

W 12-2: Fantastic performance – years of experience



such as foreground and background suppression, ASI interface, fibre-optic cable versions, insensitivity to ambient light and mutual interference when units are installed close together, are all device standards.

The WL 12 G “glass photoelectric switch” designed for filling systems used in the beverage industry, represents more than just a technical advance. This intelligent sensor needs to be configured just once using the teach-in method and then it is able to

adapt its switching threshold to increasing contamination continuously and fully automatically during operation. As a result, transparent objects, e.g. transparent films or filled PET mineral water bottles, can now be detected much more reliably. Continual cleaning and realignment are, therefore, a thing of the past.

Monitoring the flow of bottles, and bottle counting, has been made possible while simultaneously minimising maintenance requirements.

The Teflon-coated version is an added bonus for use in, for example, the beverage industry.

The W 12-2 series of photoelectric switches is in use all over the world. The key advantage for the user is the wealth of experience gained from the previous W 12 series. The W 12-2 series is backed by years of know-how gained from many thousands of applications.

A sturdy metal housing protects the WT 12-2 photoelectric proximity switch, the WL 12-2 photoelectric reflex switch and the WS/WE 12-2 through-beam photoelectric switch. Rotatable plugs provide flexibility of location and cable installation. Features

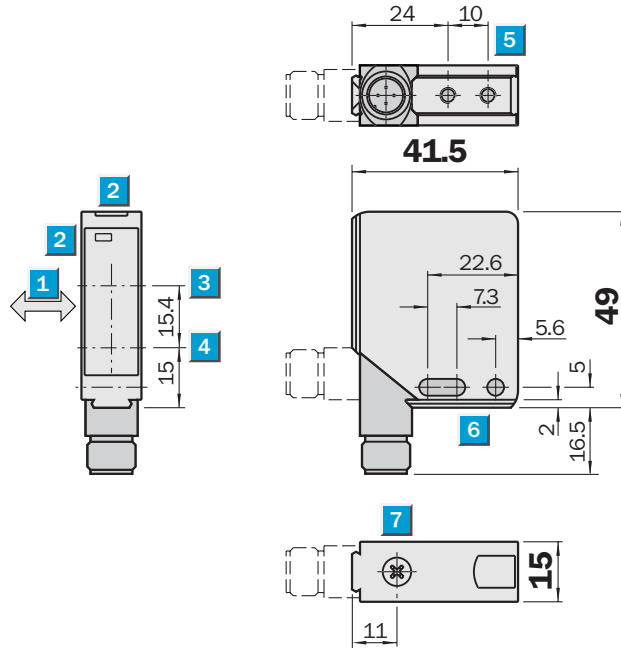
	Photoelectric proximity switches, FGS
	Photoelectric proximity switches, BGS
	Photoelectric proximity switches, energetic
	Photoelectric reflex switches
	Through-beam photoelectric switches
	Photoelectric switches with fibre-optic cable
Proximity mode	
	Photoelectric switches with fibre-optic cable
Through-beam mode	

Scanning distance
35...100 mm

Photoelectric proximity switches

- Red light; consequently, fast alignment is possible
- Insensitive to external light sources, i.e., increased operating reliability
- M 12 plug rotatable by 90°, or 2 m cable
- Adjustable foreground suppression; ideal for applications with critical surfaces

Dimensional drawing



Adjustments possible

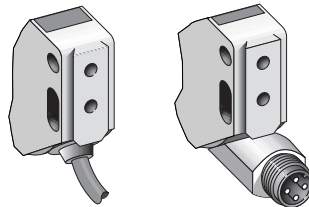
WT 12-2P 440	WT 12-2N 440
WT 12-2P 140	WT 12-2N 140

- 1** Standard direction of the material being scanned
- 2** LED signal strength indicator
- 3** Receiver's optical axis
- 4** Transmitter's optical axis
- 5** M 4 threaded mounting hole – 4 mm deep
- 6** Mounting holes \varnothing 4.2 mm
- 7** Scanning distance adjustment

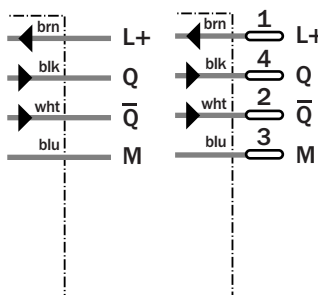


Connection types

WT 12-2P 140	WT 12-2P 440
WT 12-2N 140	WT 12-2N 440



4 x 0.25 mm ²	4-pin, M 12
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Accessories

Connectors
Mounting systems
Clamps*

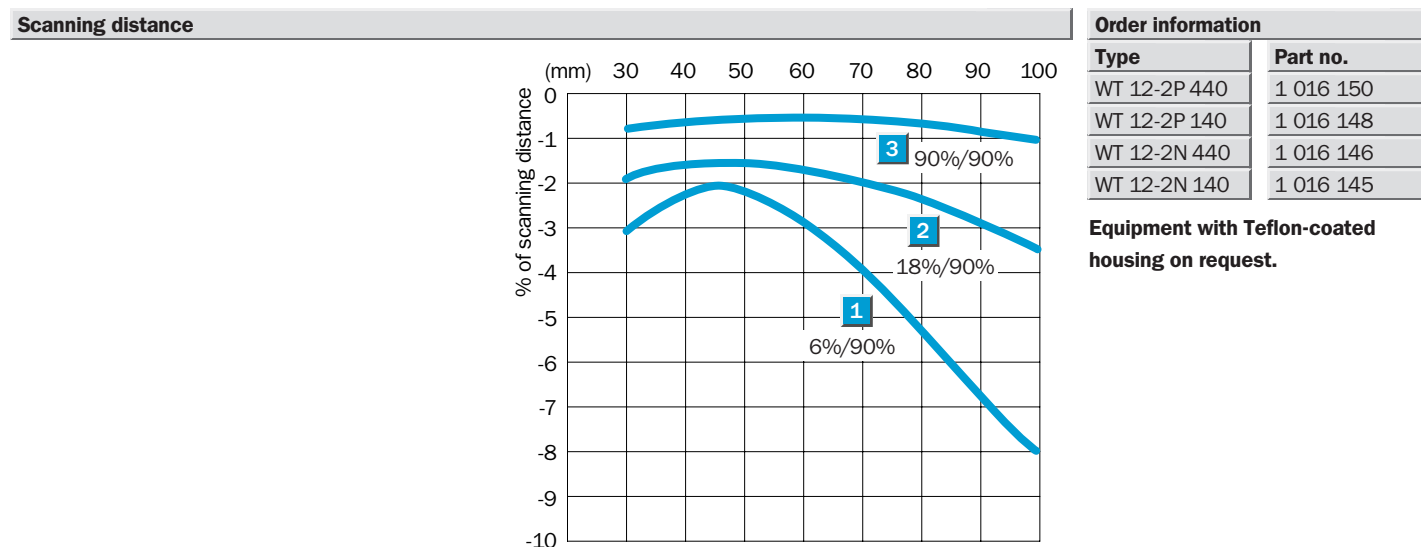
* 2 pieces included with delivery

Technical data		WT 12-2	P 440	P 140	N 440	N 140					
Scanning distance	35...100 mm, adjustable										
Light source¹⁾, light type	LED, red light										
Light spot size	3 x 3 mm at 60 mm										
Supply voltage V_s	10...30 V DC ²⁾										
Ripple ³⁾	$\leq 5 V_{pp}$										
Current consumption ⁴⁾	≤ 30 mA										
	≤ 40 mA										
Switching outputs	PNP, Q and \bar{Q}										
	NPN, Q and \bar{Q}										
Output current I_A max.	≤ 100 mA										
Response time ⁵⁾	$\leq 330 \mu s$										
Max. switching frequency ⁶⁾	1500/s										
Connection types	Cable ⁷⁾ , 2 m										
	Plug M 12, 4-pin										
VDE protection class⁸⁾	<input type="checkbox"/>										
Circuit protection⁹⁾	A, B, C										
Enclosure rating	IP 67										
Ambient temperature T_A	Operation $-40 \text{ }^\circ\text{C} \dots +60 \text{ }^\circ\text{C}$										
	Storage $-40 \text{ }^\circ\text{C} \dots +75 \text{ }^\circ\text{C}$										
Weight	With plug: 120 g										
	With cable: 200 g										
Housing material	Zinc die-cast housing										

¹⁾ Average service life 100,000 h at $T_A = +25 \text{ }^\circ\text{C}$
²⁾ Limit values
³⁾ May not exceed or fall short of V_s tolerances

⁴⁾ Without load
⁵⁾ Signal transit time with resistive load
⁶⁾ With light/dark ratio 1:1
⁷⁾ Do not bend below $0 \text{ }^\circ\text{C}$
⁸⁾ Reference voltage 50 V DC

⁹⁾ A = V_s connections reverse-polarity protected
 B = Output Q and \bar{Q} short-circuit protected
 C = Interference pulse suppression

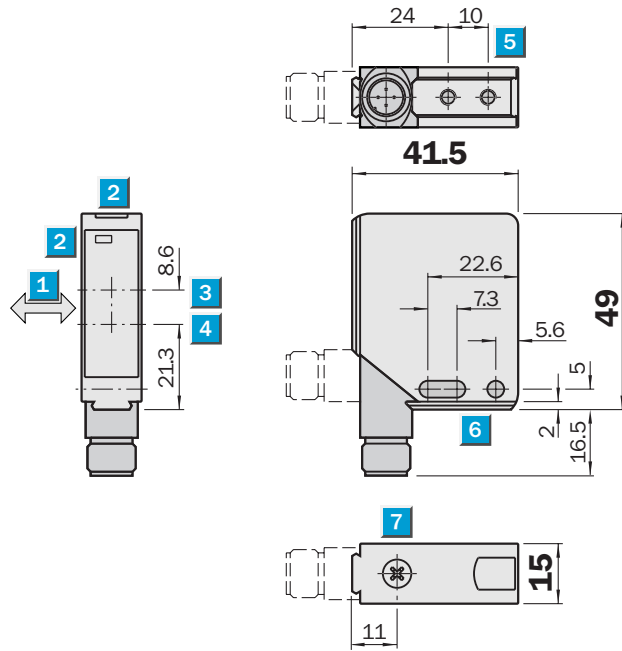


Scanning distance
20...250 mm

Photoelectric proximity switches

- Red light; consequently, fast alignment is possible
- Insensitive to external light sources, i.e., increased operating reliability
- M 12 plug rotatable by 90°, or 2 m/5 m cable
- Adjustable background suppression

Dimensional drawing



Adjustments possible

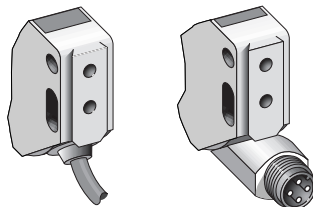
WT 12-2P 830	WT 12-2N 830
WT 12-2P 130	WT 12-2N 130
WT 12-2P 430	WT 12-2N 430

- 1 Standard direction of the material being scanned
- 2 LED signal strength indicator
- 3 Receiver's optical axis
- 4 Transmitter's optical axis
- 5 M 4 threaded mounting hole – 4 mm deep
- 6 Mounting holes \varnothing 4.2 mm
- 7 Scanning distance adjustment

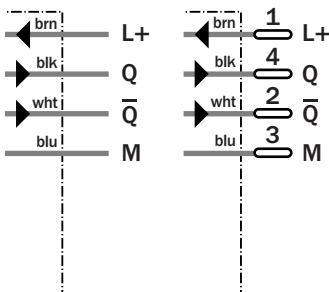


Connection types

WT 12-2P 130	WT 12-2P 430
WT 12-2N 130	WT 12-2N 430
WT 12-2P 830	
WT 12-2N 830	



4 x 0.25 mm² 4-pin, M 12



Accessories

Connectors
Mounting systems
Clamps*

* 2 pieces included with delivery



Technical data	WT 12-2	P 430	P 130	P 830	N 430	N 130	N 830				
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Scanning distance	20...250 mm, adjustable										
Light source¹⁾, light type	LED, red light										
Light spot diameter	10 mm at 200 mm										
Supply voltage V_s	10...30 V DC ²⁾										
Ripple ³⁾	$\leq 5 V_{pp}$										
Current consumption ⁴⁾	≤ 30 mA										
	≤ 40 mA										
Switching outputs	PNP, Q and \bar{Q}										
	NPN, Q and \bar{Q}										
Output current I_A max.	≤ 100 mA										
Response time ⁵⁾	$\leq 330 \mu s$										
Max. switching frequency ⁶⁾	1500/s										
Connection types	Cable ⁷⁾ , 2 m										
	Cable ⁷⁾ , 5 m										
	Plug M 12, 4-pin										
VDE protection class⁸⁾	<input type="checkbox"/>										
	II										
Circuit protection⁹⁾	A, B, C										
	A, B, C, D										
Enclosure rating	IP 67										
Ambient temperature T_A	Operation $-40 \text{ }^\circ\text{C} \dots +60 \text{ }^\circ\text{C}$										
	Storage $-40 \text{ }^\circ\text{C} \dots +75 \text{ }^\circ\text{C}$										
Weight	With plug: 120 g										
	With cable 2 m: 200 g										
	With cable 5 m: 280 g										
Housing material	Zinc die-cast housing										

¹⁾ Average service life 100,000 h at $T_A = +25 \text{ }^\circ\text{C}$

²⁾ Limit values

³⁾ May not exceed or fall short of V_s tolerances

⁴⁾ Without load

⁵⁾ Signal transit time with resistive load

⁶⁾ With light/dark ratio 1:1

⁷⁾ PVC, 5 mm ϕ ; do not bend below $0 \text{ }^\circ\text{C}$

⁸⁾ Reference voltage 50 V DC

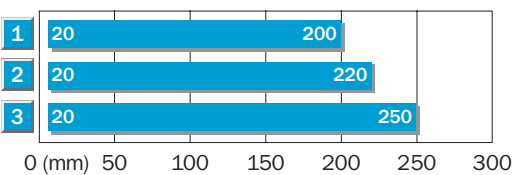
⁹⁾ A = V_s connections reverse-polarity protected

B = Output Q and \bar{Q} short-circuit protected

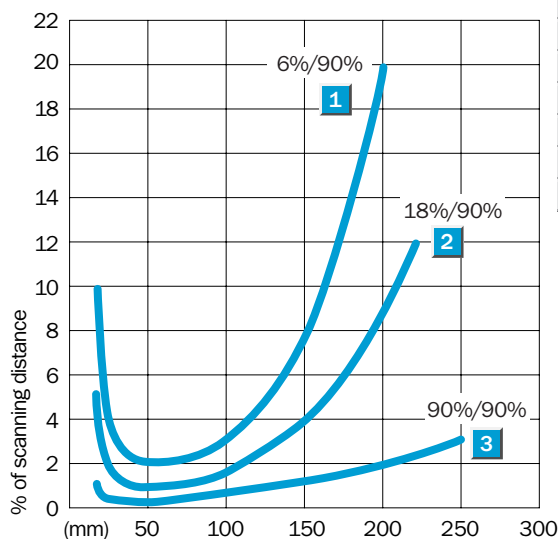
C = Interference pulse suppression

D = Output overcurrent and short-circuit protected

Scanning distance




- 1 Scanning distance on black, 6 % remission
- 2 Scanning distance on grey, 18 % remission
- 3 Scanning distance on white, 90 % remission



Order information

Type	Part no.
WT 12-2P 430	1 016 134
WT 12-2P 130	1 016 129
WT 12-2P 830	1 016 130
WT 12-2N 430	1 016 125
WT 12-2N 130	1 016 122
WT 12-2N 830	1 016 123

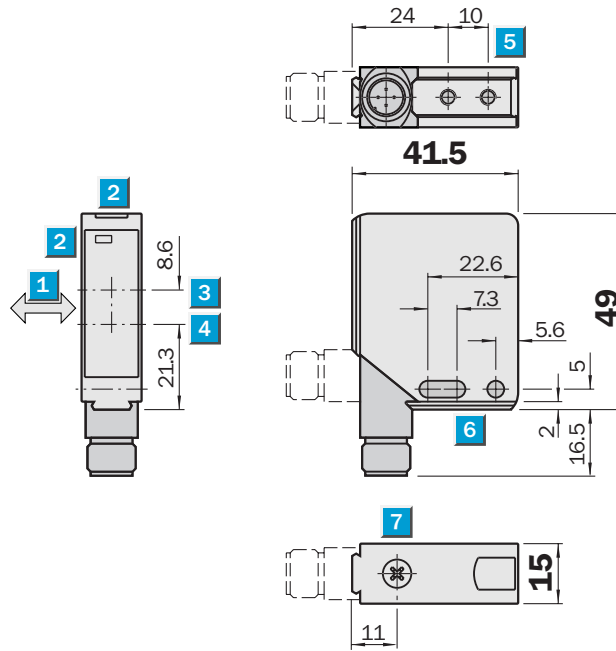
Equipment with Teflon-coated housing on request.


