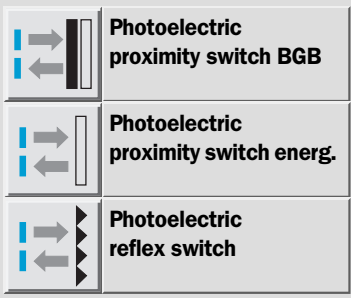
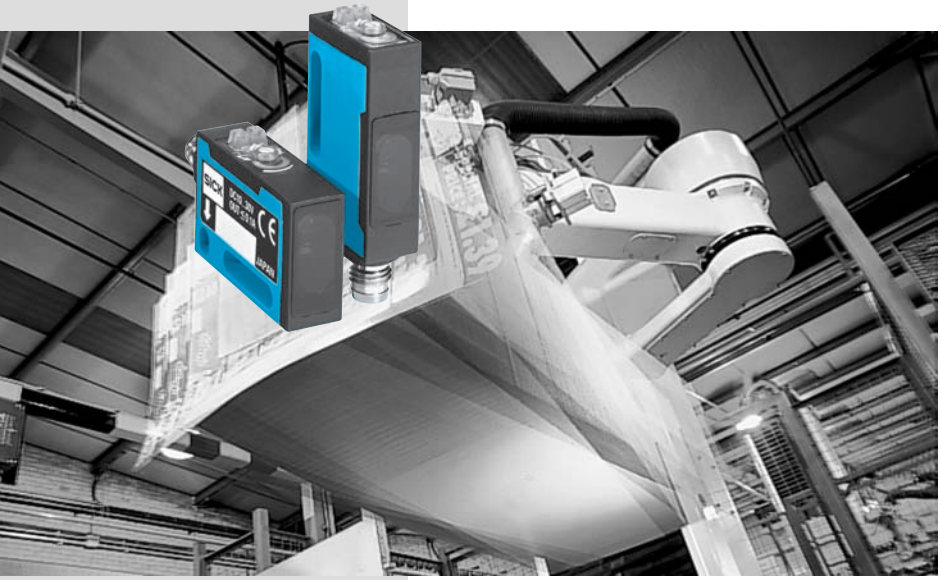
W160: Miniature Series for Optimum Solutions

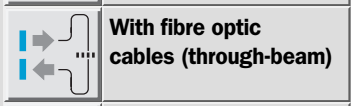

Photoelectric proximity switch BGB

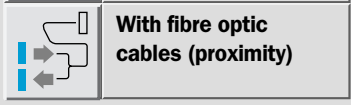
Photoelectric proximity switch energ.

Photoelectric reflex switch




Through-beam photoelectric switch


With fibre optic cables (through-beam)


With fibre optic cables (proximity)

Simple handling, large scanning distances, reduced number of types thanks to integrated L.ON/D.ON switches are system focal points. All W160 optics variants are available in two housing models with axial or 90° light emission. The WLL160 photoelectric switch for fiber-optic cables with switching point setting, manually per potentiometer or automatically per Teach-In at the push of a button, rounds out the W160 series. Plastic fiber-optic cables of the LL3 series in approx. 90 different options are available as accessories.

W160 are especially well-suited for use in the branches:

- Food and beverage industry
- Electronic components and circuit board manufacturing
- Packaging and printing industry
- Assembly and handling technology
- Special mechanical engineering
- Conveyor technology.

The ranges:

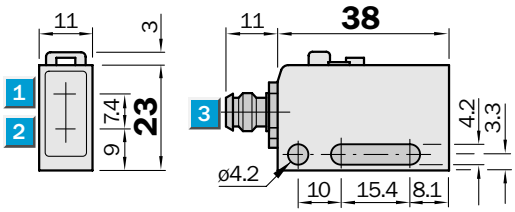
- Through-beam photoelectric switch WS/WE160: 15 m, 3 slotted masks as accessory
- Photoelectric reflex switch WL160: 6.5 m (PL80 A), with polarizing filter
- Photoelectric proximity switch WT160: energetic: scanning distance to 1000 mm (90% reflectance), for standard scanning jobs.
- With focussed optics: Scanning distance 8 to 60 mm, background suppression, small light spot, high sensitivity.
- With divergent optics (opening angle approx. 50°): scanning distance to 115 mm. Ideal for detecting objects conveyed loosely.

Scanning distance
4 ... 60 mm

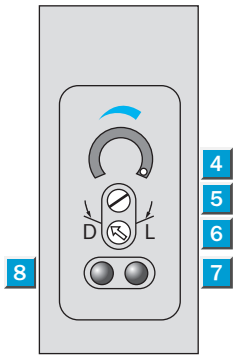
Photoelectric proximity switch

- Horizontal models
- Focussed proximity switch with background blanking
- Red light as alignment aid
- Switching point adjustable
- LED indicator: operating reserve

Dimensional drawing

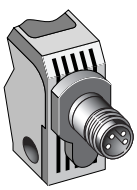
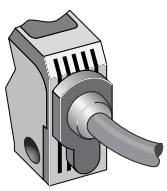
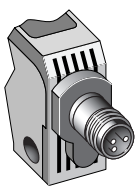
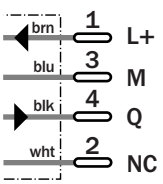
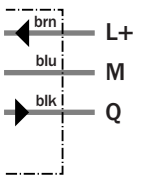
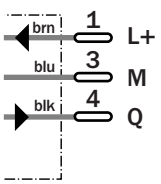


Adjustments possible



1 Centre of optical axis, receiver
2 Centre of optical axis, sender
3 Connector
4 Scaling 270°
5 Sensitivity adjuster
6 Light/dark rotary switch:
L = light switching
D = dark switching
7 LED indicator orange: switching output active
8 LED indicator green: light reception with operating reserve
> 1.1 and < 0.9

