and simple alignment.

Operating range

Describes the range which should not be exceeded during practical use of the sensor.

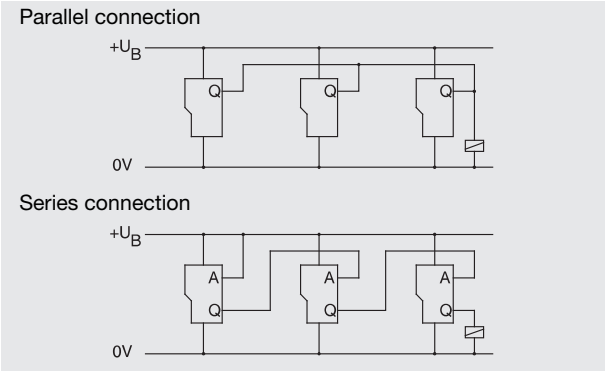
If the sensor is used within its operating range, there is still adequate performance reserve present to compensate for e.g. light soiling or misalignment.

Operating range limit

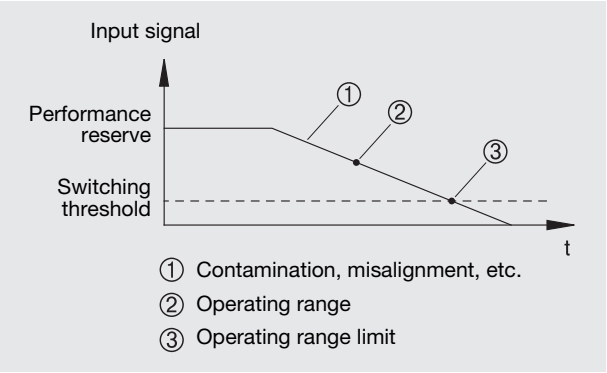
Describes the maximum possible range of the sensor. If the sensor is used at this operating range limit, the sensor functions without performance reserve. This is also referred to as "performance reserve = 1". No additional protection is present, e.g. for soiling. With regards to functional safety, a sensor should never be used at the operating range limit.

Performance reserve

Receivers of optical sensors require a minimum amount of light to be able to switch (switching threshold). All light over and above this minimum amount is designated as "performance reserve". A distinction must be made between the internal performance reserve and the performance reserve selected by the user. The internal performance reserve provides the user with additional security that the information given on the data-sheet is not the limit of what is actually possible. If, in individual cases, heavy contamination can be expected, the user should provide additional performance reserve by selecting the sensor with the next higher operating range.



Parallel and serial connection



Performance reserve: the light intensity during normal operation is clearly above the minimum value required by the receiver to trigger.

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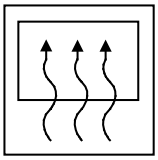
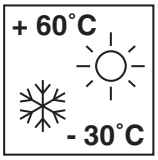
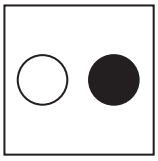
Optics heating and low-temperature versions





Optical sensors are designed for a broad temperature range. Extreme conditions, e.g. intense cooling plants, permanent outdoor installation or on gates and sluices with frequent high/low temperature transitions, require special low-temperature versions with optics heating.

Light and dark switching



With light switching optical sensors, the transistor is switched through if the light path is free and disabled if the light path is interrupted.

With dark switching sensors it is the other way around. Many photoelectric sensor types offer the choice between light and dark switching variants.

Optical sensors with changeover relay are usable in both operating modes. The user chooses through the respective connection.

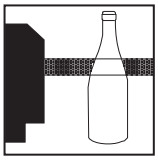
Static - Dynamic

The optical sensor output directly follows the light reception during static operation. During dynamic operation however, the optical sensor reacts to the change of brightness. A signal of a certain length is deducted from the change of light to dark.

Dynamic optical sensors are suitable for applications which would otherwise deliver impulses too short for evaluation. A typical application would be the monitoring of thin thread on spinning machines.

The torn thread passes through the light path only once.

User guidance



For detection of highly-transparent objects, special retro-reflective sensors have to be used. Adjustment of these sensors is normally very time-consuming and varies from sensor to sensor.

With user guidance, adjustment happens without an object. Through this, a fast and always reproducible adjustment is achieved. For PET, clear and colored glass, separate operating points are set within the sensor.