Scanning distance
 20...250 mm

Photoelectric proximity switches

- Red light; consequently, fast alignment is possible
- Insensitive to external light sources, i.e., increased operating reliability
- M 12 plug rotatable by 90°
- With integrated AS-i chip
- Adjustable background suppression

Dimensional drawing



Adjustments possible

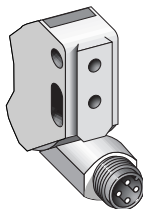
WT 12-2Z 430



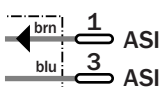
- 1 Standard direction of the material being scanned
- 2 LED signal strength indicator
- 3 Receiver's optical axis
- 4 Transmitter's optical axis
- 5 M 4 threaded mounting hole – 4 mm deep
- 6 Mounting holes \varnothing 4.2 mm
- 7 Scanning distance adjustment

Connection type

WT 12-2Z 430



4-pin, M 12



Accessories
Connectors
Mounting systems
Clamps*
AS-i components**

* 2 pieces included with delivery

** Request the Technical Description "AS-i components"!

Technical data	WT 12-2	Z 430											
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Scanning distance	20...250 mm, adjustable
Light source⁴⁾, light type	LED, red light
Light spot diameter	10 mm at 200 mm
Supply voltage V_s	26.5...31.5 V DC ²⁾
Current consumption ³⁾	≤ 35 mA
Response time ⁴⁾	≤ 330 μs
Max. switching frequency ⁵⁾	1500/s
Pre-failure signalling output	Alarm
Test input »TE«	
Connection type	Plug M 12, 4-pin
VDE protection class⁶⁾	□
Circuit protection⁷⁾	A, B, C
Enclosure rating	IP 67
AS-i profil	S 1.1
Ambient temperature T_A	Operation - 25 °C...+ 60 °C Storage - 40 °C...+ 75 °C
Weight	With plug: 120 g
Housing material	Zinc die-cast housing

¹⁾ Average service life 100,000 h at $T_A = +25 °C$

²⁾ Limit values

³⁾ Without load

⁴⁾ Signal transit time with resistive load

⁵⁾ With light/dark ratio 1:1

⁶⁾ Reference voltage 50 V DC

⁷⁾ A = V_s connections reverse-polarity protected

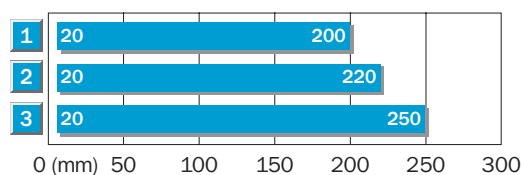
B = Output Q and \bar{Q} short-circuit protected

C = Interference pulse suppression

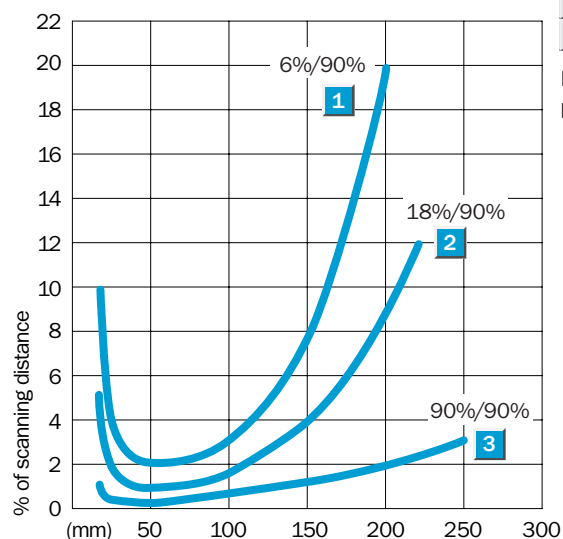
Assignment of data bits (Host level)				Assignment of parameter bits (Host level)			
D_0	Switching state	0 If light interrupted Mode: light-switching 1 If light received	Input	P_0^*	NC	0 1	Parameter
D_1	Alarm	0 Active 1 Inactive	Input	P_1^*	Light-/dark-switching	0 Dark-switching 1 Light-switching	Parameter
D_2	NC	0 1	Input	P_2^*	NC	0 1	Parameter
D_3	Test function	0 Sender ON 1 Sender OFF	Output	P_3^*	NC	0 1	Parameter

* Default setting = 1

Scanning distance	Order information
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1	Scanning distance on black, 6 % remission
2	Scanning distance on grey, 18 % remission
3	Scanning distance on white, 90 % remission



Type	Part no.
WT 12-2Z 430	1 016 136

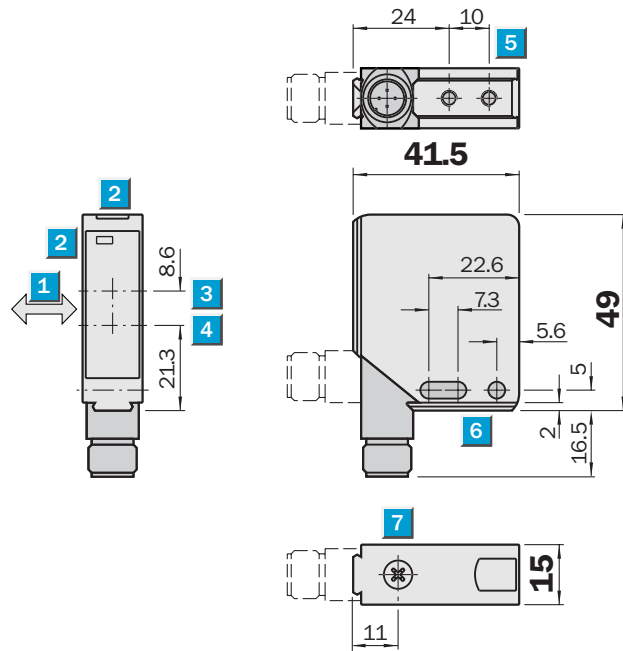
Equipment with Teflon-coated housing on request.

 **Scanning distance**
20...250 mm

Photoelectric proximity switches

- Infrared
- Insensitive to external light sources, i.e., increased operating reliability
- M 12 plug rotatable by 90°, or 2 m/3 m cable
- Adjustable background suppression

Dimensional drawing



Adjustments possible

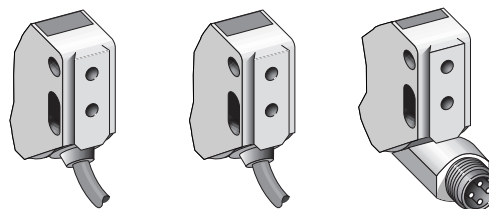
WT 12-2P 710	WT 12-2N 710
WT 12-2P 110	WT 12-2N 110
WT 12-2P 410	WT 12-2N 410

- 1 Standard direction of the material being scanned
- 2 LED signal strength indicator
- 3 Receiver's optical axis
- 4 Transmitter's optical axis
- 5 M 4 threaded mounting hole – 4 mm deep
- 6 Mounting holes \varnothing 4.2 mm
- 7 Scanning distance adjustment



Connection types

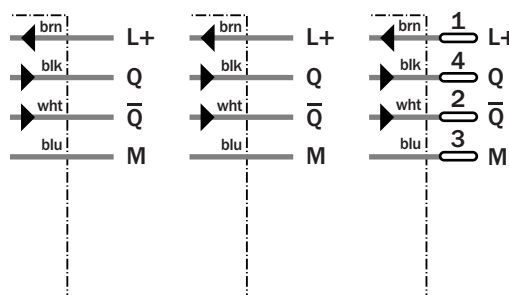
WT 12-2P 710	WT 12-2P 110	WT 12-2P 410
WT 12-2N 710	WT 12-2N 110	WT 12-2N 410



4 x 0.25 mm²

4 x 0.25 mm²

4-pin, M 12



Accessories

Connectors
Mounting systems
Clamps*

* 2 pieces included with delivery



Technical data		WT 12-2	P 410	P 110	N 710	N 410	N 110	N 710				
Scanning distance	20...250 mm, adjustable											
Light source¹⁾, light type	LED, infrared light											
Light spot diameter	10 mm at 200 mm											
Supply voltage V_s	10...30 V DC ²⁾											
Ripple ³⁾	$\leq 5 V_{pp}$											
Current consumption ⁴⁾	≤ 40 mA											
	≤ 50 mA											
Switching outputs	PNP, Q and \bar{Q}											
	NPN, Q and \bar{Q}											
Output current I_A max.	≤ 100 mA											
Response time ⁵⁾	$\leq 330 \mu s$											
Max. switching frequency ⁶⁾	1500/s											
Connection types	Cable ⁷⁾ , 2 m											
	Cable ⁷⁾ , 3 m											
	Plug M 12, 4-pin											
VDE protection class⁸⁾	<input type="checkbox"/>											
	II											
Circuit protection⁹⁾	A, B, C											
	A, B, C, D											
Enclosure rating	IP 67											
Ambient temperature T_A	Operation $-40 \text{ }^\circ\text{C} \dots +60 \text{ }^\circ\text{C}$											
	Storage $-40 \text{ }^\circ\text{C} \dots +75 \text{ }^\circ\text{C}$											
Weight	With plug: 120 g											
	With cable 2 m: 200 g											
	With cable 3 m: 250 g											
Housing material	Zinc die-cast housing											

¹⁾ Average service life 100,000 h at $T_A = +25 \text{ }^\circ\text{C}$

²⁾ Limit values

³⁾ May not exceed or fall short of V_s tolerances

⁴⁾ Without load

⁵⁾ Signal transit time with resistive load

⁶⁾ With light/dark ratio 1:1

⁷⁾ PVC, 5 mm ϕ ; do not bend below $0 \text{ }^\circ\text{C}$

⁸⁾ Reference voltage 50 V DC; 250 V AC

⁹⁾ A = V_s connections reverse-polarity protected

B = Output Q and \bar{Q} short-circuit protected


C = Interference pulse suppression

D = Output overcurrent and short-circuit protected

Scanning distance		Order information	
1	20	Type	Part no.
2	220	WT 12-2P 410	1 016 131
3	250	WT 12-2P 110	1 016 126
		WT 12-2P 710	1 016 128
		WT 12-2N 410	1 016 124
		WT 12-2N 110	1 016 118
		WT 12-2N 710	1 016 121

1 Scanning distance on black, 6 % remission
 2 Scanning distance on grey, 18 % remission
 3 Scanning distance on white, 90 % remission

Equipment with Teflon-coated housing on request.

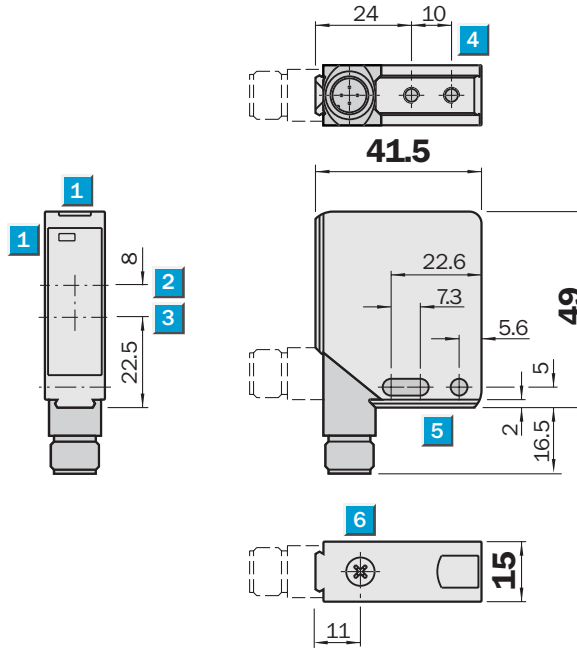

Scanning distance
80...800 mm

Photoelectric proximity switches

- Red light; consequently, fast alignment is possible
- Insensitive to external light sources, i.e., increased operating reliability
- M 12 plug rotatable by 90°, or 2 m cable
- Energetic proximity switch, scanning distance adjustable; ideal for standard applications



Dimensional drawing



Adjustments possible

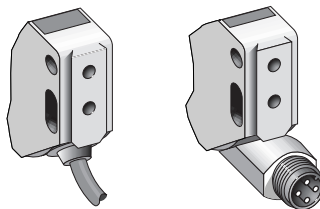
WT 12-2P 450	WT 12-2N 450
WT 12-2P 150	WT 12-2N 150

- 1 LED signal strength indicator
- 2 Receiver's optical axis
- 3 Transmitter's optical axis
- 4 M 4 threaded mounting hole – 4 mm deep
- 5 Mounting holes \varnothing 4.2 mm
- 6 Scanning distance adjustment



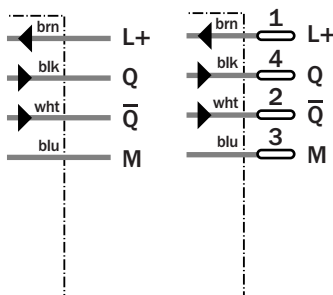
Connection types

WT 12-2P 150	WT 12-2P 450
WT 12-2N 150	WT 12-2N 450



4 x 0.25 mm²

4-pin, M 12



Accessories

Connectors
Mounting systems
Clamps*

* 2 pieces included with delivery


Technical data		WT 12-2	P 450	P 150	N 450	N 150
Scanning distance	80...800 mm, adjustable					
Light source¹⁾, light type	LED, red light					
Light spot diameter	30 mm at 600 mm					
Supply voltage V_s	10...30 V DC ²⁾					
Ripple ³⁾	$\leq 5 V_{pp}$					
Current consumption ⁴⁾	≤ 30 mA					
	≤ 40 mA					
Switching outputs	PNP, Q and \bar{Q}					
	NPN, Q and \bar{Q}					
Output current I_A max.	≤ 100 mA					
Response time ⁵⁾	$\leq 330 \mu s$					
Max. switching frequency ⁶⁾	1500/s					
Connection types	Cable ⁷⁾ , 2 m					
	Plug M 12, 4-pin					
VDE protection class⁸⁾	<input type="checkbox"/>					
Circuit protection⁹⁾	A, B, C					
Enclosure rating	IP 67					
Ambient temperature T_A	Operation $-40 \text{ }^\circ\text{C} \dots +60 \text{ }^\circ\text{C}$					
	Storage $-40 \text{ }^\circ\text{C} \dots +75 \text{ }^\circ\text{C}$					
Weight	With plug: 120 g					
	With cable: 200 g					
Housing material	Zinc die-cast housing					

1) Average service life 100,000 h at $T_A = +25 \text{ }^\circ\text{C}$
 2) Limit values
 3) May not exceed or fall short of V_s tolerances

4) Without load
 5) Signal transit time with resistive load
 6) With light/dark ratio 1:1
 7) Do not bend below $0 \text{ }^\circ\text{C}$
 8) Reference voltage 50 V DC; 250 V AC