Connection type

WT160-E410 WT160-F410	WT160-E112 WT160-F112	WT160-E310 WT160-F310
		
M8, 4-pin	3 x 0.2 mm²	M8, 3-pin
		

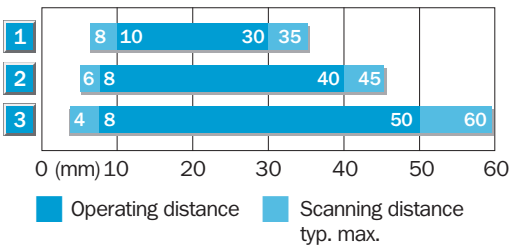
Accessories

- Connector, M8, 3-pin
- Connector, M8, 4-pin
- Mounting systems

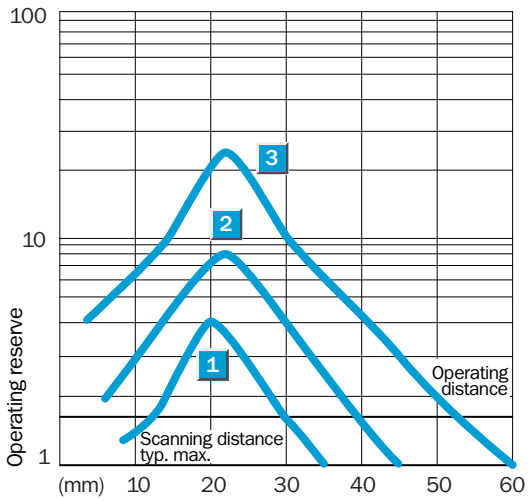
Technical specifications	WT160-	E112	E310	E410	F112	F310	F410
Scanning distance typ. max.	4 ... 60 mm[1]	■	■	■	■	■	■
Operating distance	8 ... 50 mm[1]	■	■	■	■	■	■
Adjustment of operating distance	Potentiometer, 2 rotations	■	■	■	■	■	■
Light source, light type	LED, red light, 680 nm[2]	■	■	■	■	■	■
Light spot diameter	Approx. 3 mm at 25 mm distance	■	■	■	■	■	■
Supply voltage V_S	DC 10 ... 30 V[3]	■	■	■	■	■	■
Ripple	± 10 %[4]	■	■	■	■	■	■
Power consumption	≤ 25 mA[5]	■	■	■	■	■	■
Switching outputs	NPN: open collector: Q	■	■	■			
	PNP: open collector: Q				■	■	■
Switching mode	Light-/dark-switching via rotary switch	■	■	■	■	■	■
Signal voltage PNP HIGH / LOW	V_S - 1.8 V / approx. 0 V				■	■	■
Signal voltage NPN HIGH / LOW	Approx. V_S / < 1.8 V	■	■	■			
Output current $I_a$max	100 mA	■	■	■	■	■	■
Response time	≤ 0.5 ms[6]	■	■	■	■	■	■
Switching frequency	1,000 Hz[7]	■	■	■	■	■	■
Connection type	Cable, PVC, 2 m[8]	■			■		
	Connector, M8, 3-pin		■			■	
	Connector, M8, 4-pin			■			■
VDE protection class	⏚	■	■	■	■	■	■
Circuit protection	V_S connections reverse-polarity protected / In-/outputs short-circuit protected / Interference suppression / Outputs overcurrent and short-circuit protected	■	■	■	■	■	■
Enclosure rating	IP 67, IP 69K	■	■	■	■	■	■
Ambient temperature operation	-25 °C ... +55 °C	■	■	■	■	■	■
Ambient temperature storage	-40 °C ... +70 °C	■	■	■	■	■	■
Weight	Approx. 60 g	■			■		
	Approx. 20 g		■	■		■	■
Housing design	Horizontal	■	■	■	■	■	■
Housing material	PBT, PMMA	■	■	■	■	■	■

[1] Object with 90 % remission (based on standard white to DIN 5033)
[2] Average service life 100,000 h
at T_a = +25 °C
[3] Limit values, reverse-polarity protected operation in short-circuit protected
network max. 8 A
[4] may not exceed or fall short of V_S tolerances
[5] without load
[6] Signal transit time with resistive load
[7] with light/dark ratio 1:1
[8] do not bend below 0 °C

Scanning distance



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



Ordering information

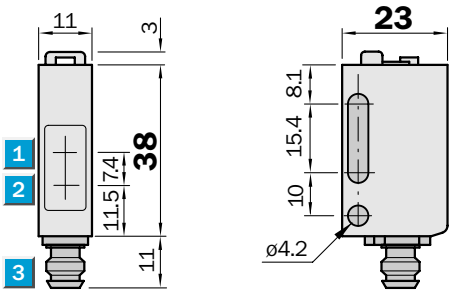
Type	Order no.
WT160-E112	6 022 775
WT160-E310	6 022 779
WT160-E410	6 022 780
WT160-F112	6 022 783
WT160-F310	6 022 787
WT160-F410	6 022 788

Scanning distance
4 ... 60 mm

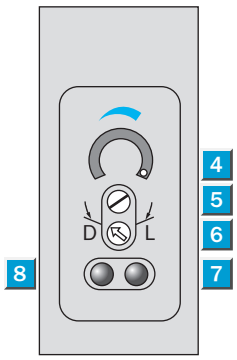
Photoelectric proximity switch

- Vertical models
- Focussed proximity switch with background blanking
- Red light as alignment aid
- Switching point adjustable
- LED indicator: operating reserve

Dimensional drawing

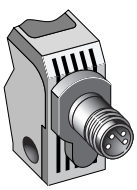
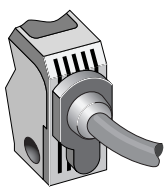
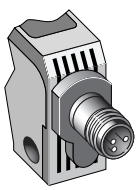
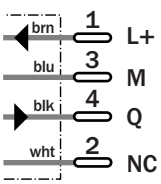
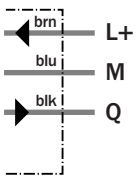
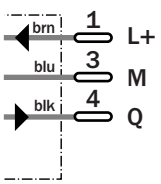


Adjustments possible



1 Centre of optical axis, receiver
2 Centre of optical axis, sender
3 Connector
4 Scaling 270°
5 Sensitivity adjuster
6 Light/dark rotary switch:
L = light switching
D = dark switching
7 LED indicator orange: switching output active
8 LED indicator green: light reception with operating reserve > 1.1 and < 0.9

Connection type

WT160-E420 WT160-F420	WT160-E122 WT160-F122	WT160-E320 WT160-F320
		
M8, 4-pin	3 x 0.2 mm²	M8, 3-pin
		

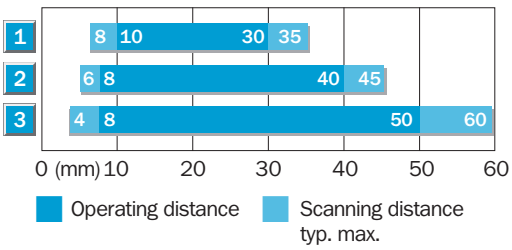
Accessories

- Connector, M8, 3-pin
- Connector, M8, 4-pin
- Mounting systems

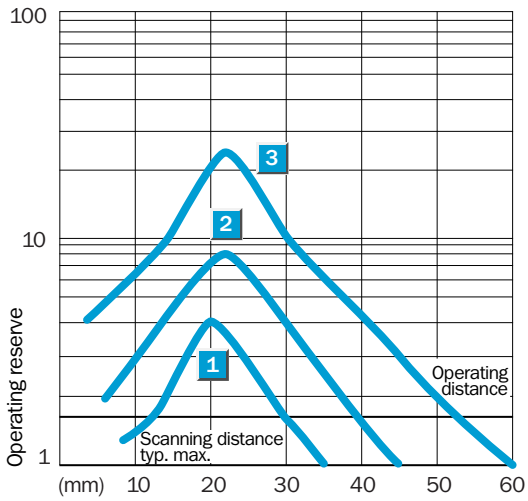
Technical specifications	WT160-	E122	E320	E420	F122	F320	F420
Scanning distance typ. max.	4 ... 60 mm[1]	■	■	■	■	■	■
Operating distance	8 ... 50 mm[1]	■	■	■	■	■	■
Adjustment of operating distance	Potentiometer, 2 rotations	■	■	■	■	■	■
Light source, light type	LED, red light, 680 nm[2]	■	■	■	■	■	■
Light spot diameter	Approx. 3 mm at 25 mm distance	■	■	■	■	■	■
Supply voltage V_S	DC 10 ... 30 V[3]	■	■	■	■	■	■
Ripple	± 10 %[4]	■	■	■	■	■	■
Power consumption	≤ 25 mA[5]	■	■	■	■	■	■
Switching outputs	NPN: open collector: Q	■	■	■			
	PNP: open collector: Q				■	■	■
Switching mode	Light-/dark-switching via rotary switch	■	■	■	■	■	■
Signal voltage PNP HIGH / LOW	V_S - 1.8 V / approx. 0 V				■	■	■
Signal voltage NPN HIGH / LOW	Approx. V_S / < 1.8 V	■	■	■			
Output current $I_a$max	100 mA	■	■	■	■	■	■
Response time	≤ 0.5 ms[6]	■	■	■	■	■	■
Switching frequency	1,000 Hz[7]	■	■	■	■	■	■
Connection type	Cable, PVC, 2 m[8]	■			■		
	Connector, M8, 3-pin		■			■	
	Connector, M8, 4-pin			■			■
VDE protection class	⏚	■	■	■	■	■	■
Circuit protection	V_S connections reverse-polarity protected / In-/outputs short-circuit protected / Interference suppression / Outputs overcurrent and short-circuit protected	■	■	■	■	■	■
Enclosure rating	IP 67, IP 69K	■	■	■	■	■	■
Ambient temperature operation	-25 °C ... +55 °C	■	■	■	■	■	■
Ambient temperature storage	-40 °C ... +70 °C	■	■	■	■	■	■
Weight	Approx. 60 g	■			■		
	Approx. 20 g		■	■		■	■
Housing design	Vertical	■	■	■	■	■	■
Housing material	PBT, PMMA	■	■	■	■	■	■