Tracking: Automatic contamination compensation

Sensors for the detection of transparent objects such as foils and glass surfaces are very sensitive to soiling due to their detection characteristics. The tracking function compensates for this gradual soiling. The sensor determines the current reception level and compares this with the initial reference value. In this way, the regulator compensates not only for the soiling, but also for the elevated signal level which occurs after cleaning without the need for new system calibration. It is no longer necessary to stop the machine. In addition, this tracking function makes possible automatic sensor commissioning. Commissioning calibration in the form of a teach-in is no longer necessary. The maintenance intervals are extended considerably.

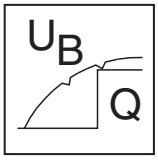
A²LS: active suppression of extraneous light

A²LS is the acronym for **A**ctive **A**mbient **L**ight **S**uppression, the active suppression of extraneous light. And it functions as follows:

An optical sensor transmits and receives light at a specific signal frequency and phase. If the sensor detects ambient light which is similar in frequency and/or phase of its own sensor signal, the optical sensor actively and automatically changes its signal or the phase. A high degree of permanent detection reliability is achieved in this way.

As a result, not even the pulsed light from energy-saving lamps or other optical sensors has a negative effect on the A²LS optical sensors.

Delay before start-up



During connection of the operating voltage to a sensor, different electronic standardising procedures are performed internally. The device is not working during this period. Also during this phase, a short, undefinable output pulse can be generated. The delay before start-up suppresses sensor operation until all device-internal preparations have been concluded. This process takes approximately 50 to 200 ms.

DIAGRAM TYPES

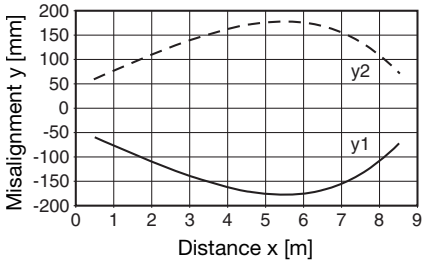
Typical response behaviour

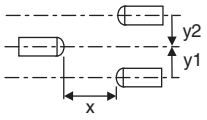
Throughbeam sensors:

The diagram illustrates the possible offset of the optical axis from the transmitter and receiver as a function of their distance.

Detection by the transmitter and receiver takes place within the two curves.

Typ. response behaviour



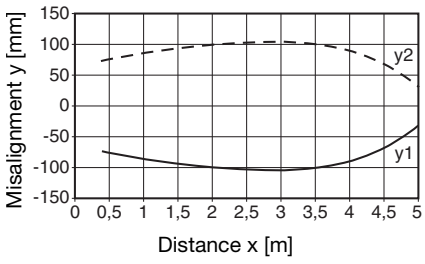


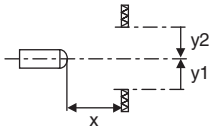
Retro-reflective sensors:

The diagram illustrates the possible offset of the optical axis of the sensor and the boundary of the reference reflector TK 100x100 as a function of the distance.

The sensor is detected by the reflector within the two curves.

Typ. response behaviour (TK 100x100)



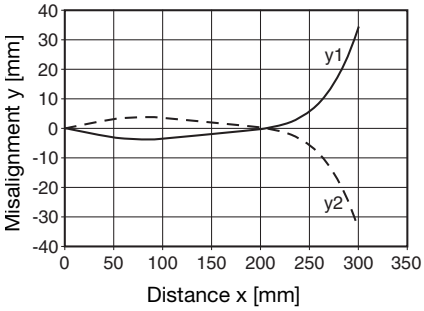


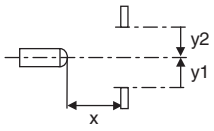
Energetic diffuse reflection scanners and diffuse reflection scanners with background suppression:

The diagram illustrates the possible offset of the optical axis of the sensor and the boundary of the measured object (90 % white) as a function of distance.

With larger distances, the edge of the measured object must cover the optical axis in order to be detected.

Typ. response behaviour (white 90 %)





Typical black/white behaviour

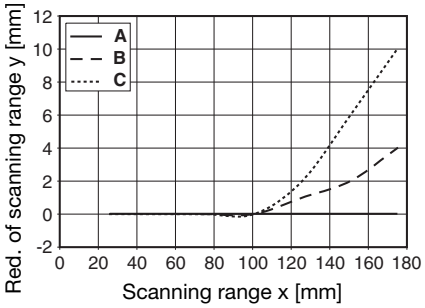
Diffuse reflection scanner with background suppression:

The diagram illustrates the reduction of the scanning range of different-colored measured objects relative to a white measured object as a function of distance.