9) A = V_s connections reverse-polarity protected
 B = Output Q and \bar{Q} short-circuit protected
 C = Interference pulse suppression

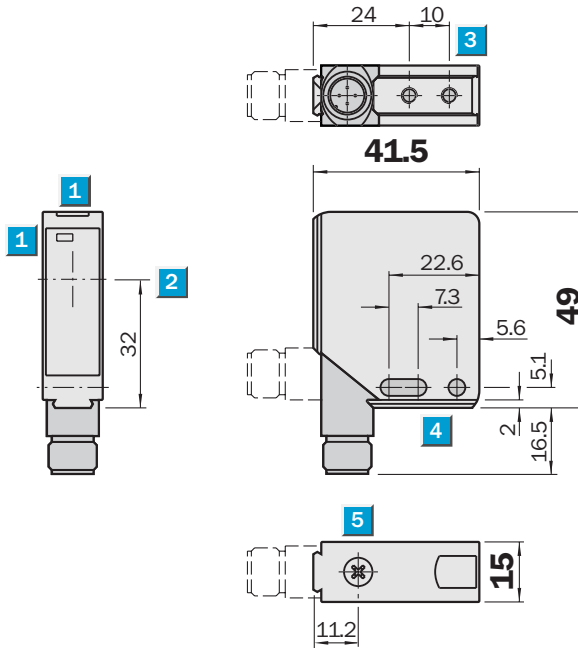
Scanning distance		Order information
1	10 350 500	Type
2	10 800 1000	Part no.
0 (mm) 200 400 600 800 1000		WT 12-2P 450 1 016 142
■ Operating distance ■ Maximum scanning distance		WT 12-2P 150 1 016 140
		WT 12-2N 450 1 016 139
		WT 12-2N 150 1 016 138
1 Scanning distance on grey, 18 % remission		Equipment with Teflon-coated housing on request.
2 Scanning distance on white, 90 % remission		

 **Scanning range**
7 m

Photoelectric reflex switches

- Red light; consequently, fast alignment is possible
- Insensitive to external light sources, i.e., increased operating reliability
- M 12 plug rotatable by 90°, or 2 m/3 m cable
- Adjustable sensitivity; optimum adaptation to application

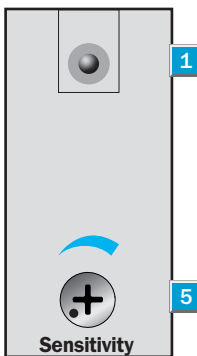
Dimensional drawing



Adjustments possible

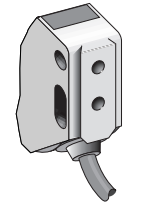
WL 12-2P 430	WL 12-2N 430
WL 12-2P 130	WL 12-2N 130
WL 12-2P 420	WL 12-2N 420
WL 12-2P 120	WL 12-2N 120
WL 12-2P 730	WL 12-2N 730

- 1 LED signal strength indicator
- 2 Centre of optical axis
- 3 M 4 threaded mounting hole – 4 mm deep
- 4 Mounting holes \varnothing 4.2 mm
- 5 Sensitivity adjustment

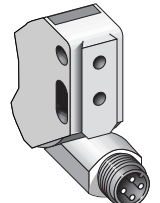
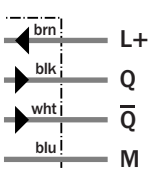


Connection types

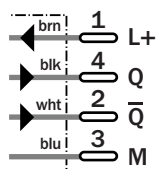
WL 12-2P 130	WL 12-2N 130	WL 12-2P 430	WL 12-2N 430
WL 12-2P 120	WL 12-2N 120	WL 12-2P 420	WL 12-2N 420
WL 12-2P 730	WL 12-2N 730		



4 x 0.25 mm²



4-pin, M 12



Accessories

Connectors
Mounting systems
Clamps*
Reflectors

* 2 pieces included with delivery

Technical data	WL 12-2	P 730	P 430	P 130	P 420	P 120	N 730	N 430	N 130	N 420	N 120
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Scanning range

max. typical/on reflector, $f = \infty$	7 m/PL 80 A										
max. typical/on reflector, $f = 90$ mm	2 m/PL 80 A										
Sensitivity	adjustable										
Light source¹⁾, light type	LED, red light										
Light spot diameter	80 mm at a distance of 3 m										
	2 mm at a distance of 90 mm										
Supply voltage V_s	10...30 V DC ²⁾										
Ripple ³⁾	$\leq 5 V_{pp}$										
Current consumption ⁴⁾	≤ 30 mA										
	≤ 40 mA										
Switching outputs	PNP, Q and \bar{Q}										
	NPN, Q and \bar{Q}										
Output current I_A max.	100 mA										
Response time ⁵⁾	$\leq 330 \mu s$										
Max. switching frequency ⁶⁾	1500/s										
Connection types	Cable ⁷⁾ , 2 m										
	Cable ⁷⁾ , 3 m										
	Plug M 12, 4-pin										
VDE protection class⁸⁾	<input type="checkbox"/>										
Circuit protection⁹⁾	A, B, C										
Enclosure rating	IP 67										
Ambient temperature T_A	Operation -40 °C... $+60$ °C										
	Storage -40 °C... $+75$ °C										
Weight	With plug: 120 g										
	With cable 2 m: 200 g										
	With cable 3 m: 230 g										
Polarising filter											
Housing material	Zinc die-cast housing										

¹⁾ Average service life 100,000 h at $T_A = +25$ °C

²⁾ Limit values

³⁾ May not exceed or fall short of V_s tolerances

⁴⁾ Without load

⁵⁾ Signal transit time with resistive load

⁶⁾ With light/dark ratio 1:1

⁷⁾ Do not bend below 0 °C

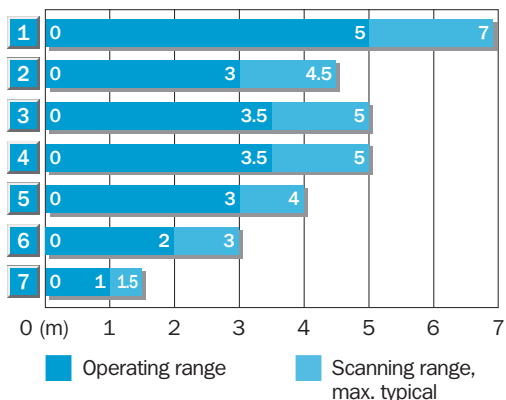
⁸⁾ Reference voltage 50 V DC

⁹⁾ A = V_s connections reverse-polarity protected

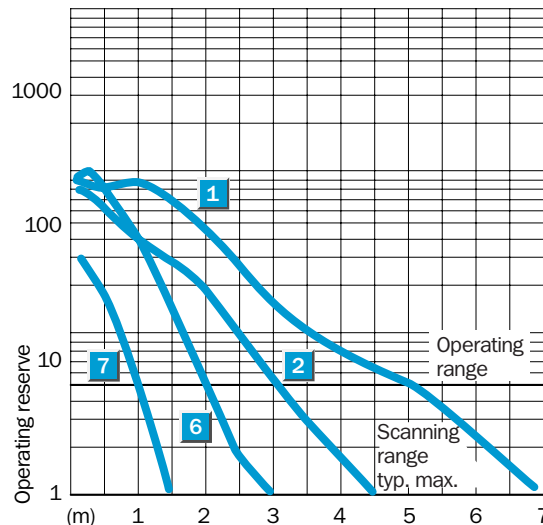
B = Output Q and \bar{Q} short-circuit protected

C = Interference pulse suppression

Operating range and operating reserve




Reflector type	Operating range
1 PL 80 A	0...5.0 m
2 C 110	0...3.0 m
3 PL 50 A	0...3.5 m
4 PL 40 A	0...3.5 m
5 PL 30 A	0...3.0 m
6 PL 20 A	0...2.0 m
7 Reflective tape	0...1.0 m



Order information

Type	Part no.
WL 12-2P 730	1 016 098
WL 12-2P 430	1 016 102
WL 12-2P 130	1 016 096
WL 12-2P 420	1 016 101
WL 12-2P 120	1 016 095
WL 12-2N 730	1 016 088
WL 12-2N 430	1 016 092
WL 12-2N 130	1 016 085
WL 12-2N 420	1 016 091
WL 12-2N 120	1 016 084

Equipment with Teflon-coated housing on request.

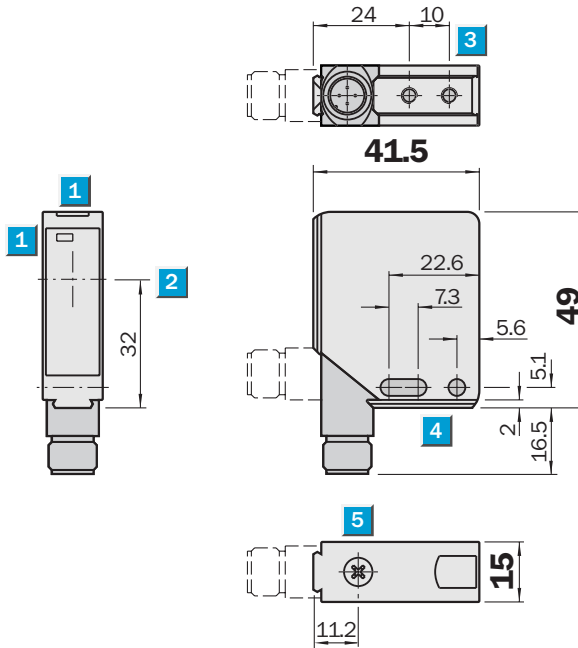

Scanning range
7 m/2 m

Photoelectric reflex switches

- Red light; consequently, fast alignment is possible
- Without polarisation filter
- Insensitive to external light sources, i.e., increased operating reliability
- M 12 plug rotatable by 90°, or 2 m cable
- Adjustable sensitivity; optimum adaptation to application



Dimensional drawing



Adjustments possible

WL 12-2P 480	WL 12-2N 480
WL 12-2P 180	WL 12-2N 180
WL 12-2P 490	WL 12-2N 490
WL 12-2P 190	WL 12-2N 190

- 1** LED signal strength indicator
- 2** Centre of optical axis
- 3** M 4 threaded mounting hole – 4 mm deep
- 4** Mounting holes ϕ 4.2 mm
- 5** Sensitivity adjustment

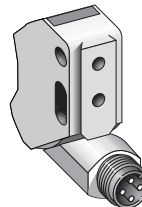
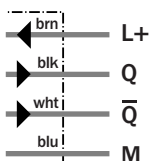


Connection types

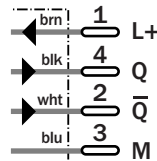
WL 12-2P 180	WL 12-2P 190	WL 12-2P 480	WL 12-2P 490
WL 12-2N 180	WL 12-2N 190	WL 12-2N 480	WL 12-2N 490



4 x 0.25 mm²



4-pin, M 12



Accessories

Connectors
Mounting systems
Clamps*
Reflectors

* 2 pieces included with delivery

Technical data	WL 12-2	P 480	P 180	P 490	P 190	N 480	N 180	N 490	N 190		
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Scanning range

max. typical/on reflector, $f = \infty$	7 m/PL 80 A										
max. typical/on reflector $f = 90$ mm	2 m/PL 80 A										
Sensitivity	adjustable										
Light source¹⁾, light type	LED, red light										
Light spot diameter	80 mm at 3 m 2 mm at 90 mm										
Polarisation filter	Without										
Supply voltage V_s	10 ... 30 V DC ²⁾										
Ripple ³⁾	$\leq 5 V_{SS}$										
Current consumption ⁴⁾	≤ 30 mA ≤ 40 mA										
Switching outputs	PNP, Q u. \bar{Q} NPN, Q u. \bar{Q}										
Output current I_A max.	100 mA										
Response time ⁵⁾	$\leq 330 \mu s$										
Max. switching frequency ⁶⁾	1500/s										
Connection types	Cable ⁷⁾ , 2 m Plug M 12, 4-pin										
VDE protection class⁸⁾	II										
Circuit protection⁹⁾	A, B, C										
Enclosure rating	IP 67										
Ambient temperature T_A	Operation -40 °C... $+60$ °C Storage -40 °C... $+75$ °C										
Weight	With plug: 120 g With cable: 200 g										
Housing material	Zinc die-cast housing										

¹⁾ Average service life 100,000 h at $T_A = +25$ °C

²⁾ Limit values

³⁾ May not exceed or fall short of V_s tolerances

⁴⁾ Without load

⁵⁾ Signal transit time with resistive load

⁶⁾ With light/dark ratio 1:1

⁷⁾ Do not bend below 0 °C

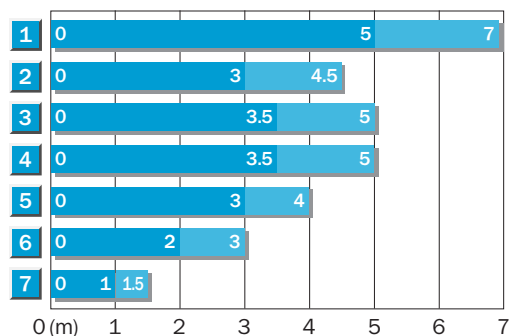
⁸⁾ Reference voltage 50 V DC

⁹⁾ A = V_s connections reverse-polarity protected

B = Output Q and \bar{Q} short-circuit protected

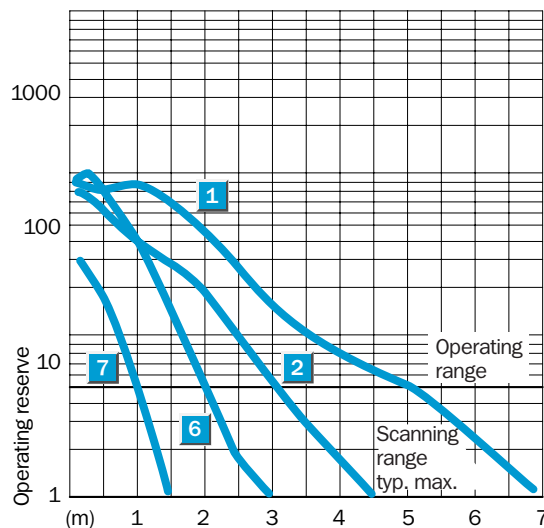
C = Interference pulse suppression

Operating range and operating reserve



■ Operating range ■ Scanning range, max. typical


Reflector type	Operating range
1 PL 80 A	0...5.0 m
2 C 110	0...3.0 m
3 PL 50 A	0...3.5 m
4 PL 40 A	0...3.5 m
5 PL 30 A	0...3.0 m
6 PL 20 A	0...2.0 m
7 Reflective tape	0...1.0 m



Order information

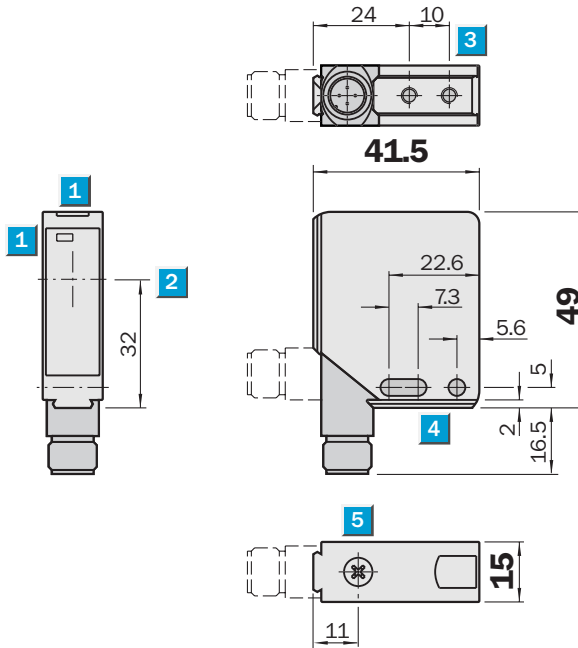
Type	Part no.
WL 12-2P 480	1 016 106
WL 12-2P 180	1 016 099
WL 12-2P 490	1 016 107
WL 12-2P 190	1 016 100
WL 12-2N 480	1 016 093
WL 12-2N 180	1 016 089
WL 12-2N 490	1 016 094
WL 12-2N 190	1 016 090

Equipment with Teflon-coated housing on request.