[1] Object with 90 % remission (based on standard white to DIN 5033)
[2] Average service life 100,000 h
at T_a = +25 °C
[3] Limit values, reverse-polarity protected operation in short-circuit protected network max. 8 A
[4] may not exceed or fall short of V_S tolerances
[5] without load
[6] Signal transit time with resistive load
[7] with light/dark ratio 1:1
[8] do not bend below 0 °C

Scanning distance



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



Ordering information

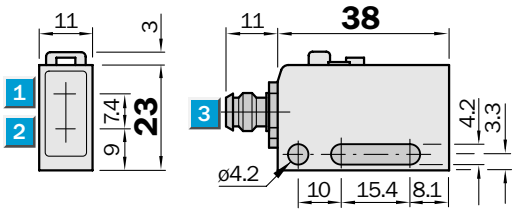
Type	Order no.
WT160-E122	6 022 777
WT160-E320	6 022 781
WT160-E420	6 022 782
WT160-F122	6 022 785
WT160-F320	6 022 789
WT160-F420	6 022 790

Scanning distance
0 ... 1,000 mm

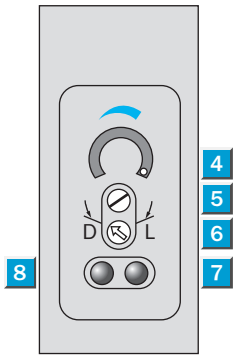
Photoelectric proximity switch

- Horizontal models
- Energetic proximity switch for standard applications
- Red light as alignment aid
- Switching point adjustable
- LED indicator: operating reserve

Dimensional drawing

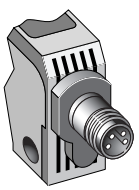
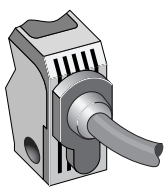
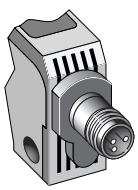
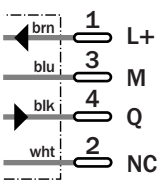
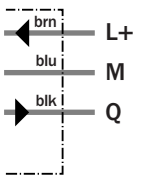
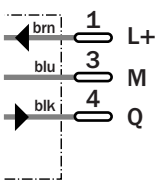


Adjustments possible



1 Centre of optical axis, receiver
2 Centre of optical axis, sender
3 Connector
4 Scaling 270°
5 Sensitivity adjuster
6 Light/dark rotary switch:
L = light switching
D = dark switching
7 LED indicator orange: switching output active
8 LED indicator green: light reception with operating reserve > 1.1 and < 0.9

Connection type

WT160-E470 WT160-F470	WT160-E172 WT160-F172	WT160-E370 WT160-F370
		
M8, 4-pin	3 x 0.2 mm²	M8, 3-pin
		

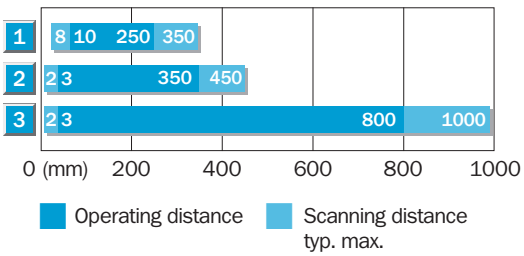
Accessories

- Connector, M8, 3-pin
- Connector, M8, 4-pin
- Mounting systems

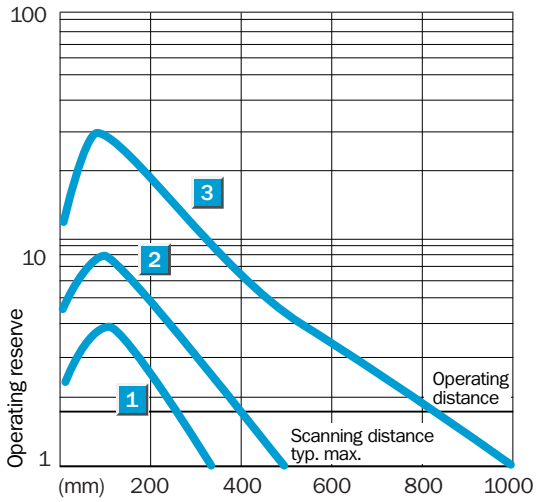
Technical specifications	WT160-	E172	E370	E470	F172	F370	F470
Scanning distance typ. max.	0 ... 1,000 mm[1]	■	■	■	■	■	■
Operating distance	0 ... 800 mm[1]	■	■	■	■	■	■
Adjustment of operating distance	Potentiometer, 2 rotations	■	■	■	■	■	■
Light source, light type	LED, red light, 680 nm[2]	■	■	■	■	■	■
Light spot diameter	Approx. 90 mm at 500 mm distance	■	■	■	■	■	■
Angle of dispersion	Approx. 10 °	■	■	■	■	■	■
Supply voltage V_S	DC 10 ... 30 V[3]	■	■	■	■	■	■
Ripple	± 10 %[4]	■	■	■	■	■	■
Power consumption	≤ 25 mA[5]	■	■	■	■	■	■
Switching outputs	NPN: open collector: Q	■	■	■			
	PNP: open collector: Q				■	■	■
Switching mode	Light-/dark-switching via rotary switch	■	■	■	■	■	■
Signal voltage PNP HIGH / LOW	V_S - 1.8 V / approx. 0 V				■	■	■
Signal voltage NPN HIGH / LOW	Approx. V_S / < 1.8 V	■	■	■			
Output current $I_a$max	100 mA	■	■	■	■	■	■
Response time	≤ 0.5 ms[6]	■	■	■	■	■	■
Switching frequency	1,000 Hz[7]	■	■	■	■	■	■
Connection type	Cable, PVC, 2 m[8]	■			■		
	Connector, M8, 3-pin		■			■	
	Connector, M8, 4-pin			■			■
VDE protection class	⧫	■	■	■	■	■	■
Circuit protection	V_S connections reverse-polarity protected / In-/outputs short-circuit protected / Interference suppression / Outputs overcurrent and short-circuit protected	■	■	■	■	■	■
Enclosure rating	IP 67, IP 69K	■	■	■	■	■	■
Ambient temperature operation	-25 °C ... +55 °C	■	■	■	■	■	■
Ambient temperature storage	-40 °C ... +70 °C	■	■	■	■	■	■
Weight	Approx. 60 g	■			■		
	Approx. 20 g		■	■		■	■
Housing design	Horizontal	■	■	■	■	■	■
Housing material	PBT, PMMA	■	■	■	■	■	■