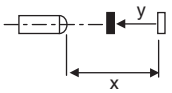
In the diagram, the scanning range reduction from black (6 % diffuse reflection) and grey (18 % diffuse reflection) relative to white (90 % diffuse reflection) is plotted.

In this example, a scanning range reduction of 8 mm relative to black is read for a scanning range setting on the sensor of 160 mm. Thus, the sensor has a scanning range of 152 mm on black.

Typ. black/white behaviour



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



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STANDARDS AND CERTIFICATION

Optical sensors for the potentially explosive area

In order to use optical sensors in potentially explosive atmospheres, it is necessary to take constructive measures to avoid the explosion of an inflammable mixture even if an error occurs. The principle of such a measure is marked by the protection method (examples: pressurisation or intrinsic safety).

The protection method intrinsic safety is available for all sensor operating principles. They are examined and equipped with the respective certificate of conformity.

Intrinsically safe optical sensors

An intrinsically safe circuit must never, neither in normal function nor in abnormal conditions, release sufficient ignition energy which can through

- sparks (opening, closing, short circuit, ground contact)

or

- extreme heating of the operating material and conductors

cause an ignition of the surrounding explosive atmosphere.

Switching amplifiers take over the function of dividing the explosive area and the safe area. The connection to the sensor is done via the NAMUR-interface acc. to EN 60947-5-6 (IEC 60947-5-6). The different switching amplifier types differ with respect to operating voltage and output. Via DIP switches the output signal can be inverted (light/dark switching) and wire-break or short-circuit monitoring can be activated.

CE labelling

An important goal of the European Union (EU) is free trade and the standardisation of applicable regulations within EU member countries. To achieve this aim, the European parliament has enacted certain guidelines.

2006/42/EC	Machinery directive
2004/108/EC	EMC directive
2006/95/EC	Low voltage directive
94/9/EC	ATEX Product directive

If a product falls under one of these directives, it must only be placed on the market if it meets the requirements of the respective directive. The product also has to be marked with the CE label. The CE certification certifies conformity with the applicable guideline(s).

All listed products are equipped with the CE certification.

Standards

For optical sensors, there are independent, harmonised product standards on both national and international levels. These product standards ensure adherence to the corresponding basic and specific standards.

Among other topics, optical sensor functions, construction requirements, pin assignments, temperature ranges, protection classes, electromagnetic compatibility as well as vibration and shock load are described in these standards.

The applicable international standard is the IEC 60947-5-2, for Europe EN 60947-5-2 (in Germany: DIN EN 60947-5-2).

C-UL-US certification

Products with this certification meet the requirements specified by UL (Underwriters Laboratory Inc.) for both the USA as well as Canada. The adherence to the specifications is checked during periodical audits by the UL officials or their representatives. The product standard which is used is UL 508.

CDRH

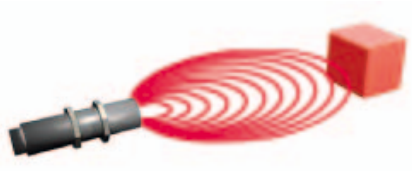
Laser products which are imported into the USA are to be specified by the manufacturer to the CDRH (**C**enter for **D**evices and **R**adiological **H**ealth), a branch of the FDA. Verification of conformity with the applicable US rules for laser products (21 CFR 1040.10 and, if applicable, 1040.11 including the applicable laser notices, issued by the CDRH) is to be documented and an appropriate certification attached to the products.

Products with the CDRH certification in the catalog or to which the certification label has been attached fulfil the specified rules.

INDUCTIVE SWITCH ABC

Introduction

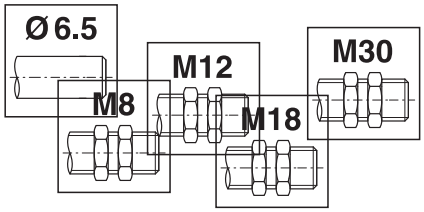
The inductive switch ABC shall assist you in selecting the right switch.



You will find here explanations on the different inductive switch types, the additional functions and a lot of information for the practitioner.