	Scanning range 7 m
Photoelectric reflex switches	

- Red light; consequently, fast alignment is possible
- Insensitive to external light sources, i.e., increased operating reliability
- M 12 plug rotatable by 90°
- Integrated AS-i chip
- Adjustable sensitivity; optimum adaptation to application

Dimensional drawing



Adjustments possible

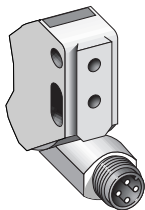
WL 12-2Z 430



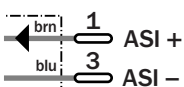
- 1** LED signal strength indicator
- 2** Centre of optical axis
- 3** M 4 threaded mounting hole – 4 mm deep
- 4** Mounting holes \varnothing 4.2 mm
- 5** Sensitivity adjustment

Connection type

WL 12-2Z 430



4-pin, M 12



Accessories
Connectors
Mounting systems
Clamps*
Reflectors
AS-i components

* 2 pieces included with delivery

** Request the Technical Description "AS-i components"!

Technical data	WL 12-2	Z 430																		
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Scanning range

max. typical/on reflector PL 80 A	7 m	
Sensitivity	adjustable	
Light source¹⁾, light type	LED, red light	
Light spot diameter	80 mm at 3 m	
Supply voltage V_s	26.5...31.6 V DC ²⁾	
Ripple ³⁾	≤ 35 mA	
Response time ⁴⁾	≤ 330 μs	
Max. switching frequency ⁵⁾	1500/s	
Pre-failure signalling output	Alarm	
Test input »TE«		
Connection type	M 12 plug, 4-pin	
VDE protection class⁶⁾	□	
Circuit protection⁷⁾	A, C	
Enclosure rating	IP 67	
AS-i profil	S 1.1	
Ambient temperature T_A	Operation - 25 °C...+ 60 °C Storage - 40 °C...+ 75 °C	
Weight	With plug: 120 g	
Polarising filter		
Housing material	Zinc die-cast housing	

¹⁾ Average service life 100,000 h at T_A = + 25 °C
²⁾ Limit values
³⁾ Without load

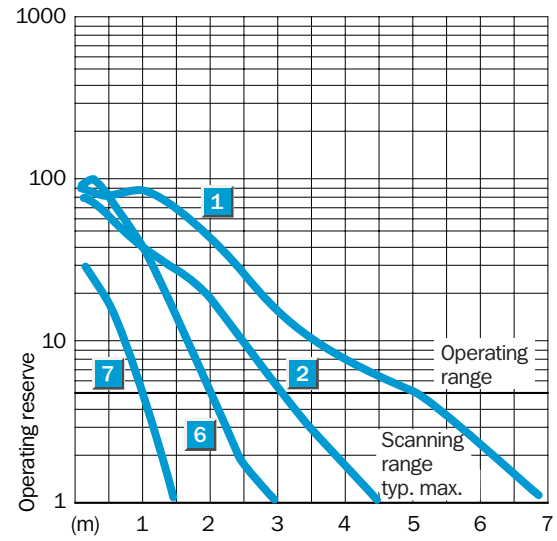
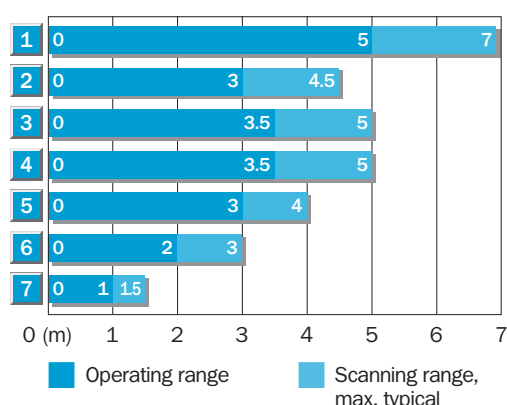
⁴⁾ Signal transit time with resistive load
⁵⁾ With light/dark ratio 1:1
⁶⁾ Reference voltage 50 V DC

⁷⁾ A = V_s connections reverse-polarity protected
 C = Interference pulse suppression

Assignment of data bits (Host level)				Assignment of parameter bits (Host level)			
D ₀	Switching state Mode: light-switching	0 If light interrupted 1 If light received	Input	P ₀ *	NC	0 1	Parameter
D ₁	Alarm	0 Active 1 Inactive	Input	P ₁ *	Light-/dark-switching	0 Dark-switching 1 Light-switching	Parameter
D ₂	NC	0 1	Input	P ₂ *	NC	0 1	Parameter
D ₃	Test function	0 Sender ON 1 Sender OFF	Output	P ₃ *	NC	0 1	Parameter

* Default setting = 1


Scanning range **Order information**



Type	Part no.
WL 12-2Z 430	1 016 108

Equipment with Teflon-coated housing on request.

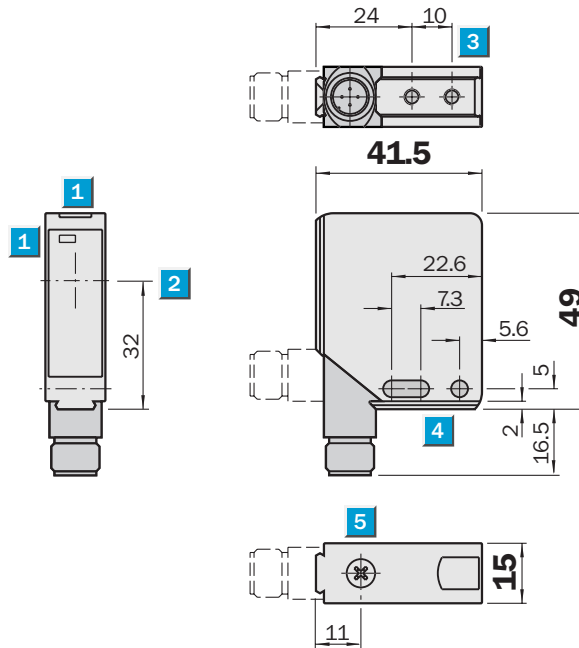
Reflector type	Operating range	
1	PL 80 A	0...5.0 m
2	C 110	0...3.0 m
3	PL 50 A	0...3.5 m
4	PL 40 A	0...3.5 m
5	PL 30 A	0...3.0 m
6	PL 20 A	0...2.0 m
7	Reflective tape	0...1.0 m

 **Scanning range**
2 m

Photoelectric reflex switches

- Red light; consequently, fast alignment is possible
- Reliable detection of transparent objects
- Innovative microprocessor technology allows continuous adaptation of the switching threshold on contamination
- Operating range can be preselected via rotary switch aor external cable

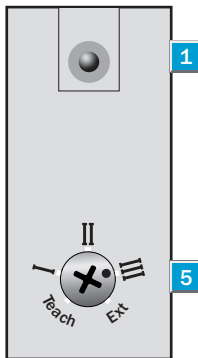
Dimensional drawing



Adjustments possible

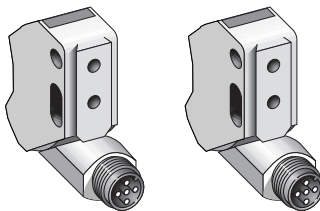
WL 12G-P 530	WL 12G-V 530
WL 12G-N 530	WL 12G-W 530

- 1 LED signal strength indicator
- 2 Centre of optical axis
- 3 M 4 threaded mounting hole – 4 mm deep
- 4 Mounting holes \varnothing 4.2 mm
- 5 Function selector



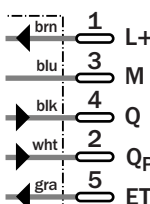
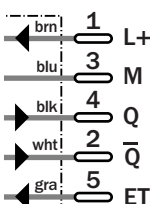
Connection types

WL 12G-P 530	WL 12G-V 530
WL 12G-N 530	WL 12G-W 530



5-pin, M 12

5-pin, M 12



Accessories

Connectors
Mounting systems
Clamps*
Reflectors

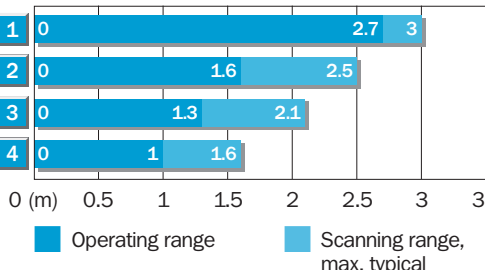
* 2 pieces included with delivery

Technical data		WL 12G-	P 530	N 530	V 530	W 530
Scanning range , max. typical/on refl.	3 m/PL 80 A					
Sensitivity	adjustable					
Light source⁴⁾, light type	LED, red light					
Light spot size	Approx. 8 x 13 at 200 mm					
Supply voltage V_s	10...30 V DC ²⁾					
Ripple ³⁾	$\leq 5 V_{pp}$					
Current consumption ⁴⁾	≤ 65 mA					
Transistor switching outputs	PNP, Q and \bar{Q}					
	NPN, Q and \bar{Q}					
	PNP, Q and plausibility output					
	NPN, Q and plausibility output					
Output current I_A max.	100 mA					
Resp. time ⁵⁾ /max. switching freq. ⁶⁾	≤ 0.5 ms/1000/s					
Operating mode	Light-switching, Q active if light beam to reflector is unbroken					
Plausibility output Q_p						
Reliable detection	Approx. 0 V					
	Approx. $+V_s$					
incorrect setting or severe pollution	$V_s - 2.9$ V					
	Approx. 1.8 V					
Teach input ET						
Teach-in	≥ 10 V to $+V_s$					
Normal operation	< 2 V or open input					
Connection types	M 12 plug, 5-pin					
VDE protection class⁷⁾	<input type="checkbox"/>					
Circuit protection⁸⁾	A, B, C					
Enclosure rating	IP 67					
Ambient temperature T_A	Operation -25 °C... $+60$ °C					
	Storage -40 °C... $+75$ °C					
Weight	With plug: 120 g					
Polarising filter						
Housing material	Zinc die-cast housing					

Operating range setting			Set via rotary switch on device or via ET cable (+ V_s to ET)
Mode I : 50 ms⁹⁾	Mode II : 150 ms⁹⁾	Mode III : 250 ms⁹⁾	
Switches at signal attenuation > 10 %	Switches at signal attenuation > 18 %	Switches at signal attenuation > 40 %	
Clean PET bottles	Clear-glass bottles	Coloured glass or non-transparent objects	

- ¹⁾ Average service life 100,000 h at $T_A = +25$ °C
- ²⁾ Limit values
- ³⁾ May not exceed or fall short of V_s tolerances
- ⁴⁾ Without load
- ⁵⁾ Signal transit time with resistive load
- ⁶⁾ With light/dark ratio 1:1
- ⁷⁾ Reference voltage 50 V DC
- ⁸⁾ A = V_s connections reverse-polarity protected
B = Output Q and \bar{Q} short-circuit protected
C = Interference pulse suppression
- ⁹⁾ Pulse duration via ET (control cable), duration set via rotary switch approx. 2 s

Operating range and operating reserve

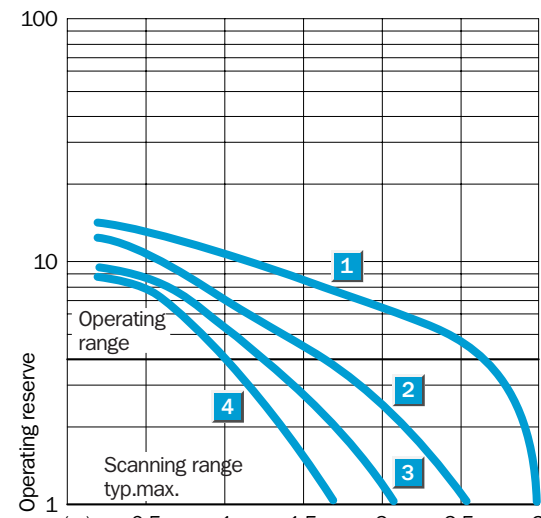


Reflector type	Operating range
1 PL 80 A	0...2.7 m
2 PL 40 A	0...1.6 m
3 PL 30 A	0...1.3 m
4 PL 20 A	0...1.0 m

Order information

Type	Part no.
WL 12G-P 530	1 016 289
WL 12G-N 530	1 016 309
WL 12G-V 530	1 016 310
WL 12G-W 530	1 016 311

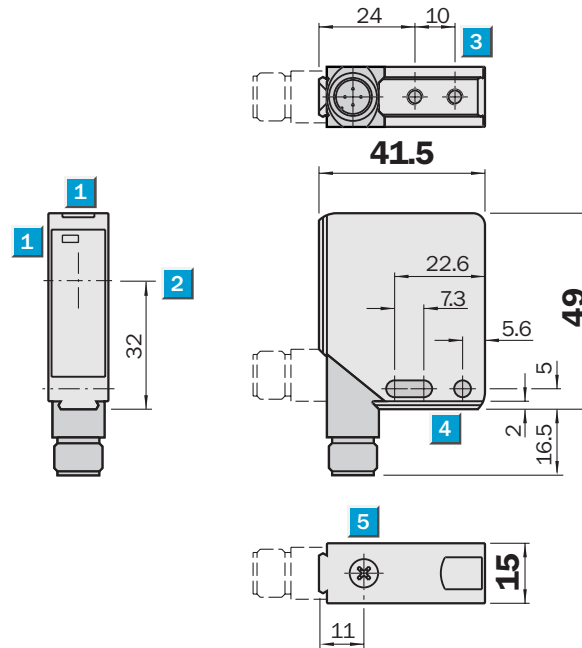
Equipment with Teflon-coated housing on request.