[1] Object with 90 % remission (based on standard white to DIN 5033)
[2] Average service life 100,000 h
[3] Limit values, reverse-polarity protected operation in short-circuit protected
[4] may not exceed or fall short of V_S tolerances
[5] without load
[6] Signal transit time with resistive load
[7] with light/dark ratio 1:1
[8] do not bend below 0 °C

Scanning distance



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



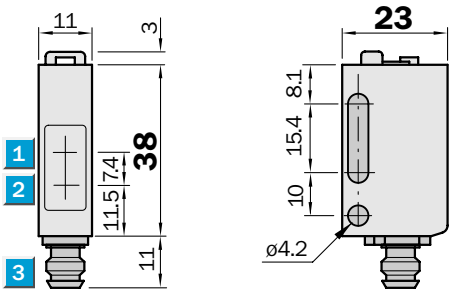
Ordering information	
Type	**Order no.**
WT160-E172	6 022 807
WT160-E370	6 022 811
WT160-E470	6 022 812
WT160-F172	6 022 815
WT160-F370	6 022 819
WT160-F470	6 022 820

Scanning distance
0 ... 1,000 mm

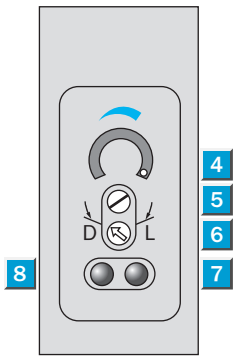
Photoelectric proximity switch

- Vertical models
- Energetic proximity switch for standard applications
- Red light as alignment aid
- Switching point adjustable
- LED indicator: operating reserve

Dimensional drawing

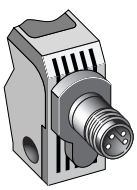
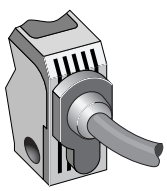
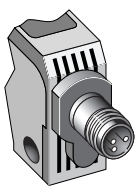
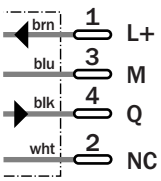
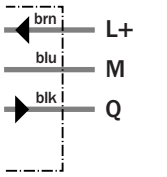
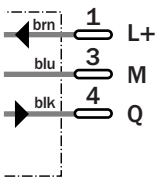


Adjustments possible



1 Centre of optical axis, receiver
2 Centre of optical axis, sender
3 Connector
4 Scaling 270°
5 Sensitivity adjuster
6 Light/dark rotary switch:
L = light switching
D = dark switching
7 LED indicator orange: switching output active
8 LED indicator green: light reception with operating reserve > 1.1 and < 0.9

Connection type

WT160-E480 WT160-F480	WT160-E182 WT160-F182	WT160-E380 WT160-F380
		
M8, 4-pin	3 x 0.2 mm²	M8, 3-pin
		

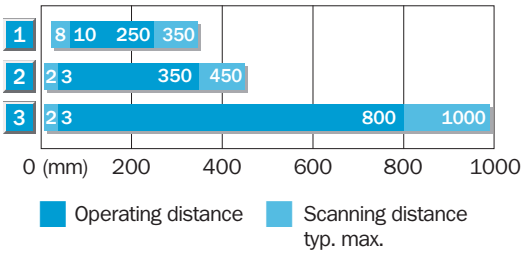
Accessories

- Connector, M8, 3-pin
- Connector, M8, 4-pin
- Mounting systems

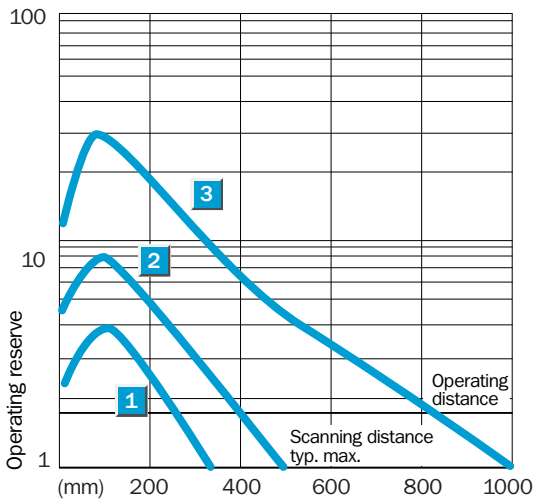
Technical specifications	WT160-	E182	E380	E480	F182	F380	F480
Scanning distance typ. max.	0 ... 1,000 mm[1]	■	■	■	■	■	■
Operating distance	0 ... 800 mm[1]	■	■	■	■	■	■
Adjustment of operating distance	Potentiometer, 2 rotations	■	■	■	■	■	■
Light source, light type	LED, red light, 680 nm[2]	■	■	■	■	■	■
Light spot diameter	Approx. 90 mm at 500 mm distance	■	■	■	■	■	■
Angle of dispersion	Approx. 10 °	■	■	■	■	■	■
Supply voltage V_S	DC 10 ... 30 V[3]	■	■	■	■	■	■
Ripple	± 10 %[4]	■	■	■	■	■	■
Power consumption	≤ 25 mA[5]	■	■	■	■	■	■
Switching outputs	NPN: open collector: Q	■	■	■			
	PNP: open collector: Q				■	■	■
Switching mode	Light-/dark-switching via rotary switch	■	■	■	■	■	■
Signal voltage PNP HIGH / LOW	V_S - 1.8 V / approx. 0 V				■	■	■
Signal voltage NPN HIGH / LOW	Approx. V_S / < 1.8 V	■	■	■			
Output current $I_a$max	100 mA	■	■	■	■	■	■
Response time	≤ 0.5 ms[6]	■	■	■	■	■	■
Switching frequency	1,000 Hz[7]	■	■	■	■	■	■
Connection type	Cable, PVC, 2 m[8]	■			■		
	Connector, M8, 3-pin		■			■	
	Connector, M8, 4-pin			■			■
VDE protection class	⧫	■	■	■	■	■	■
Circuit protection	V_S connections reverse-polarity protected / In-/outputs short-circuit protected / Interference suppression / Outputs overcurrent and short-circuit protected	■	■	■	■	■	■
Enclosure rating	IP 67, IP 69K	■	■	■	■	■	■
Ambient temperature operation	-25 °C ... +55 °C	■	■	■	■	■	■
Ambient temperature storage	-40 °C ... +70 °C	■	■	■	■	■	■
Weight	Approx. 60 g	■			■		
	Approx. 20 g		■	■		■	■
Housing design	Vertical	■	■	■	■	■	■
Housing material	PBT, PMMA	■	■	■	■	■	■

[1] Object with 90 % remission (based on standard white to DIN 5033)
[2] Average service life 100,000 h at T_a = +25 °C
[3] Limit values, reverse-polarity protected operation in short-circuit protected network max. 8 A
[4] may not exceed or fall short of V_S tolerances
[5] without load
[6] Signal transit time with resistive load
[7] with light/dark ratio 1:1
[8] do not bend below 0 °C

Scanning distance



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



Ordering information

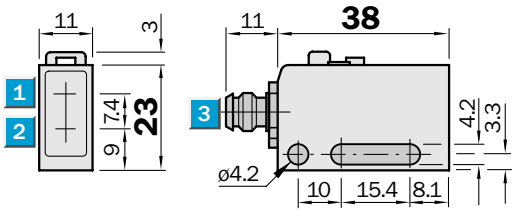
Type	Order no.
WT160-E182	6 022 809
WT160-E380	6 022 813
WT160-E480	6 022 814
WT160-F182	6 022 817
WT160-F380	6 022 821
WT160-F480	6 022 822