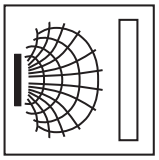
Inductive switch types

The wide variety of constructions with their varying scanning ranges solves almost every "detection problem".



The following explanations shall assist you in making the right selection for the corresponding application.

Functionality



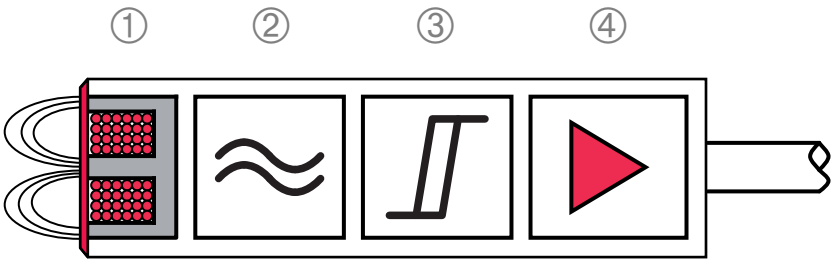
The function of inductive switches is based on the interaction of metallic conductors with the electromagnetic field of the switch.

Eddy currents are induced in the metallic damping material, and these extract energy from the sensor's alternating field. If the amplitude of the internal oscillation falls below the factory-set switching threshold, the signal at the switch output changes.

Function groups of a switch

① Coil and ferrite core define the geometry and hence the operating range of the electromagnetic field.

② The oscillator defines the oscillating frequency and supplies the coil with energy.



③ The trigger circuit detects the changes in the oscillating circuit.

④ The driver stage amplifies the trigger signal for evaluation by a control.

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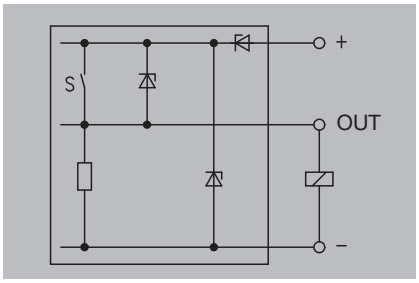
Outputs

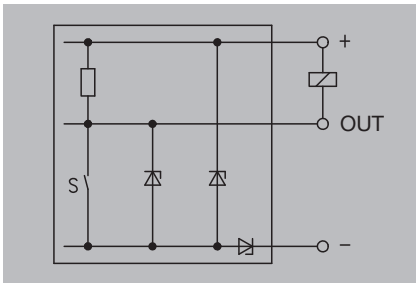
PNP transistor outputs

The PNP transistor output is a high-impedance switching output with open collector. It switches positive potential to the connected load.



NPN transistor outputs

The NPN transistor output is a high-impedance switching output with open collector. It switches GND to the connected load.



Short-circuit protection

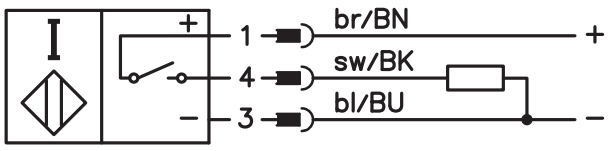
Transistor outputs are usually short-circuit proof. This is achieved by monitoring the output current and, should it exceed a certain level, cutting off the supply to the transistor.

The information on the maximum current given on the data sheet have to be observed despite the short-circuit protection.

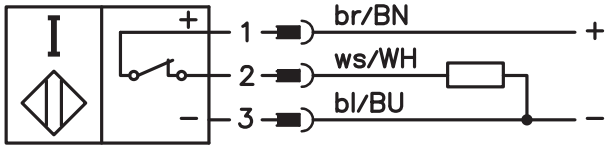
Switching functions

PNP (+) switching

NO (Normally Open – make-contact)

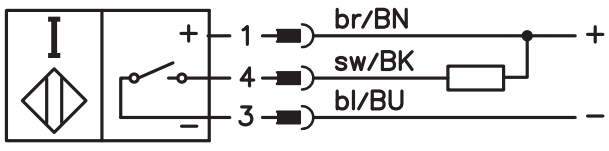


NC (Normally Closed – break-contact)

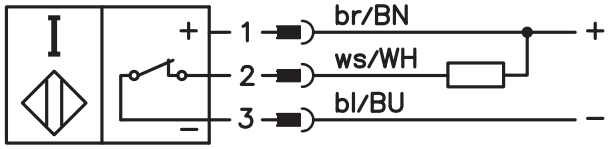


NPN (–) switching

NO (Normally Open – make-contact)



NC (Normally Closed – break-contact)



MOUNTING / INSTALLATION

Metal installation

The inductive switches can be classified as "**embedded installation possible**" and "**embedded installation not possible**".