	Scanning range 4 m
Photoelectric reflex switches	

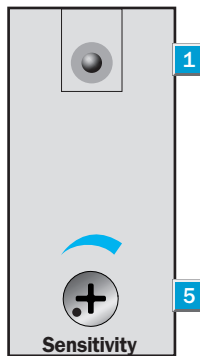
- Red light; consequently, fast alignment is possible
- Insensitive to external light sources, i.e., increased operating reliability
- Detection of glass and transparent films
- Adjustable sensitivity, optimum adaptation to application

Dimensional drawing



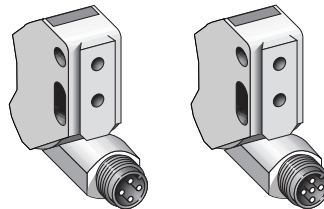
Adjustments possible	
WL 12-2B 560	WL 12-2P 460

- 1** LED signal strength indicator
- 2** Centre of optical axis
- 3** M 4 threaded mounting hole – 4 mm deep
- 4** Mounting holes \varnothing 4.2 mm
- 5** Sensitivity adjustment

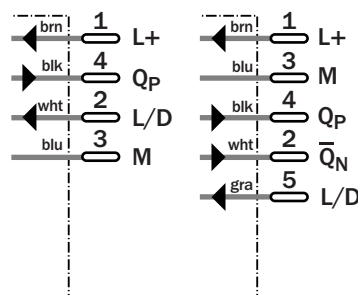


Connection type

WL 12-2P 460	WL 12-2B 560
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4-pin, M 12	5-pin, M 12
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Accessories
Connectors
Mounting systems
Clamps*
Reflectors

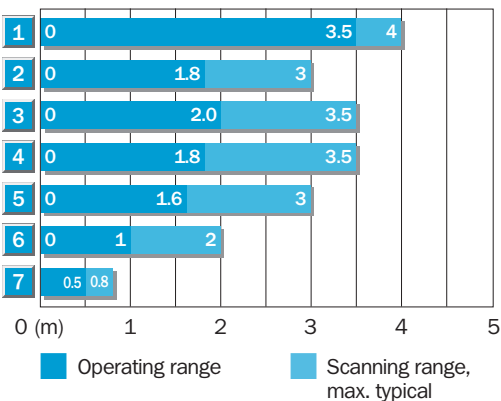
* 2 pieces included with delivery

Technical data	WL 12-2	B 560	P 460											
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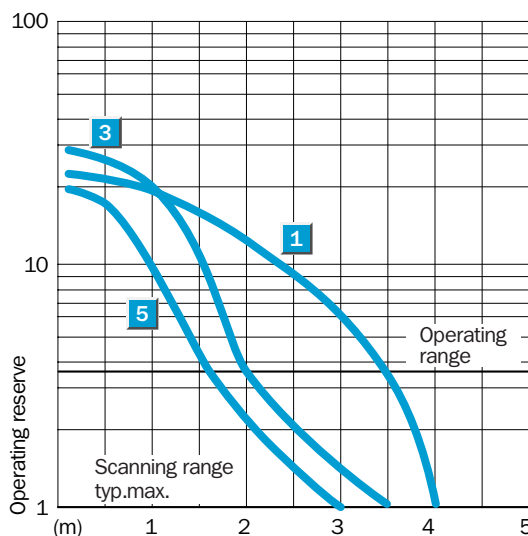
Scanning range , max. typical/on refl.	4 m/PL 80 A		
Sensitivity	adjustable		
Light source¹⁾, light type	LED, red light		
Angle of dispersion	Approx. 1.2°		
Light spot diameter	30 mm at 1.5 m		
Supply voltage V_s	10...30 V DC ²⁾		
Ripple ³⁾	≤ 5 V _{pp}		
Current consumption ⁴⁾	≤ 30 mA		
Switching outputs	Transistor outputs Q _P and Q _N		
	Transistor outputs Q _P		
Output current I _A max.	100 mA		
Response time ⁵⁾	≤ 330 μs		
Max. switching frequency ⁶⁾	1500/s		
Operating mode	Light- or dark-switching		
Control cable L/D	0 V or open-circuited = light-switching		
Control cable L/D	V _s = dark-switching		
Connection type	M 12 plug, 4-pin		
	M 12 plug, 5-pin		
VDE protection class⁷⁾	□		
Circuit protection⁸⁾	A, B, C		
Enclosure rating	IP 67		
Ambient temperature T_A	Operation - 40 °C...+ 60 °C		
	Storage - 40 °C...+ 75 °C		
Weight	With plug: 120 g		
Polarisation filter			
Housing material	Zinc die-cast housing		

- ¹⁾ Average service life 100,000 h at T_A = + 25 °C
- ²⁾ Limit values
- ³⁾ May not exceed or fall short of V_s tolerances
- ⁴⁾ Without load
- ⁵⁾ Signal transit time with resistive load
- ⁶⁾ With light/dark ratio 1:1
- ⁷⁾ Reference voltage 50 V DC
- ⁸⁾ A = V_s connections reverse-polarity protected
 B = Output Q_P and Q_N short-circuit protected
 C = Interference pulse suppression

Operating range and operating reserve



Reflector type	Operating range	
1	PL 80 A	0...3.5 m
2	C 110	0...1.8 m
3	PL 50 A	0...2.0 m
4	PL 40 A	0...1.8 m
5	PL 30 A	0...1.6 m
6	PL 20 A	0...1.0 m
7	Reflective tape	0...0.5 m



Order information

Type	Part no.
WL 12-2B 560	1 016 080
WL 12-2P 460	1 016 105

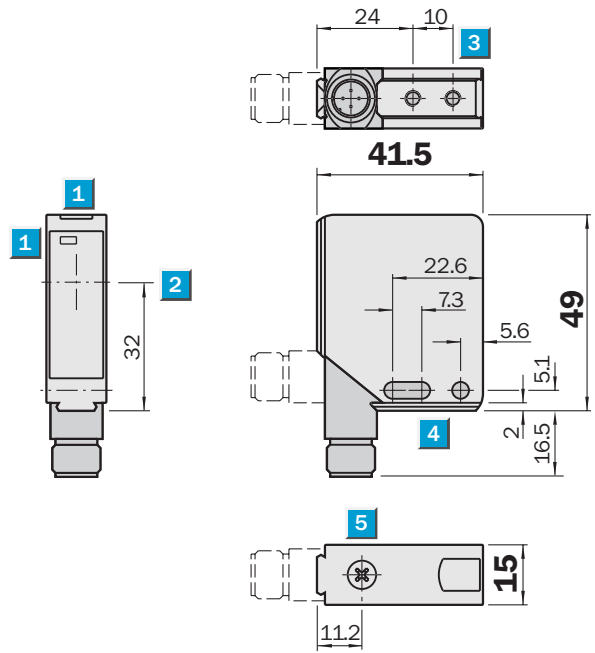
Equipment with Teflon-coated housing on request.

Scanning range
20 m

Through-beam photoelectric switches

- Red light; consequently, fast alignment is possible
- Insensitive to external light sources, i.e., increased operating reliability
- M 12 plug rotatable by 90°, or 2 m cable
- Adjustable sensitivity; optimum adaptation to application

Dimensional drawing



Adjustments possible

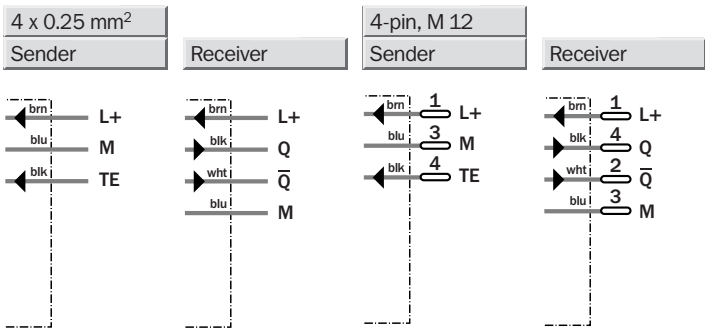
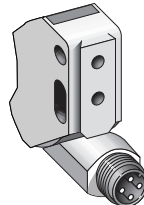
WS/WE 12-2P 430	WS/WE 12-2N 430
WS/WE 12-2P 130	WS/WE 12-2N 130

- 1 LED signal strength indicator
- 2 Centre of optical axis
- 3 M 4 threaded mounting hole – 4 mm deep
- 4 Mounting holes \varnothing 4.2 mm
- 5 Sensitivity adjustments



Connection types

WS/WE 12-2P 130	WS/WE 12-2P 430
WS/WE 12-2N 130	WS/WE 12-2N 430



Accessories

Connectors
Mounting systems
Clamps*
Masks

* 2 pieces included with delivery

Technical data		WS/WE 12-2	P 430	P 130	N 430	N 130
Scanning range , max. typical	20 m					
with 2 mm mask	2 m					
with 1.5 mm mask	1.5 m					
with 1 mm mask	1 m					
with 0.5 mm mask	0.5 mm					
Sensitivity	adjustable					
Light source¹⁾, light type	LED, red light					
Light spot diameter	Approx. 500 mm at 15 m					
Angle of dispersion	1.5°					
Supply voltage V_s	10...30 V DC ²⁾					
Ripple ³⁾	≤ 5 V _{pp}					
Current consumption⁴⁾						
sender	≤ 30 mA					
receiver	≤ 15 mA					
receiver	≤ 25 mA					
Switching output	PNP, Q and \bar{Q}					
	NPN, Q and \bar{Q}					
Output current I _A max.	100 mA					
Response time ⁵⁾	≤ 330 μs					
Max. switching frequency ⁶⁾	1500/s					
Test input "TE" for sender						
Sender OFF	TE to 0 V					
Connection types	M 12 plug, 4-pin					
	Cable ⁷⁾ , 2 m					
VDE protection class⁸⁾	□					
Circuit protection⁹⁾	A, B, C					
Enclosure rating	IP 67					
Ambient temperature T_A	Operation - 40 °C...+ 60 °C					
	Storage - 40 °C...+ 75 °C					
Weight	With plug: 120 g					
	With cable: 200 g					
Housing material	Zinc die-cast housing					

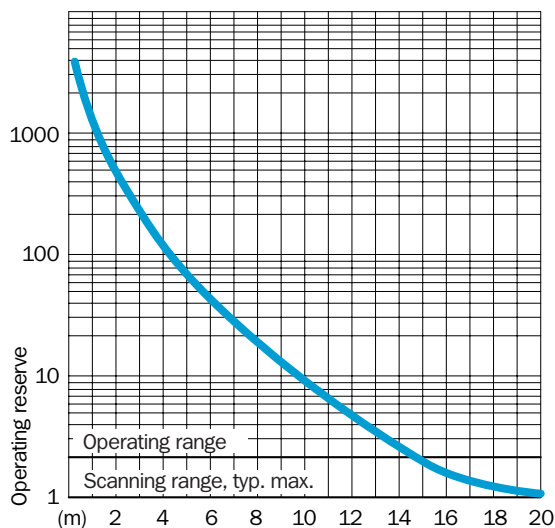
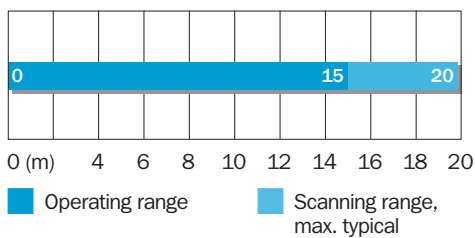
¹⁾ Average service life 100,000 h at T_A = + 25 °C
²⁾ Limit values

³⁾ May not exceed or fall short of V_s tolerances
⁴⁾ Without load

⁵⁾ Signal transit time with resistive load
⁶⁾ With light/dark ratio 1:1
⁷⁾ Do not bend below 0 °C
⁸⁾ Reference voltage 50 V DC

⁹⁾ A = V_s connections reverse-polarity protected
 B = Output Q and \bar{Q} short-circuit protected
 C = Interference pulse suppression



Scanning range



Order information

Type	Part no.
WS/WE 12-2P430	1 016 157
WS/WE 12-2P130	1 016 156
WS/WE 12-2N430	1 016 155
WS/WE 12-2N130	1 016 154

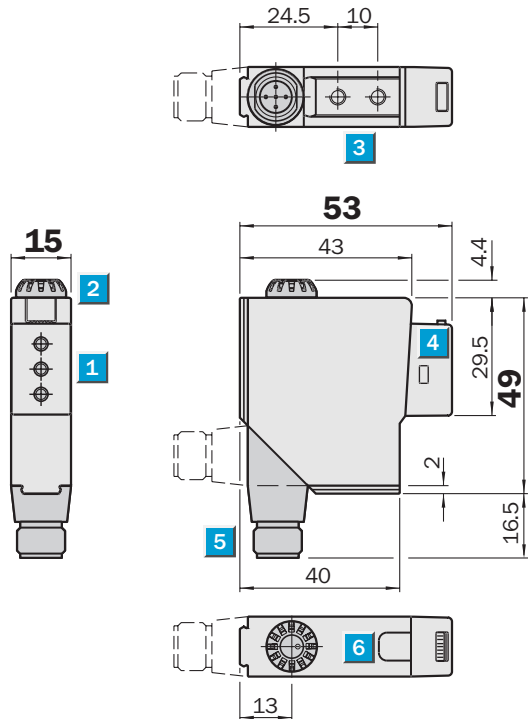
Equipment with Teflon-coated housing on request.

	Scanning range up to 550 mm
Through-beam systems	
	Scanning distance up to 50 mm
Proximity systems	

- Red, infrared or green light; consequently multifaceted application possibilities
- Plug-in fibre-optic cables
- Switch-selectable light-/dark-switching
- Adjustable sensitivity, optimum adaptation to application



Dimensional drawing

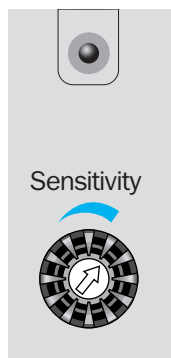


AD adapter* for		
Fibre-optic	Type	Part no.
LL 3-...	AD-LL-1M0	2 015 026
∅ (1.0 mm)		
LL 3-...	AD-LL-2M2	2 015 210
∅ (2.2 mm)		
LM/LT-...	AD-LL-GF	2 015 034
LH10-1000	AD-LL-HGA	2 015 033

* not included with delivery

Adjustments possible

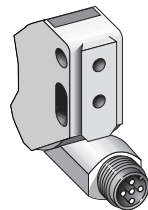
All types



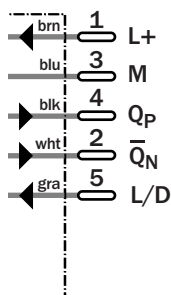
- 1 Connector for fibre-optic cable
- 2 Sensitivity control
- 3 M4 threaded mounting hole – 4 mm deep
- 4 Adapter
- 5 Plug not rotatable. Plug facing backwards on request
- 6 LED signal strength indicator

Connection type

All types



5-pin, M 12



Accessories
Connectors
Mounting systems
Clamps*
Fibre-optic cables

* 2 pieces included with delivery



Technical data		WLL 12-	B5181	B5281	B5381	B5481					
Scanning distance/ scanning range, max.	50/550 mm										
Fibre-optic cable											
Sensitivity	adjustable										
Scanning distance ¹⁾	10 mm ± 1 mm, fixed										
Background suppression											
Light source ²⁾ , light type	LED, red light ³⁾ Infrared light ⁴⁾ Green light ⁵⁾										
Supply voltage V _s	10...30 V DC ⁶⁾										
Ripple ⁷⁾	≤ 5 V _{pp}										
Current consumption ⁸⁾	≤ 35 mA										
Switching outputs	PNP: Q/NPN: Q										
Output current I _A max.	100 mA										
Switching cycles	1300/s										
Response time ⁹⁾	360 μs										
Max. switching frequency ¹⁰⁾	1300/s										
Control input L/D	Light-/dark-switching										
Connection type	Plug M 12, 5-pin Plug facing downwards ¹¹⁾										
VDE protection class ¹²⁾	□										
Circuit protection ¹³⁾	A, B, C										
Enclosure rating	IP 67										
Ambient temperature T _A	Operation - 25 °C...+ 55 °C Storage - 25 °C...+ 70 °C										
Weight	Approx. 130 g										
Housing material	Zinc die-cast housing										

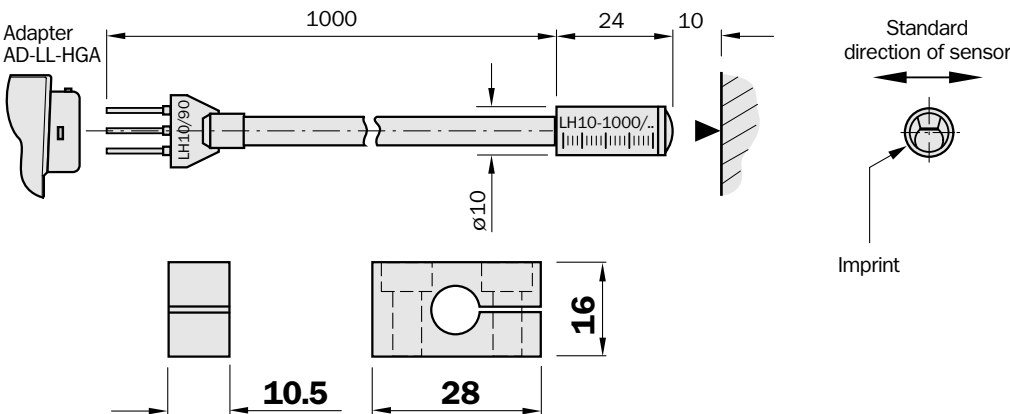
1) With LH 10-1000 fibre-optic cable
 2) Average service life 100,000 h at T_A = + 25 °C
 3) Preferably LL 3 fibre-optic cable
 4) Preferably LM/LT fibre-optic cable