Scanning distance
0 ... 115 mm

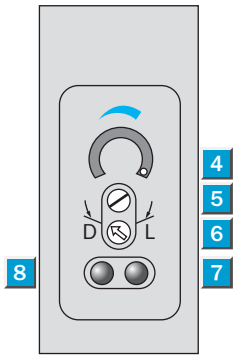
Photoelectric proximity switch

- Horizontal models
- Proximity switch with large opening angle for detecting objects conveyed loosely
- Red light as alignment aid
- Switching point adjustable
- LED indicator: operating reserve

Dimensional drawing

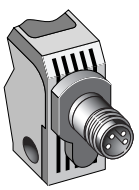
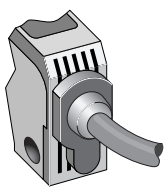
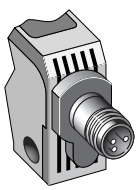
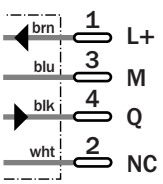
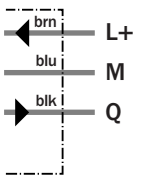
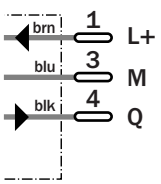


Adjustments possible



1 Centre of optical axis, receiver
2 Centre of optical axis, sender
3 Connector
4 Scaling 270°
5 Sensitivity adjuster
6 Light/dark rotary switch:
L = light switching
D = dark switching
7 LED indicator orange: switching output active
8 LED indicator green: light reception with operating reserve > 1.1 and < 0.9

Connection type

WT160-E450 WT160-F450	WT160-E152 WT160-F152	WT160-E350 WT160-F350
		
M8, 4-pin	3 x 0.2 mm²	M8, 3-pin
		

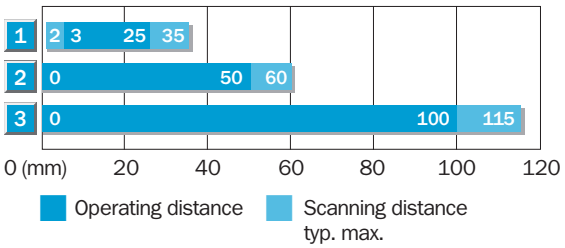
Accessories

Connector, M8, 3-pin
Connector, M8, 4-pin
Mounting systems

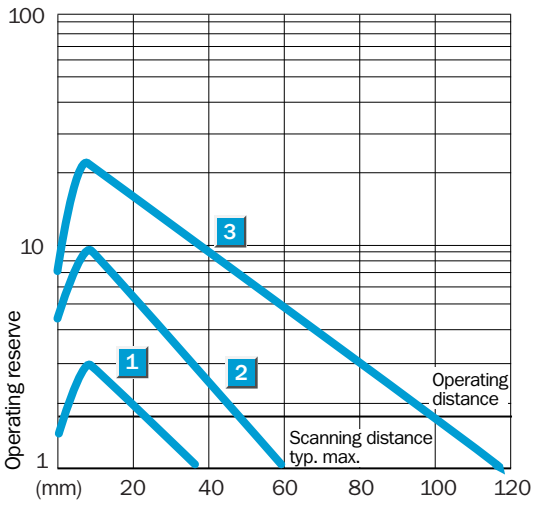
Technical specifications	WT160-	E152	E350	E450	F152	F350	F450
Scanning distance typ. max.	0 ... 115 mm[1]	■	■	■	■	■	■
Operating distance	0 ... 100 mm[1]	■	■	■	■	■	■
Adjustment of operating distance	Potentiometer, 2 rotations	■	■	■	■	■	■
Light source, light type	LED, red light, 680 nm[2]	■	■	■	■	■	■
Light spot diameter	Approx. 100 mm at 100 mm distance	■	■	■	■	■	■
Angle of dispersion	Approx. 50 °	■	■	■	■	■	■
Supply voltage V_S	DC 10 ... 30 V[3]	■	■	■	■	■	■
Ripple	± 10 %[4]	■	■	■	■	■	■
Power consumption	≤ 25 mA[5]	■	■	■	■	■	■
Switching outputs	NPN: open collector: Q	■	■	■			
	PNP: open collector: Q				■	■	■
Switching mode	Light-/dark-switching via rotary switch	■	■	■	■	■	■
Signal voltage PNP HIGH / LOW	V_S - 1.8 V / approx. 0 V				■	■	■
Signal voltage NPN HIGH / LOW	Approx. V_S / < 1.8 V	■	■	■			
Output current $I_a$max	100 mA	■	■	■	■	■	■
Response time	≤ 0.5 ms[6]	■	■	■	■	■	■
Switching frequency	1,000 Hz[7]	■	■	■	■	■	■
Connection type	Cable, PVC, 2 m[8]	■			■		
	Connector, M8, 3-pin		■			■	
	Connector, M8, 4-pin			■			■
VDE protection class	⧫	■	■	■	■	■	■
Circuit protection	V_S connections reverse-polarity protected / In-/outputs short-circuit protected / Interference suppression / Outputs overcurrent and short-circuit protected	■	■	■	■	■	■
Enclosure rating	IP 67, IP 69K	■	■	■	■	■	■
Ambient temperature operation	-25 °C ... +55 °C	■	■	■	■	■	■
Ambient temperature storage	-40 °C ... +70 °C	■	■	■	■	■	■
Weight	Approx. 60 g	■			■		
	Approx. 20 g		■	■		■	■
Housing design	Horizontal	■	■	■	■	■	■
Housing material	PBT, PMMA	■	■	■	■	■	■

[1] Object with 90 % remission (based on standard white to DIN 5033)
[2] Average service life 100,000 h at T_a = +25 °C
[3] Limit values, reverse-polarity protected operation in short-circuit protected network max. 8 A
[4] may not exceed or fall short of V_S tolerances
[5] without load
[6] Signal transit time with resistive load
[7] with light/dark ratio 1:1
[8] do not bend below 0 °C

Scanning distance



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



Ordering information

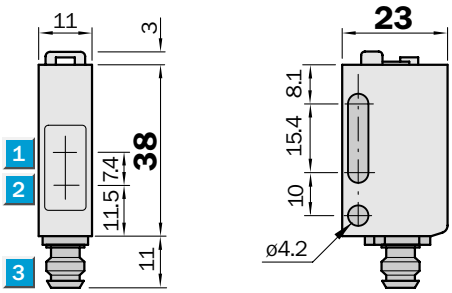
Type	Order no.
WT160-E152	6 022 791
WT160-E350	6 022 795
WT160-E450	6 022 796
WT160-F152	6 022 799
WT160-F350	6 022 803
WT160-F450	6 022 804

Scanning distance
0 ... 115 mm

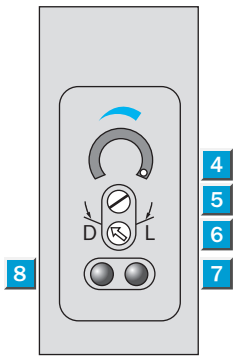
Photoelectric proximity switch

- Vertical models
- Proximity switch with large opening angle for detecting objects conveyed loosely
- Red light as alignment aid
- Switching point adjustable
- LED indicator: operating reserve

Dimensional drawing

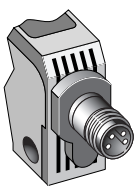
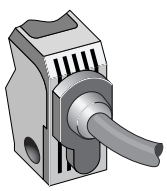
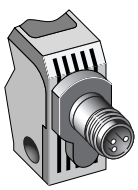
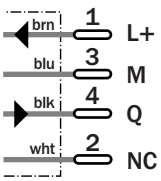
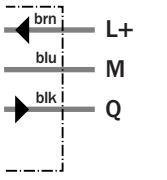
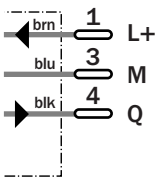