Switches for which embedded installation is possible may be recognized from their metal sleeve, which does not fully stretch to the active surface, but falls a few millimeters short depending on the switch's diameter.

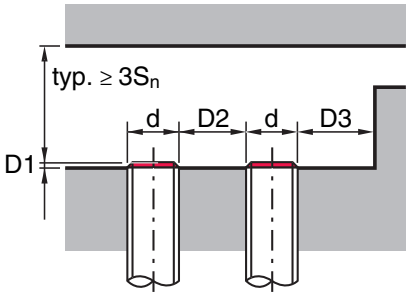
Switches that are not for embedded installation permit a larger operating distance to be achieved.

Notice:

The individual installation specifications may be found in the data sheet of the respective switch.

Embedded installation in metal

For inductive switches capable of embedded installation, the active surface can be installed flush with the surrounding metal surface.



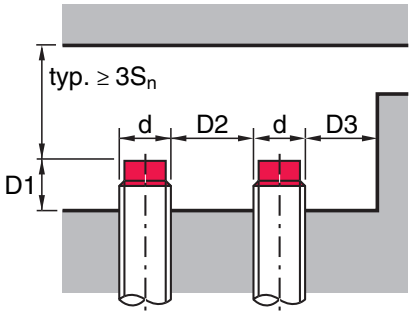
For switches with increased operating distance S_n (typically the scanning range limit), the active surface must protrude by the distance D1.

If switches for embedded installation are mounted side by side, a distance of more than D2 must be kept.
The distance to the adjacent metal walls must be at least D3.

The distance of the switch's active surface to the opposite metal surfaces must be 3 x S_n.

Non-embedded installation in metal

Inductive switches for non-embedded installation can be recognized by the protruding caps. This area must not be installed inside metal. This lets these switches achieve a larger operating distance S_n.



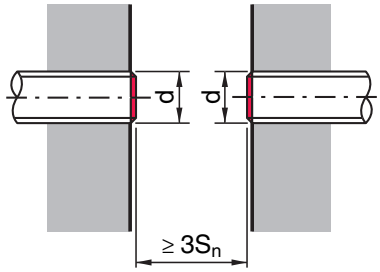
The distance from the switch's active surface to the surrounding metal surface must be D1.

If switches for non-embedded installation are mounted side by side, a distance of more than D2 must be kept. The distance to the adjacent metal walls must be at least D3.

The distance of the switch's active surface to the opposite metal surfaces must be 3 x S_n.

Installation of 2 switches opposite to each other

If two inductive switches are mounted opposite each other, the minimum distance between the active surfaces must be 3 x S_n.



Tightening torque

If the holding nut is tightened too much, the cylindrical switches may be mechanically damaged. In order to avoid this, the indicated maximum admissible tightening torques must not be exceeded:

Installation size	**max. tightening torque**
M8 x 1	4 Nm
M12 x 1	10 Nm
M18 x 1	30 Nm
M30 x 1.5	60 Nm

Notice:

For precise individual values please refer to the data sheet of the respective switch.

IP protection class

In order to make the protection of housings against foreign objects and water comparable, the protection classes have been defined in EN 60529/IEC 60529.

The first digit refers to the protection against foreign objects, the second to water protection.

Leuze inductive switches meet at least protection class IP 67. The models featuring stainless steel housings were specifically developed against intrusion of humidity during high-pressure cleaning and pass the tests of protection class IP 69K according to DIN 40050 Part 9.

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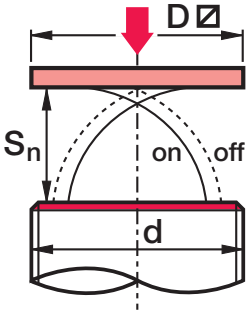
Typical response behaviour

The specified values for the operating distance S relate to the damping of the inductive switch using a standard measuring plate in axial direction. If the measuring plate is laterally offset or the switch is approached radially, the actual operating distance S_r shifts.



As an example, the diagram above shows the response behaviour of an inductive switch: the operating distance in relation to axial and radial offset.