5) Preferably contrast detection
 6) Limit values
 7) May not exceed or fall short of V_s tolerances
 8) Without load

9) Signal transit time with resistive load
 10) With light/dark ratio 1:1
 11) Plug facing backwards on request
 12) Reference voltage 50 V DC

13) A = V_s connections reverse-polarity protected
 B = Output Q and Q̄ short-circuit protected
 C = Interference pulse suppression

Proximity system with background suppression, WLL 12-B 5481 with LH 10-1000 fibre-optic cable



Order information	
Type	Part no.
WLL 12-B 5181	1 011 677
WLL 12-B 5281	1 011 687
WLL 12-B 5381	1 011 688
WLL 12-B 5481	1 011 965
LH 10-1000	2 015 692
AD-LL-HGA	2 015 033
Bracket	4 028 164

Scanning distance:	10 mm (-1 mm), fixed
Light spot diameter:	approx. 2.5 x 3.5 mm
Switching hysteresis:	≤ 0.3 mm, based on standard white 90 % to standard black 6 %



Features

- Highly flexible
- Small bend radii
- Most fibre-optic cables can easily be cut to length using cutter FC⁸⁾ (supplied)
- Operating temperature - 40 ... + 70 °C, special designs up to 180 °C



Selection table: sensors, fibre-optic cables, scanning ranges

Proximity Systems

LL 3 Fibre-optic cables

Description	Bend radius mm	Type	Part no.	Scanning distance SD ¹⁾ and minimum target diameter MD ⁷⁾ in mm in combination with sensor type				
				Adapter for WLL 12-2 AD-LL-	WLL 12-2 Red light		WLL 12-2 Infra-red light	
					SD	MD	SD	MD
Compact sleeve, M 4, long scanning range	25	LL 3-DM 01	5 308 071	●				
Super compact, sleeve 2.5 mm diameter	15	LL 3-DT 03	5 308 072	●				
Super compact, sleeve M 3	10	LL 3-DS 06	5 308 073	●				
Long scanning range, M 6, coaxial fibre-optic cable	25	LL 3-DB 01	5 308 074	2M2	30	0.02	12	0.02
10 m length, M 6, coaxial fibre-optic cable	25	LL 3-DB 01-10	5 308 075	●				
For front lenses, M 3	15	LL 3-DT 01	5 308 076	●				
Thin, short sleeve, M 4, coaxial fibre-optic cable	25	LL 3-DM 02	5 308 077	●				
Highly flexible, M 6, long scanning range	4	LL 3-DR 01	5 308 078	2M2	40	0.02	8	0.02
Highly flexible, small sleeve, M 3	4	LL 3-DR 02	5 308 079	●				
Highly flexible, 3 mm diameter, thin sleeve	4	LL 3-DR 03	5 308 080	●				
Highly flexible, 1.5 mm diameter, thin sleeve	4	LL 3-DR 04 ⁴⁾	5 308 081	2M2	4	0.02		
Highly flexible, M 4, compact sleeve	4	LL 3-DR 06	5 308 082	●				
Supple sleeve, M 6, long scanning ranges	25/10 ³⁾	LL 3-DB 02	5 308 083	●				
Supple sleeve, M 4	25/10 ³⁾	LL 3-DM 03	5 308 084	●				
Thin long tip, M 3	15	LL 3-DT 02	5 308 085	●				
Thin long tip, M 3, coaxial fibre-optic cable	15	LL 3-DT 04 ⁴⁾	5 308 086	2M2	6	0.02		
diameter 3.0 mm, thin tip, 0.82 mm diameter	4	LL 3-DR 05 ⁴⁾	5 308 087	2M2	4	0.02		
90° offset, 5.0 mm diameter	25	LL 3-DV 01	5 308 088	●				
90° offset, small sleeve, 3.0 mm diameter	15	LL 3-DV 02	5 308 089	●				
90° offset, M 6	25	LL 3-DV 03	5 308 090	2M2	20	0.03		
Temperature resistant to 180 °C, M 6, long scanning range	30	LL 3-DH 01 ⁵⁾	5 308 091	2M2	50	0.02	15	0.02
Temperature resistant to 100 °C, M 6	25	LL 3-DH 02 ⁶⁾	5 308 092	●				
Teflon sheath, resistant to chemicals, 6.0 mm diameter	40	LL 3-DY 01	5 308 093	●				
Level switch, clear liquid, 6.0 mm diameter	50	LL 3-DF 01	5 308 094	●				
Level switch, cloudy liquid, 6.0 mm diameter	50	LL 3-DF 02	5 308 095	●				

¹⁾ For white scanned object, 90 % remission, minimum object diameter = size of light (aperture LL: approx. 65°) fibre-optic cable not shortened

²⁾ With scanning front lens for LL 3, see front lenses for LL 3

³⁾ Bend radius of the supple end sleeve

⁴⁾ Cannot be cut

⁵⁾ Ambient operating temperature - 40 ... + 180 °C

⁶⁾ Ambient operating temperature - 40 ... + 100 °C

⁷⁾ Minimum object diameter: scanning range reduction!

⁸⁾ Cutter FC see page 30

● not available

Adaptor for WLL 12-2		
Type	Part no.	LL-φ
AD-LL 2M2	2 015 210	2.2 mm

Fibre-optic cable Through-beam systems



Features

- Highly flexible
- Small bend radii
- Most fibre-optic cables can be easily cut to length using cutter FC⁷⁾ (supplied)
- Operating temperature – 40 ... +70 °C, special designs up to 180 °C

Selection table: sensors, fibre-optic cables, scanning ranges

Through-beam systems

LL 3 Fibre-optic cables

Scanning range SR¹⁾ and minimum target diameter MD⁶⁾ in mm in combination with sensor type

Description	Bend radius mm	Type	Part no.	Adaptor for WLL 12-2 AD-LL-		WLL 12-2 Red Light		WLL 12-2 Infra-red light	
						SR	MD	SR	MD
Standard M 4	25	LL 3-TB 02	5 308 048	2M2	120	0.2	25	0.2	
Standard, 3 mm diameter, long range	35	LL 3-TS 07	5 308 049	2M2	180	0.5	45	0.5	
Standard, M 4, long range	25	LL 3-TB 01	5 308 050	2M2	180	0.5	45	0.5	
Standard, M 4, length 10 m	25	LL 3-TB 01-10	5 308 051	2M2	70	0.5	25	0.5	
Highly flexible, M 4, long range	4	LL 3-TR 01	5 308 052	2M2	110	0.3	25	0.3	
Highly flexible, M 3	4	LL 3-TR 02	5 308 053	1M0	25	0.2	4	0.2	
Small sleeve, 1.5 mm diameter, highly flexible, length 1 m	4	LL 3-TR 03	5 308 054	●	●	●	●	●	
Small sleeve, 1.5 mm diameter, highly flexible, length 2 m	4	LL 3-TR 03-2	5 308 055	●	●	●	●	●	
Flexible end sleeve, M 4	25/10 ³⁾	LL 3-TB 03	5 308 056	●	●	●	●	●	
Compact, M 3, end piece 1.0 mm diameter	15	LL 3-TT 01	5 308 057	●	●	●	●	●	
90° offset, standard, 3 mm diameter	25	LL 3-TV 01	5 308 058	●	●	●	●	●	
90° offset, compact, 2.5 mm diameter	15	LL 3-TV 02	5 308 059	●	●	●	●	●	
90° offset, compact, M 3	15	LL 3-TV 04	5 308 060	●	●	●	●	●	
90° offset, standard, 3 mm diameter	25	LL 3-TS 08	5 308 061	2M2	60	0.2	10	0.2	
90° offset, long range	25	LL 3-TS 12	5 308 062	2M2	400	0.5	●	●	
Fibre-optic cable cell	25	LL 3-TS 10	5 308 063	2M2	75	1.0	20	1.0	
Temperature-resistant, M 4	25	LL 3-TH 01 ⁴⁾	5 308 064	2M2	70	0.2	15	0.2	
Temperature-resistant up to 180 °C, M 4	30	LL 3-TH 02 ⁵⁾	5 308 065	2M2	160	0.5	30	0.5	
Teflon sheath, 6.0 mm diameter, chemically resistant	40	LL 3-TY 01	5 308 066	2M2	620	0.8	70	0.8	
Teflon sheath, 6.0 mm diameter, chemically resistant	40	LL 3-TY 02	5 308 067	2M2	160	0.5	25	0.5	
90° offset									
Small end sleeve, M 3, long range	25	LL 3-TM 01	5 308 068	●	●	●	●	●	
Small end sleeve M 3	15	LL 3-TM 02	5 308 069	1M0	30	0.2	4	0.2	
Small end sleeve, 1.5 mm diameter	15	LL 3-TM 03	5 308 070	●	●	●	●	●	

¹⁾ Fibre-optic cable not shortened
²⁾ With scanning front lens for LL 3, see front lenses for LL 3
³⁾ Bend radius of the supple end sleeve
⁴⁾ Ambient operating temperature – 40 ... +100 °C
⁵⁾ Ambient operating temperature – 40 ... +180 °C
⁶⁾ Minimum object diameter: scanning range reduction!
⁷⁾ Cutter FC see page 30

● not available

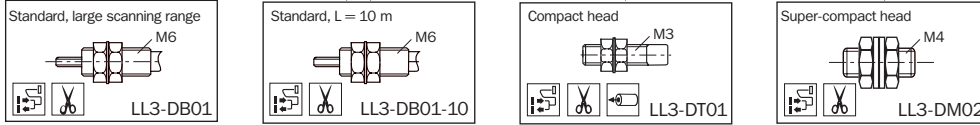
Adaptor for WLL 12-2		
Type	Part no.	LL-φ
AD-LL 1M0	2 015 026	1.0 mm
AD-LL 2M2	2 015 210	2.2 mm

Flow chart – selection of fibre-optic cables

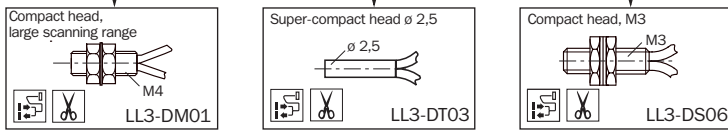
Proximity systems

Coaxial structure for precise switching

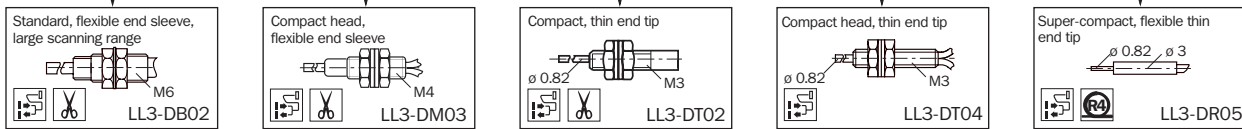
Fibre-optic cable length 10 m



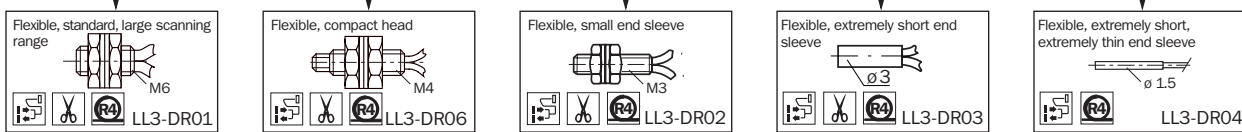
Compact end sleeve, excellent scanning ranges



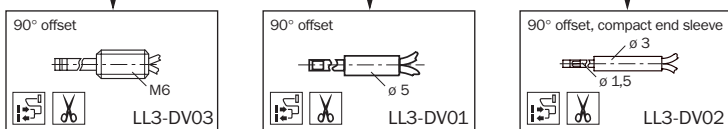
Thin end sleeves, long, very thin and flexible end tips: ideal for small, inaccessible objects



Extremely flexible fibre-optic cable, bend radius R4, for dynamic mechanical systems



Integrated 90° offset, extremely short installation depths

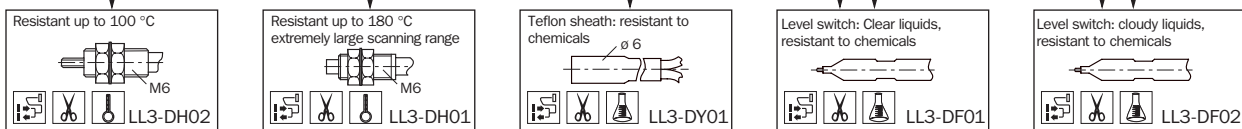


Special applications:

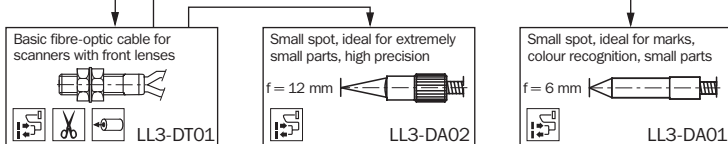
Level switches

Chemicals

High temperature

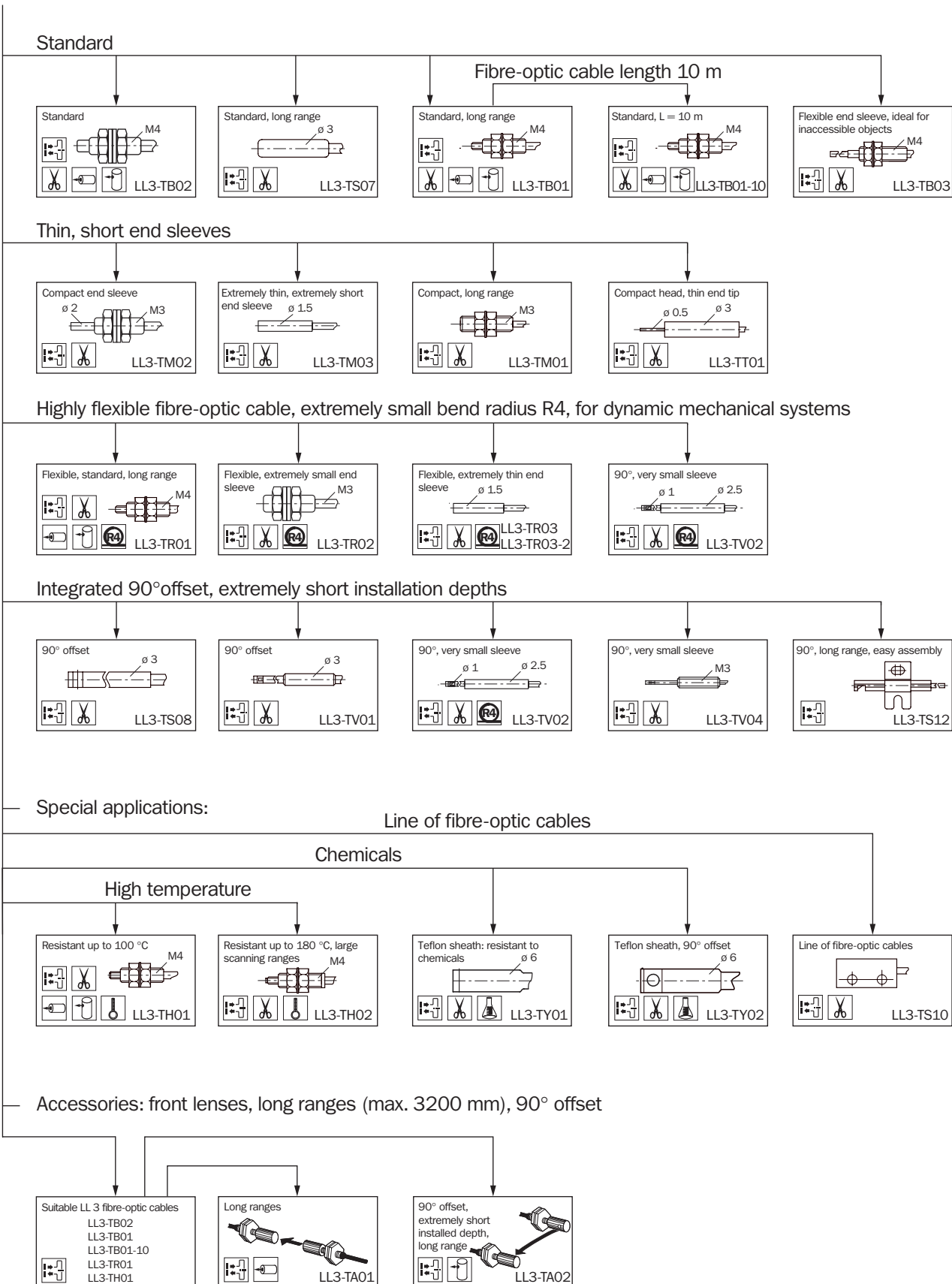


Accessories: lenses at the front with focused optics



Flow chart – selection of fibre-optic cables

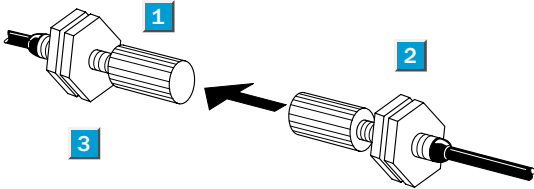
Through-beam systems



Front lenses for through-beam systems

■ Long ranges

- 1 Light spot diameter: approx. 170 mm at 1000 mm
- 2 Aperture approx. 15°
- 3 Material: CuZn (nickel-plated)/glass