Adjustments possible



1 Centre of optical axis, receiver
2 Centre of optical axis, sender
3 Connector
4 Scaling 270°
5 Sensitivity adjuster
6 Light/dark rotary switch:
L = light switching
D = dark switching
7 LED indicator orange: switching output active
8 LED indicator green: light reception with operating reserve
> 1.1 and < 0.9

Connection type

WT160-E460 WT160-F460	WT160-E162 WT160-F162	WT160-E360 WT160-F360
		
M8, 4-pin	3 x 0.2 mm²	M8, 3-pin
		

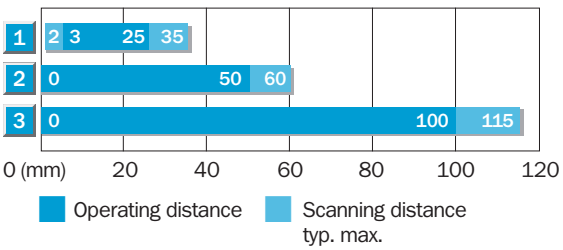
Accessories

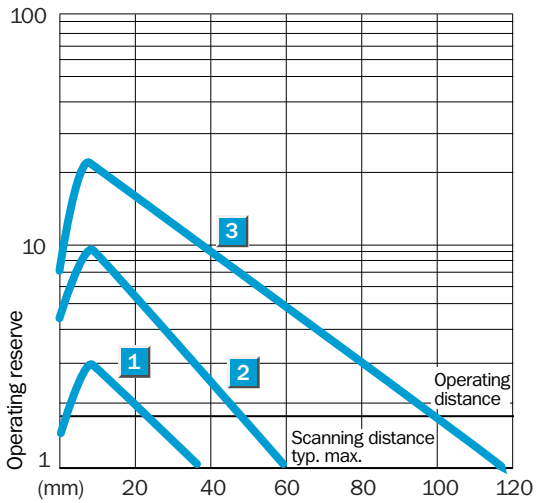
Connector, M8, 3-pin
Connector, M8, 4-pin
Mounting systems

Technical specifications	WT160-	E162	E360	E460	F162	F360	F460
Scanning distance typ. max.	0 ... 115 mm[1]	■	■	■	■	■	■
Operating distance	0 ... 100 mm[1]	■	■	■	■	■	■
Adjustment of operating distance	Potentiometer, 2 rotations	■	■	■	■	■	■
Light source, light type	LED, red light, 680 nm[2]	■	■	■	■	■	■
Light spot diameter	Approx. 100 mm at 100 mm distance	■	■	■	■	■	■
Angle of dispersion	Approx. 50 °	■	■	■	■	■	■
Supply voltage V_S	DC 10 ... 30 V[3]	■	■	■	■	■	■
Ripple	± 10 %[4]	■	■	■	■	■	■
Power consumption	≤ 25 mA[5]	■	■	■	■	■	■
Switching outputs	NPN: open collector: Q	■	■	■			
	PNP: open collector: Q				■	■	■
Switching mode	Light-/dark-switching via rotary switch	■	■	■	■	■	■
Signal voltage PNP HIGH / LOW	V_S - 1.8 V / approx. 0 V				■	■	■
Signal voltage NPN HIGH / LOW	Approx. V_S / < 1.8 V	■	■	■			
Output current $I_a$max	100 mA	■	■	■	■	■	■
Response time	≤ 0.5 ms[6]	■	■	■	■	■	■
Switching frequency	1,000 Hz[7]	■	■	■	■	■	■
Connection type	Cable, PVC, 2 m[8]	■			■		
	Connector, M8, 3-pin		■			■	
	Connector, M8, 4-pin			■			■
VDE protection class	⧫	■	■	■	■	■	■
Circuit protection	V_S connections reverse-polarity protected / In-/outputs short-circuit protected / Interference suppression / Outputs overcurrent and short-circuit protected	■	■	■	■	■	■
Enclosure rating	IP 67, IP 69K	■	■	■	■	■	■
Ambient temperature operation	-25 °C ... +55 °C	■	■	■	■	■	■
Ambient temperature storage	-40 °C ... +70 °C	■	■	■	■	■	■
Weight	Approx. 60 g	■			■		
	Approx. 20 g		■	■		■	■
Housing design	Vertical	■	■	■	■	■	■
Housing material	PBT, PMMA	■	■	■	■	■	■

[1] Object with 90 % remission (based on standard white to DIN 5033)
[2] Average service life 100,000 h at T_a = +25 °C
[3] Limit values, reverse-polarity protected operation in short-circuit protected network max. 8 A
[4] may not exceed or fall short of V_S tolerances
[5] without load
[6] Signal transit time with resistive load
[7] with light/dark ratio 1:1
[8] do not bend below 0 °C

Scanning distance





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

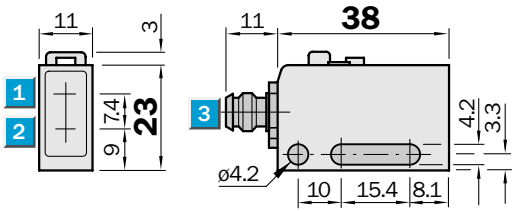
Ordering information	
Type	**Order no.**
WT160-E162	6 022 793
WT160-E360	6 022 797
WT160-E460	6 022 798
WT160-F162	6 022 801
WT160-F360	6 022 805
WT160-F460	6 022 806

Scanning range 0.01 ... 6.5 m

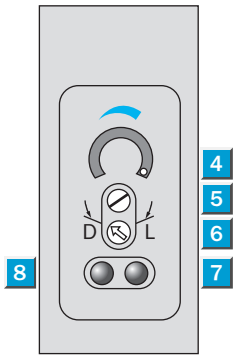
Photoelectric reflex switch

- Horizontal models
- Polarization filter, consequently reliable detection of objects with shiny surfaces
- Red light as alignment aid
- Sensitivity adjustable
- LED indicator: operating reserve

Dimensional drawing

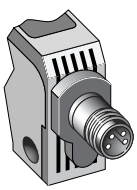
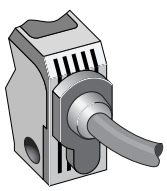
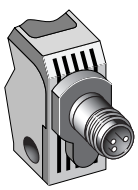
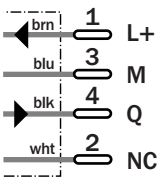
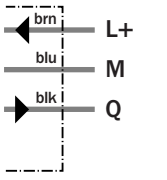
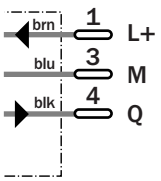


Adjustments possible



1 Centre of optical axis, receiver
2 Centre of optical axis, sender
3 Connector
4 Scaling 270°
5 Sensitivity adjuster
6 Light/dark rotary switch:
L = light switching
D = dark switching
7 LED indicator orange: switching output active
8 LED indicator green: light reception with operating reserve > 1.1 and < 0.9