Notice:

The type-specific response curves may be found in the data sheet of the respective switch.

Active surface

The active surface is the area from which the electromagnetic field of the switch emanates. It is used as reference point for the specified operating distance.

The area is determined by the coil core geometry and roughly matches the surface of the core cap.

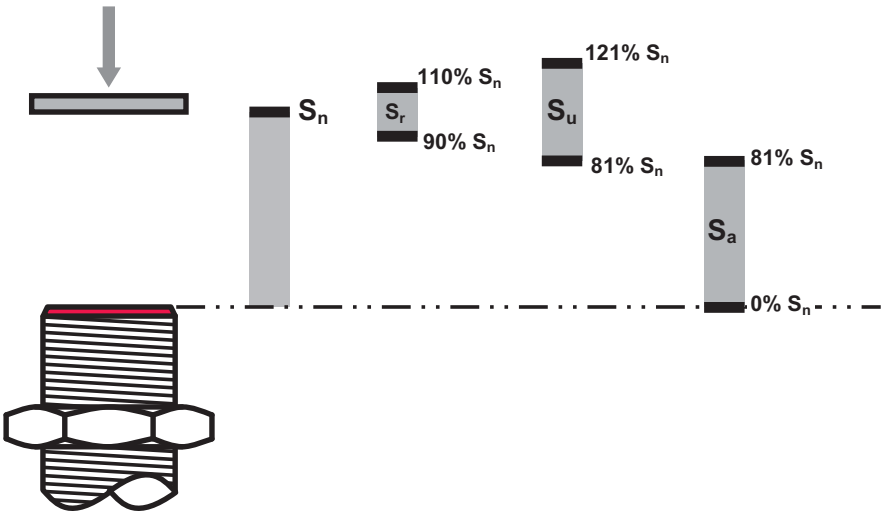
Standard measuring plate

The standard measuring plate is used to determine the inductive characteristics such as operating distance, repeatability, or temperature drift according to IEC 60947-5-2.

The plate is a square of 1 mm thickness and made of steel (Fe360). The side length **a** of the square is the diameter of the inscribed circle of the active surface, or three times the rated operating distance S_n if this is the larger value.

Operating distances

The operating distance S defines the distance from a standard measuring plate to the inductive switch at which the signal at the switch's switching output changes.



Typ. Scanning range limit (rated operating distance S_n)

The rated operating distance S_n is a parameter for the specification of operating distances. It considers neither manufacturing tolerances nor changes due to external influences such as voltage and temperature.

The actual operating distance Sr of an inductive switch is measured under defined installation conditions, at rated operating voltage and an ambient temperature of 23 °C ± 5 °C ($0.9 \times S_n \leq S_r \leq 1.1 \times S_n$).

The usable operating distance S_u is measured over the complete ambient temperature range (typically: -25 °C … 70 °C) at a supply voltage of 85 % … 110 % of the rated value ($0.81 \times S_n \leq S_u \leq 1.21 \times S_n$).

Scanning range (assured operating distance S_a)

The assured operating distance S_a describes the scanning range that ensures a safe operation of the switch across the specified temperature and voltage range.

For inductive switches, the assured operating distance S_a is between 0 % … 81 % of the rated operating distance S_n.

Reduction factors

The reduction factor is a value that changes depending on the material. It describes the change of the operating distance S if the damping material differs from Fe360: S_r = factor x S_n

Material	Factor
Steel (FE360)	1.0
Copper	0.18 ... 0.50
Aluminium	0.25 ... 0.50
Brass	0.33 ... 0.60
Stainless steel	0.63 ... 0.90

Notice:

For precise individual values please refer to the data sheet of the respective switch.

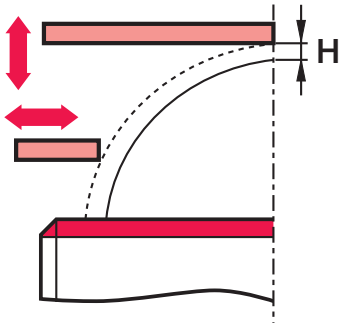
CHARACTERISTICS

Delay before start-up

The delay before start-up is the maximum delay between switching the operating voltage on and the switch reaching readiness for operation.

Hysteresis H

The hysteresis H is the range between switch-on and cut-out point (switch reversal) of an inductive switch.



It is determined at the rated operating voltage and an ambient temperature of 23 °C ± 5 °C.