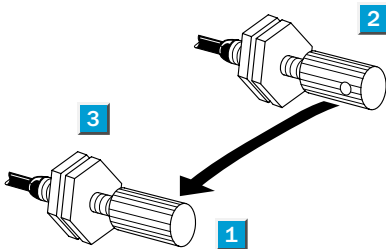


Order information	
Type	Part no.
LL 3-TA01	5 308 128

Front lenses for through-beam systems

■ Compact 90° offset

- 1 Light spot diameter: X-axis approx. 110 mm
Y-axis: approx. 170 mm, for 200 mm range in each case
- 2 Aperture, X-axis approx. 30°, Y-axis: approx. 40°
- 3 Material: CuZn (nickel-plated)/glass

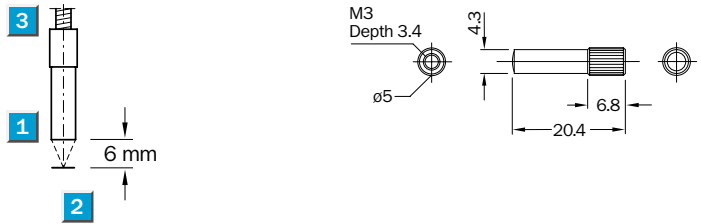


Order information	
Type	Part no.
LL 3-TA02	5 308 129

Front lenses for proximity systems

- For detection of very small parts
- Focused, very small light spot diameter
- High sensitivity (6 % remission)
- For suppressing interference – causing backgrounds

- 1 Light spot diameter: approx. 0.25 mm at the focal point = 6 mm
- 2 Aperture: focus = 6 mm
- 3 Material: Al (aluminium)/glass

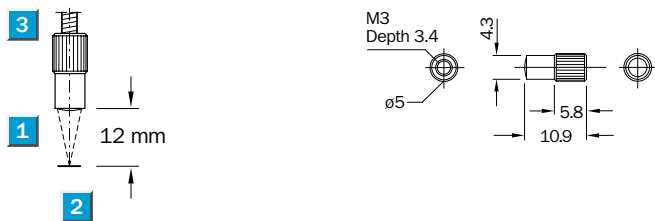


Order information	
Type	Part no.
LL 3-DA01	5 308 127

Front lenses for proximity systems

- Suitable as a “mark sensor” for colour marks
- Focused, very small light spot diameter
- High sensitivity (6 % remission)
- For suppressing interference – causing backgrounds

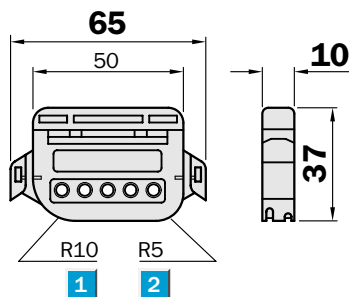
- 1 Light spot diameter approx. 3 mm at the focal point = 12 mm
- 2 Aperture: focus = 12 mm
- 3 Material: Al (aluminium)/glass



Order information	
Type	Part no.
LL 3-DA02	5 308 130

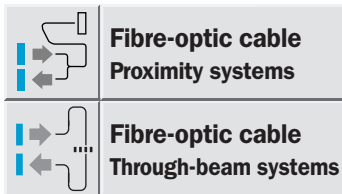
Cutter FC[®] for fibre-optic cables

Type	Part no.
FC	5 304 141



- 1 Template for bending radius R 10 mm, for sensing tip ϕ 1.5 mm and ϕ 2.5 mm
- 2 Bending radius R 5 mm

* Supplied with fibre optic cable for cutting it to length



Features

- Robust glass fiber-fiber optic cable within a helical metal spring
- Operating temperature for chrome-plated helical metal spring - 25... + 250 °C
Operating temperature for helical metal spring with PVC sheath - 10... + 60 °C
- Minimum bend radius 20 mm

Selection table: sensors, fibre-optic cables, scanning distance/range

Fibre-optic cables, proximity systems

Scanning distance in mm with photoelectric switches

Description	Type	Part no.	WLL 12-B 5181			WLL 12-B 5281			WLL 12-B 5381		
			1	2	4	1	2	4	1	2	3
			Red light			Infrared light			Green light		
150 mm	LM 31-150	2 015 225	50	12	280	60	20	280	5	2	60
450 mm	LM 31-450	2 015 223	50	12	280	60	20	280	5	2	60
750 mm	LM 31-750	2 015 224	50	12	280	60	20	280	5	2	60
1500 mm	LM 31-1500	2 017 381	50	12	280	60	20	280	5	2	60
150 mm, with rectangular light outlet	LM 35-150	2 015 226	50	12	280	60	20	280	5	2	60
450 mm, with rectangular light outlet	LM 35-450	2 015 230	50	12	280	60	20	280	5	2	60
750 mm, with rectangular light outlet	LM 35-750	2 015 231	50	12	280	60	20	280	5	2	60
150 mm, with 90° offset head with rectangular light outlet	LM 36-150	2 015 232	50	12	280	60	20	280	5	2	60
450 mm, with 90° offset head with rectangular light outlet	LM 36-450	2 015 233	50	12	280	60	20	280	5	2	60
750 mm, with 90° offset head with rectangular light outlet	LM 36-750	2 015 234	50	12	280	60	20	280	5	2	60
1000 mm, with 90° offset head with rectangular light outlet	LM 36-1000	2 016 772	50	12	280	60	20	280	5	2	60
1250 mm, with 90° offset head with rectangular light outlet	LM 36-1250	2 016 792	50	12	280	60	20	280	5	2	60
150 mm, as LM 36, but with light outlet turned 90°	LM 37-150	2 015 235	50	12	280	60	20	280	5	2	60
450 mm, as LM 36, but with light outlet turned 90°	LM 37-450	2 015 236	50	12	280	60	20	280	5	2	60
750 mm, as LM 36, but with light outlet turned 90°	LM 37-750	2 015 237	50	12	280	60	20	280	5	2	60
450 mm, up to 250 °C	LT 31-450	2 015 227	50	12	280	60	20	280	5	2	60
750 mm, up to 250 °C	LT 31-750	2 015 228	50	12	280	60	20	280	5	2	60
2200 mm, up to 250 °C	LT 31-2200	2 017 871	50	12	280	60	20	280	5	2	60

Fibre-optic cables, through-beam systems

Scanning range in mm with photoelectric switches

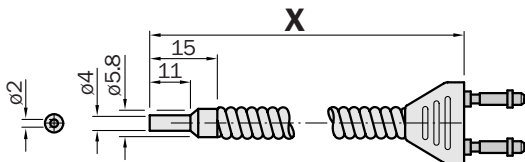
Description	Type	Part no.	WLL 12-B 5181			WLL 12-B 5281			WLL 12-B 5381		
			Red light			Infrared light			Green light		
			450 mm	LM 32-450	2 014 850	200			300		
750 mm	LM 32-750	2 015 038	200			300			20		
150 mm, with 90° offset head	LM 38-150	2 016 788	200			300			20		
450 mm, with 90° offset head	LM 38-450	2 015 049	200			300			20		
750 mm, with 90° offset head	LM 38-750	2 015 050	200			300			20		
750 mm, with 90° offset head and front lens	LM 38-751	2 015 970	330			550			32		
450 mm, as LM 38, but with light outlet turned 90°	LM 39-450	2 015 047	200			300			20		
750 mm, as LM 38, but with light outlet turned 90°	LM 39-750	2 015 048	200			300			20		
450 mm, up to 250 °C	LT 32-450	2 015 072	200			300			20		
750 mm, up to 250 °C	LT 32-750	2 015 073	200			300			20		

- 1 With reference to standard white, 90 % remission
- 2 With reference to standard grey, 18 % remission
- 3 With reference to standard black, 6 % remission
- 4 On "diamond grade" reflective tape

Dimensional drawings and order information

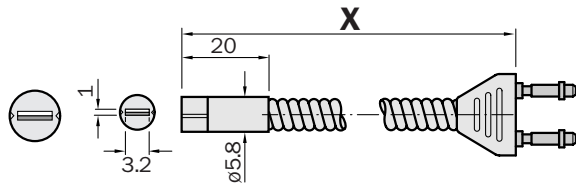
LM 31 Fibre-optic cables, helical metal spring with PVC sheath

Type	Part no.	Length X
LM 31-150	2 015 225	150 mm
LM 31-450	2 015 223	450 mm
LM 31-750	2 015 224	750 mm
LM 31-1500	2 017 381	1500 mm



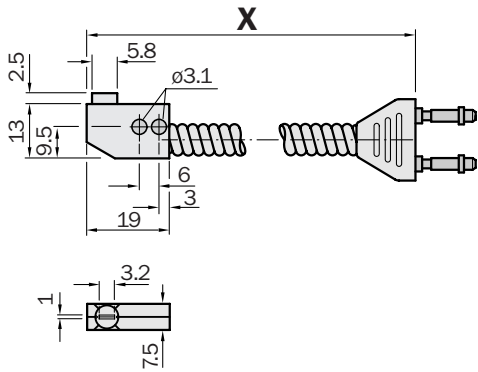
LM 35 Fibre-optic cables, helical metal spring with PVC sheath

Type	Part no.	Length X
LM 35-150	2 015 226	150 mm
LM 35-450	2 015 230	450 mm
LM 35-750	2 015 231	750 mm



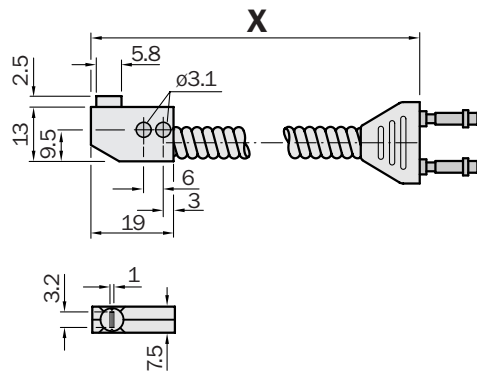
LM 36 Fibre-optic cables, helical metal spring with PVC sheath

Type	Part no.	Length X
LM 36-150	2 015 232	150 mm
LM 36-450	2 015 233	450 mm
LM 36-750	2 015 234	750 mm
LM 36-1000	2 016 772	1000 mm
LM 36-1250	2 016 792	1250 mm



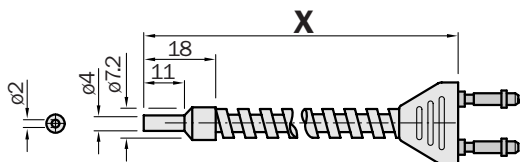
LM 37 Fibre-optic cables, helical metal spring with PVC sheath

Type	Part no.	Length X
LM 37-150	2 015 235	150 mm
LM 37-450	2 015 236	450 mm
LM 37-750	2 015 237	750 mm



LT 31 Fibre-optic cables, helical metal spring, chrome-plated

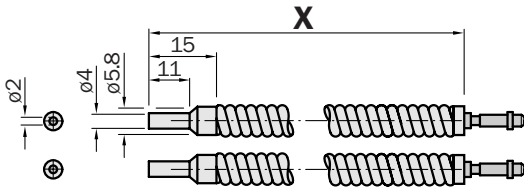
Type	Part no.	Length X
LT 31-450	2 015 227	450 mm
LT 31-750	2 015 228	750 mm
LT 31-2200	2 017 871	2200 mm



Dimensional drawings and order information

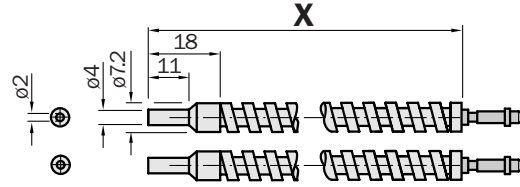
LM 32 Fibre-optic cables, helical metal spring with PVC sheath

Type	Part no.	Length X
LM 32-450	2 014 850	450 mm
LM 32-750	2 015 038	750 mm



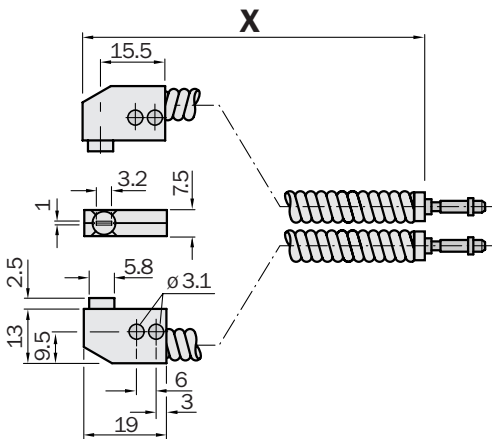
LT 32 Fibre-optic cables, helical metal spring, chrome-plated

Type	Part no.	Length X
LT 32-450	2 015 072	450 mm
LT 32-750	2 015 073	750 mm



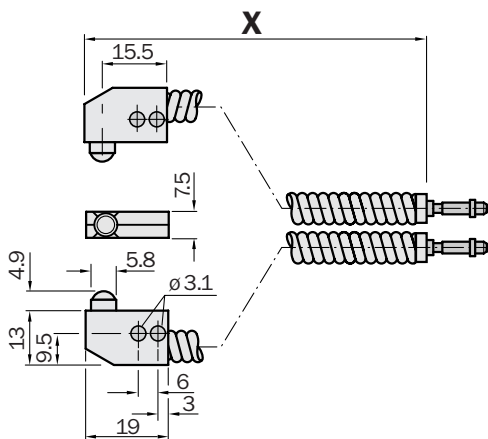
LM 38 Fibre-optic cables, helical metal spring with PVC sheath

Type	Part no.	Length X
LM 38-150	2 015 788	150 mm
LM 38-450	2 015 049	450 mm
LM 38-750	2 015 050	750 mm