Connection type

WL160-E430 WL160-F430	WL160-E132 WL160-F132	WL160-E330 WL160-F330
		
M8, 4-pin	3 x 0.2 mm²	M8, 3-pin
		

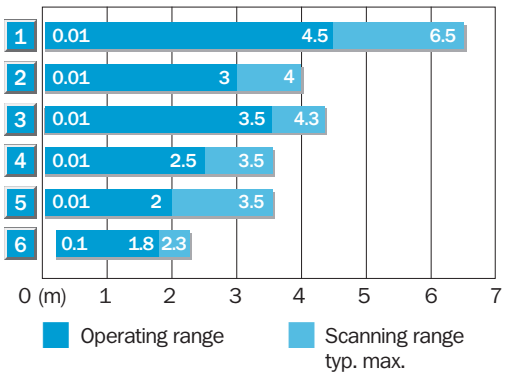
Accessories

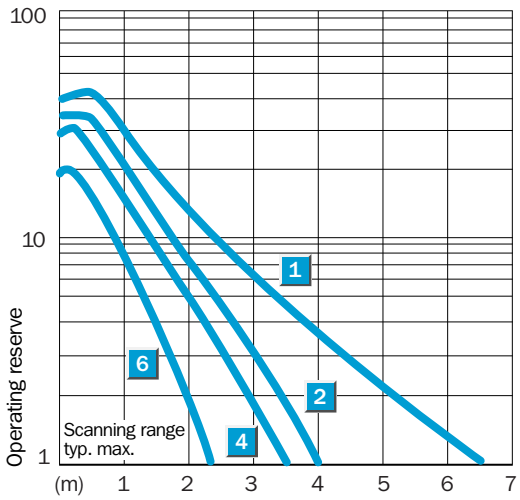
- Connector, M8, 3-pin
- Connector, M8, 4-pin
- Mounting systems
- Reflectors

Technical specifications	WL160-	E132	E330	E430	F132	F330	F430
Scanning range typ. max.	0.01 ... 6.5 m	■	■	■	■	■	■
Scanning range, recommended	0.01 ... 4.5 m	■	■	■	■	■	■
Relating to	Reflector PL80A	■	■	■	■	■	■
Sensitivity adjustment	Potentiometer, 2 rotations	■	■	■	■	■	■
Light source, light type	LED, red light, 680 nm[1]	■	■	■	■	■	■
Light spot diameter	Approx. 300 mm at 3 m distance	■	■	■	■	■	■
Angle of dispersion	Approx. 5.8 °	■	■	■	■	■	■
Polarisation filter	✓	■	■	■	■	■	■
Supply voltage V_S	DC 10 ... 30 V[2]	■	■	■	■	■	■
Ripple	± 10 %[3]	■	■	■	■	■	■
Power consumption	≤ 25 mA[4]	■	■	■	■	■	■
Switching outputs	NPN: open collector: Q	■	■	■			
	PNP: open collector: Q				■	■	■
Switching mode	Light-/dark-switching via rotary switch	■	■	■	■	■	■
Signal voltage PNP HIGH / LOW	V_S - 1.8 V / approx. 0 V				■	■	■
Signal voltage NPN HIGH / LOW	Approx. V_S / < 1.8 V	■	■	■			
Output current $I_a$max	100 mA	■	■	■	■	■	■
Response time	≤ 0.5 ms[5]	■	■	■	■	■	■
Switching frequency	1,000 Hz[6]	■	■	■	■	■	■
Connection type	Cable, PVC, 2 m[7]	■			■		
	Connector, M8, 3-pin		■			■	
	Connector, M8, 4-pin			■			■
VDE protection class	⧈	■	■	■	■	■	■
Circuit protection	V_S connections reverse-polarity protected / In-/outputs short-circuit protected / Interference suppression / Outputs overcurrent and short-circuit protected	■	■	■	■	■	■
Enclosure rating	IP 67, IP 69K	■	■	■	■	■	■
Ambient temperature operation	-25 °C ... +55 °C	■	■	■	■	■	■
Ambient temperature storage	-40 °C ... +70 °C	■	■	■	■	■	■
Weight	Approx. 60 g	■			■		
	Approx. 20 g		■	■		■	■
Housing design	Horizontal	■	■	■	■	■	■
Housing material	PBT, PMMA	■	■	■	■	■	■

[1] Average service life 100,000 h at T_a = +25 °C
[2] Limit values, reverse-polarity protected operation in short-circuit protected network max. 8 A
[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

Scanning range and operating reserve





	Reflector type	Operating range
1	PL80A	0.01 ... 4.5 m
2	P250	0.01 ... 3 m
3	PL50A/PL40A	0.01 ... 3.5 m
4	PL30A/PL31A	0.01 ... 2.5 m
5	PL20A	0.01 ... 2 m
6	Reflective tape Diamond Grade	0.1 ... 1.8 m (100 x 100 mm²)

Ordering information

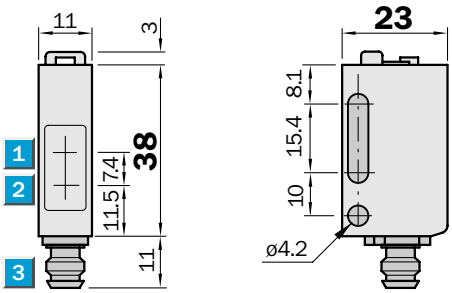
Type	Order no.
WL160-E132	6 022 759
WL160-E330	6 022 763
WL160-E430	6 022 764
WL160-F132	6 022 767
WL160-F330	6 022 771
WL160-F430	6 022 772

Scanning range
0.01 ... 6.5 m

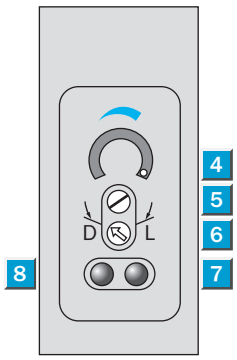
Photoelectric reflex switch

- Vertical models
- Polarization filter, consequently reliable detection of objects with shiny surfaces
- Red light as alignment aid
- Sensitivity adjustable
- LED indicator: operating reserve

Dimensional drawing

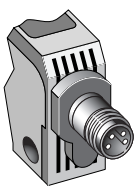
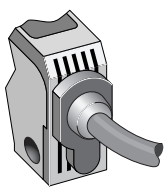
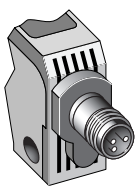
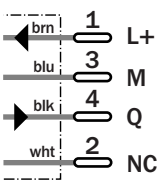
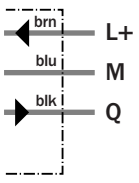
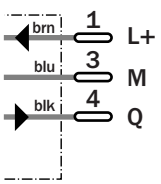


Adjustments possible



1 Centre of optical axis, receiver
2 Centre of optical axis, sender
3 Connector
4 Scaling 270°
5 Sensitivity adjuster
6 Light/dark rotary switch:
L = light switching
D = dark switching
7 LED indicator orange: switching output active
8 LED indicator green: light reception with operating reserve > 1.1 and < 0.9