At the most, the hysteresis is 20 % of the actual operating distance S_r.

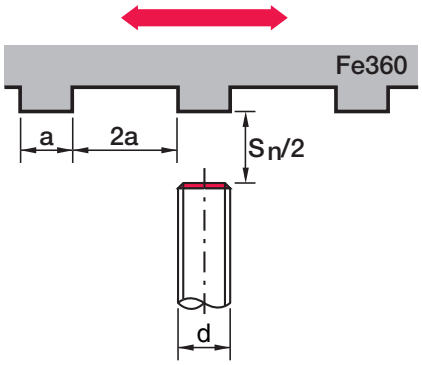
Repeatability

The repeatability of the actual operating distance S_r is measured over eight hours at an ambient temperature of 23 °C ± 5 °C, a relative humidity of 90 %, and the rated operating voltage.

The difference between two arbitrary measurement values must not exceed 10 % of the actual operating distance S_r.

Switching frequency

The switching frequency indicates the maximum possible number of switching sequences per second at a constant pulse-pause ratio (1:2) and half the rated operating distance S_n.



Ambient temperature

The ambient temperature range specified (typically -25 °C … +70 °C) must not be exceeded, as the switches may be damaged in this case. The functionality outside these limits is also not defined.

Temperature drift

The temperature drift is the deviation of the actual operating distance S_r within the temperature range of -25 °C … +70 °C. According to IEC 60947-5-2, the difference is at most 10 % compared to the rated value.

Voltage drop U_d

In the switched-on state, a current-dependent voltage drop is present across the output transistor.

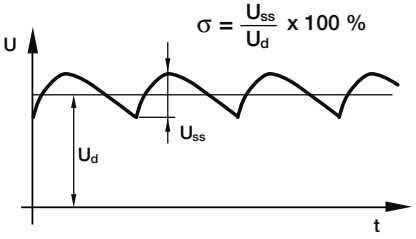
The actual output voltage is the applied operating voltage less the voltage drop.

Operating voltage U_B

The operating voltage is the voltage at which the switch operates safely. The operating voltage is 10 … 30 VDC.

Residual ripple σ

The residual ripple is the AC voltage superimposed onto the DC voltage.



If the residual ripple is too high, the switching behavior of the switch may be undefined.

The maximum allowable operating voltage U_B must not be exceeded, even during the peaks of U_{ss}.

Open-circuit current I_0

The open-circuit current is the current consumption of the inductive sensor for operating LED, amplifier etc. in the locked state.

Output current I_L

The devices are designed for a maximum output current I_L. If this current is exceeded, even for brief periods, the overload protection activates.

Residual current I_r

If the output is switched off, the residual current flows through the output transistor and therefore through the load connected.

Electromagnetic compatibility – EMC

The EMC robustness of the products listed meets the high requirements of the IEC 60947-5-2. They are subjected to the following tests:

- IEC 60255-5	1 kV
- IEC 61000-4-2	Level 3 (ESD)
- IEC 61000-4-3	Level 3 (RFI)
- IEC 61000-4-4	Level 3 (Burst)

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STANDARDS AND CERTIFICATION

IEC 60947-5-2

There is a harmonized product standard for inductive switches.

It provides a reference to the respective basic standards and basic engineering standards and describes, among others, the inductive switch functions, pin assignments, temperature ranges, protection classes, electromagnetic compatibility, and the stress from swinging and shock.

The applicable international standard is the IEC 60947-5-2, for Europe EN 60947-5-2 (in Germany: DIN EN 60947-5-2).

CE labelling

An important goal of the European Union (EU) is free trade and the standardisation of applicable regulations within EU member countries. To achieve this aim, the European parliament has enacted certain guidelines.

2006/42/EC	Machinery directive
2004/108/EC	EMC directive
2006/95/EC	Low voltage directive
94/9/EC	ATEX Product directive

If a product falls under one of these directives, it must only be placed on the market if it meets the requirements of the respective directive. The product also has to be marked with the CE label. The CE certification certifies conformity with the applicable guideline(s).

All listed products are equipped with the CE certification.

C-UL-US certification

Products with this certification meet the requirements specified by UL (Underwriters Laboratory Inc.) for both the USA as well as Canada. The adherence to the specifications is checked during periodical audits by the UL officials or their representatives. The product standard which is used is UL 508.

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