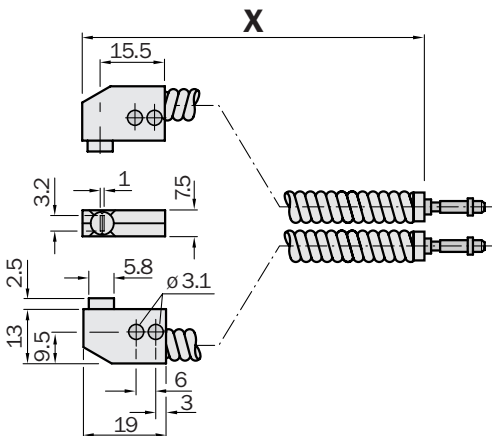
LM 38 Fibre-optic cables, with front lens, helical metal spring w. PVC sheath

Type	Part no.	Length X
LM 38-751	2 015 970	750 mm



LM 39 Fibre-optic cables, helical metal spring with PVC sheath

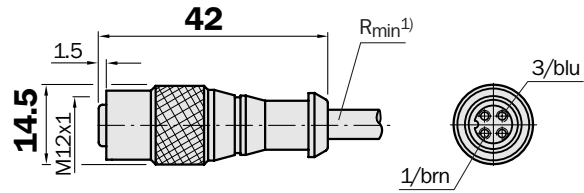
Type	Part no.	Length X
LM 39-450	2 015 047	450 mm
LM 39-750	2 015 048	750 mm



Dimensional drawings and order information

SENSICK screw-in system M 12, 2-pin, enclosure rating IP 67

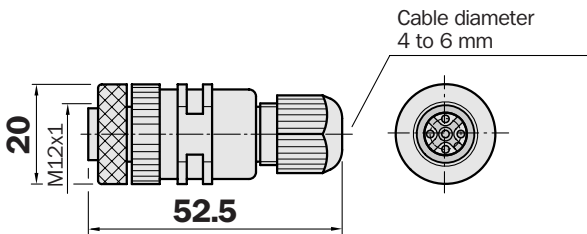
Female cable connector M 12, 2-pin, straight		
Cable diameter 4.5 mm, 2 x 0.34 mm ² , sheath PVC		
Type	Part no.	Cable length
DOL-1202-G02M	6 010 728	2 m



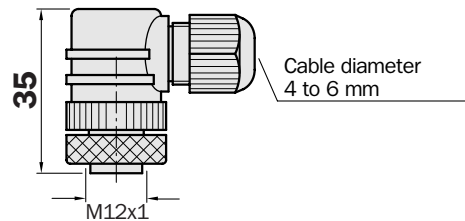
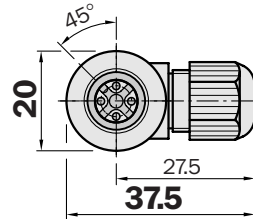
¹⁾ Minimum bend radius in dynamic use
 $R_{min} = 20 \times \text{cable diameter}$

SENSICK screw-in system M 12, 4- or 5-pin, enclosure rating IP 67

Female connector M 12, 4- or 5-pin, straight		
Type	Part no.	Contacts
DOS-1204-G	6 007 302	4
DOS-1205-G	6 009 719	5

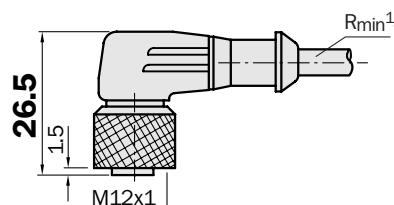
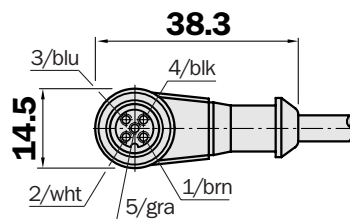
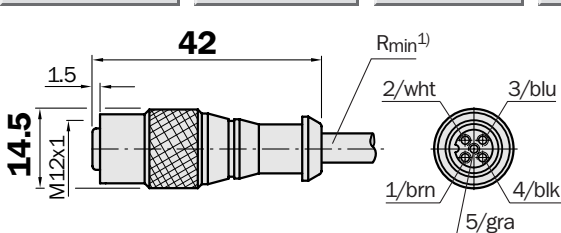


Female connector M 12, 4- or 5-pin, right angle		
Type	Part no.	Contacts
DOS-1204-W	6 007 303	4
DOS-1205-W	6 009 720	5



Female connector M 12, 4- or 5-pin, straight			
Cable diameter 5/6 mm, 4/5 x 0.25 mm ² , sheath PVC			
Type	Part no.	Contacts	Cable length
DOL-1204-G02M	6 009 382	4	2 m
DOL-1204-G05M	6 009 866	4	5 m
DOL-1204-G10M	6 010 543	4	10 m
DOL-1204-G15M	6 010 753	4	15 m
DOL-1205-G02M	6 008 899	5	2 m
DOL-1205-G05M	6 009 868	5	5 m
DOL-1205-G10M	6 010 544	5	10 m

Female connector M 12, 4- or 5-pin, right angle			
Cable diameter 5/6 mm, 4/5 x 0.25 mm ² , sheath PVC			
Type	Part no.	Contacts	Cable length
DOL-1204-W02M	6 009 383	4	2 m
DOL-1204-W05M	6 009 867	4	5 m
DOL-1204-W10M	6 010 541	4	10 m
DOL-1205-W02M	6 008 900	5	2 m
DOL-1205-W05M	6 009 869	5	5 m
DOL-1205-W10M	6 010 542	5	10 m



¹⁾ Minimum bend radius in dynamic use
 $R_{min} = 20 \times \text{cable diameter}$

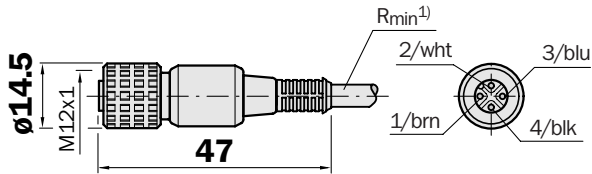
Dimensional drawings and order information

SENSICK screw-in system M 12, 4- or 5-pin, enclosure rating IP 67

Female connector M 12, 4-pin, straight

Cable diameter 4.5 mm, 4 x 0.34 mm², sheath PUR

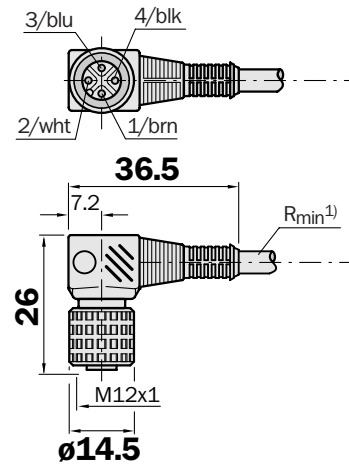
Type	Part no.	Cable length
DOL-1204-G05MB	7 902 084	5 m



Female connector M 12, 4-pin, right angle

Cable diameter 4.5 mm, 4 x 0.34 mm², sheath PUR

Type	Part no.	Cable length
DOL-1204-W05MB	7 902 085	5 m

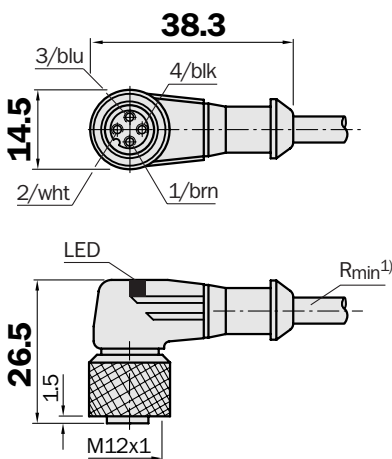


Female connector M 12, 4-pin, right angle

Cable diameter 5 mm, 4 x 0.34 mm², sheath PUR/PVC

With built-in LED-operation and function indicators, PNP complementary²⁾

Type	Part no.	Contacts	Cable length
DOL-1204-W05ME	6 020 398	4	5 m



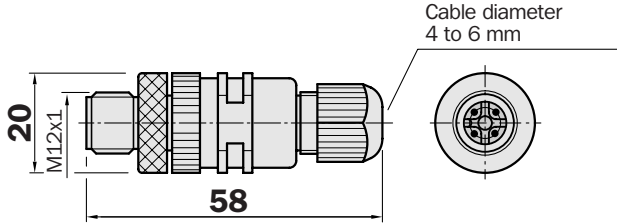
¹⁾ Minimum bend radius in dynamic use
 $R_{min} = 20 \times \text{cable diameter}$
²⁾ Not suitable for sender in through-beam photoelectric switches

Dimensional drawings and order information

SENSICK screw-in system M 12, 4- or 5-pin, enclosure rating IP 67

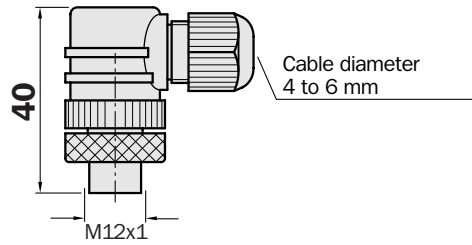
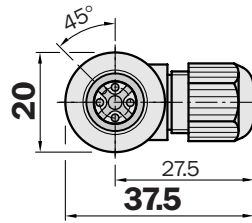
Male connector M 12, 4- or 5-pin, straight

Type	Part no.	Contacts
STE-1204-G	6 009 932	4
STE-1205-G	6 022 083	5



Male connector M 12, 4- or 5-pin, right angle

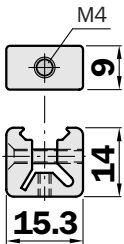
Type	Part no.	Contacts
STE-1204-W	6 022 084	4
STE-1205-W	6 022 082	5



Clamp/Mounting bracket

Clamp

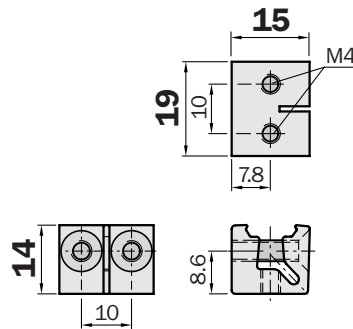
Type	Part no.
BEF-KH-W12	2 013 285



Countersunk screw M 4 x 15 mm included with delivery

Double clamp

Type	Part no.
BEF-DKH-W12	2 013 947



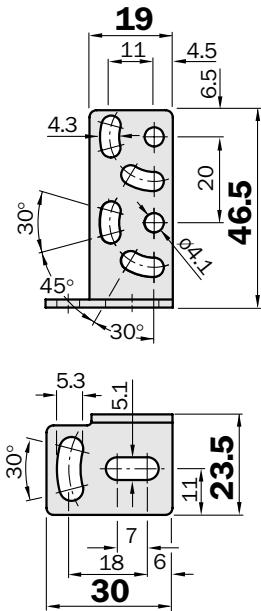
2 countersunk screws M 4 x 15 mm included with delivery

Dimensional drawings and order information

Clamp/Mounting bracket

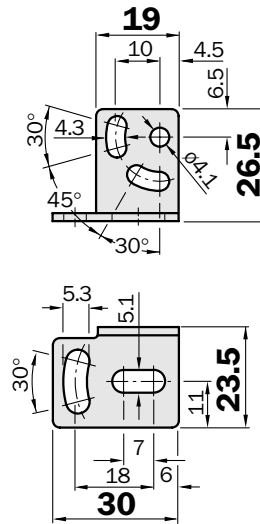
Mounting bracket, large (stainless steel)

Type	Part no.
BEF-WG-W12	2 013 942



Mounting bracket, small (stainless steel)

Type	Part no.
BEF-WK-W12	2 012 938

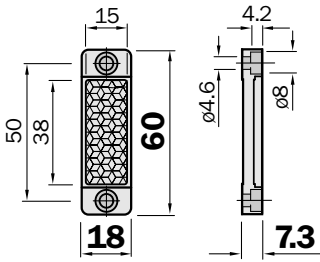


Dimensional drawings and order information

Plastic design for temperatures up to 65 °C

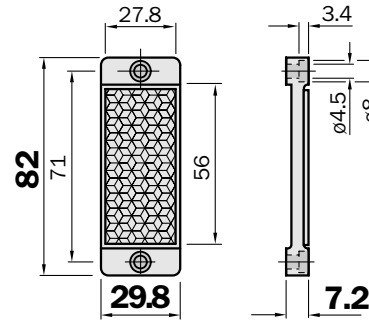
Reflector, 20 x 40 mm

Type	Part no.
PL 20 A	1 012 719



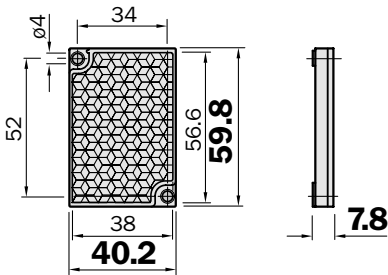
Reflector, 30 x 50 mm

Type	Part no.
PL 30 A	1 002 314



Reflector, 40 x 60 mm

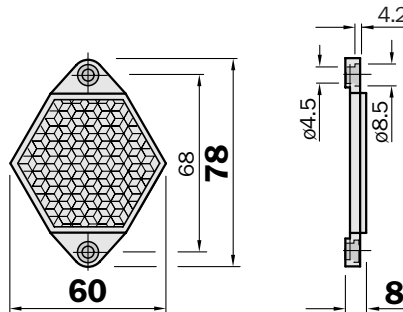
Type	Part no.
PL 40 A	1 012 720



Reflector, 6-sided

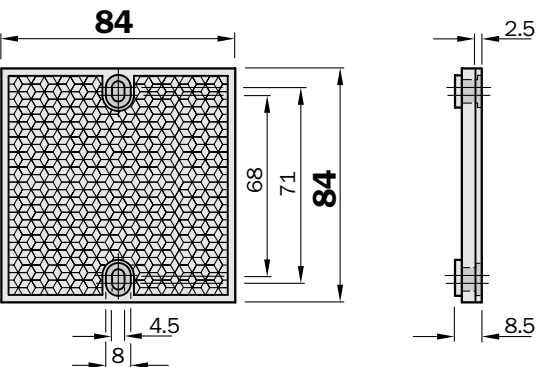
width across flats 48 mm

Type	Part no.
PL 50 A	1 000 132



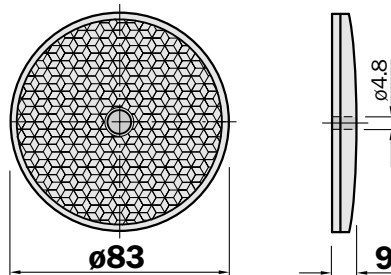
Reflector, 80 x 80 mm

Type	Part no.
PL 80 A	1 003 865



Reflector, diameter 83 mm, centre hole mounting

Type	Part no.
C 110	5 304 549



Dimensional drawings and order information

Self-adhesive reflective tape for photoelectric switches with polarisation filter

Reflective tape APM	
Sheet 225 x 225 mm	
Type	Part no.
REF-APM	4 025 097

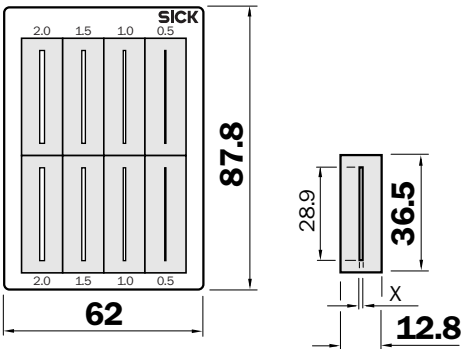
Reflective tape "Diamond Grade"	
Sheet 749 x 914 mm	
Type	Part no.
REF-DG	5 304 334

Reflective tape "Diamond Grade"	
Cut to size	
Type	Part no.
REF-DG-K	4 019 634



Masks

Mask card for WS/WE 12-2	
with 2 self-adhesive masks each for sender (WS) and receiver (WE)	
Slot width X: 0.5 mm/1.0 mm/1.5 mm/2.0 mm	
Type	Part no.
BL 12-SKN	4 031 815



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