Connection type

WL160-E440 WL160-F440	WL160-E142 WL160-F142	WL160-E340 WL160-F340
		
M8, 4-pin	3 x 0.2 mm²	M8, 3-pin
		

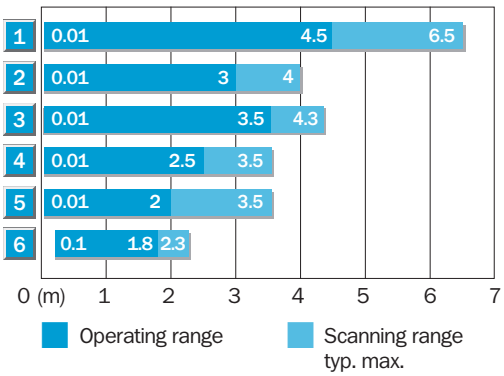
Accessories

- Connector, M8, 3-pin
- Connector, M8, 4-pin
- Mounting systems
- Reflectors

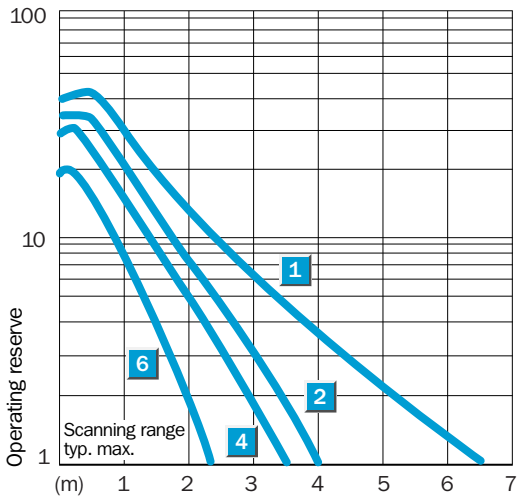
Technical specifications	WL160-	E142	E340	E440	F142	F340	F440
Scanning range typ. max.	0.01 ... 6.5 m	■	■	■	■	■	■
Scanning range, recommended	0.01 ... 4.5 m	■	■	■	■	■	■
Relating to	Reflector PL80A	■	■	■	■	■	■
Sensitivity adjustment	Potentiometer, 2 rotations	■	■	■	■	■	■
Light source, light type	LED, red light, 680 nm[1]	■	■	■	■	■	■
Light spot diameter	Approx. 300 mm at 3 m distance	■	■	■	■	■	■
Angle of dispersion	Approx. 5.8 °	■	■	■	■	■	■
Polarisation filter	✓	■	■	■	■	■	■
Supply voltage V_S	DC 10 ... 30 V[2]	■	■	■	■	■	■
Ripple	± 10 %[3]	■	■	■	■	■	■
Power consumption	≤ 25 mA[4]	■	■	■	■	■	■
Switching outputs	NPN: open collector: Q	■	■	■			
	PNP: open collector: Q				■	■	■
Switching mode	Light-/dark-switching via rotary switch	■	■	■	■	■	■
Signal voltage PNP HIGH / LOW	V_S - 1.8 V / approx. 0 V				■	■	■
Signal voltage NPN HIGH / LOW	Approx. V_S / < 1.8 V	■	■	■			
Output current $I_a$max	100 mA	■	■	■	■	■	■
Response time	≤ 0.5 ms[5]	■	■	■	■	■	■
Switching frequency	1,000 Hz[6]	■	■	■	■	■	■
Connection type	Cable, PVC, 2 m[7]	■			■		
	Connector, M8, 3-pin		■			■	
	Connector, M8, 4-pin			■			■
VDE protection class	⧈	■	■	■	■	■	■
Circuit protection	V_S connections reverse-polarity protected / In-/outputs short-circuit protected / Interference suppression / Outputs overcurrent and short-circuit protected	■	■	■	■	■	■
Enclosure rating	IP 67, IP 69K	■	■	■	■	■	■
Ambient temperature operation	-25 °C ... +55 °C	■	■	■	■	■	■
Ambient temperature storage	-40 °C ... +70 °C	■	■	■	■	■	■
Weight	Approx. 60 g	■			■		
	Approx. 20 g		■	■		■	■
Housing design	Vertical	■	■	■	■	■	■
Housing material	PBT, PMMA	■	■	■	■	■	■

[1] Average service life 100,000 h at T_a = +25 °C
[2] Limit values, reverse-polarity protected operation in short-circuit protected network max. 8 A
[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

Scanning range and operating reserve



	Reflector type	Operating range
1	PL80A	0.01 ... 4.5 m
2	P250	0.01 ... 3 m
3	PL50A/PL40A	0.01 ... 3.5 m
4	PL30A/PL31A	0.01 ... 2.5 m
5	PL20A	0.01 ... 2 m
6	Reflective tape Diamond Grade	0.1 ... 1.8 m (100 x 100 mm²)



Ordering information

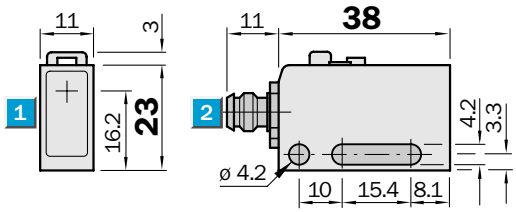
Type	Order no.
WL160-E142	6 022 761
WL160-E340	6 022 765
WL160-E440	6 022 766
WL160-F142	6 022 769
WL160-F340	6 022 773
WL160-F440	6 022 774

Scanning range
0 ... 15 m

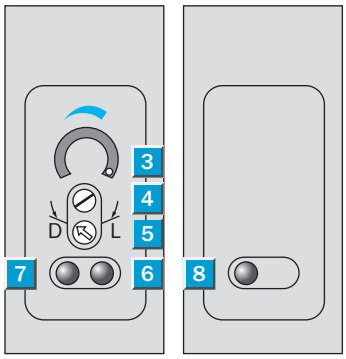
Through-beam photoelectric switch

- Horizontal models
- Slotted masks (accessories) for detecting small objects or positioning jobs
- Red light as alignment aid
- Sensitivity adjustable
- LED indicator: operating reserve

Dimensional drawing

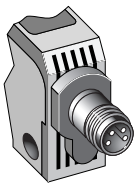
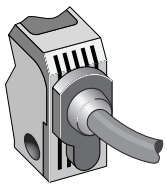
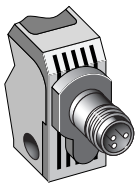
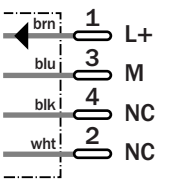
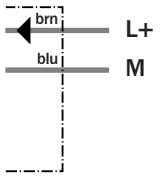
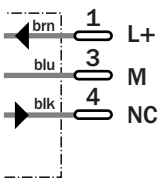
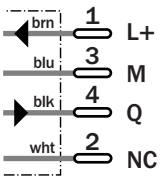
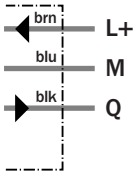
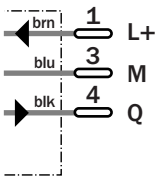


Sender/receiver



1 Centre of optical axis
2 Connector
3 Sensitivity adjuster
4 Scaling 270°
5 Light/dark rotary switch:
L = light switching
D = dark switching
6 LED indicator orange: switching output active
7 LED indicator green: light reception with operating reserve > 1.1 and < 0.9
8 LED indicator red: sender active

Connection type

	WS/WE160-E430 WS/WE160-F430	WS/WE160-E132 WS/WE160-F132	WS/WE160-E330 WS/WE160-F330
			
Sender	M8, 4-pin	2 x 0.2 mm²	M8, 3-pin
			
Receiver	M8, 4-pin	3 x 0.2 mm²	M8, 3-pin
			

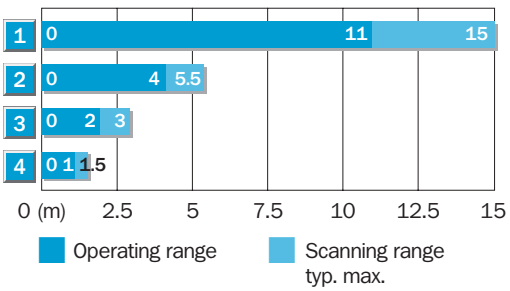
Accessories

Connector, M8, 3-pin
Connector, M8, 4-pin
Mounting systems

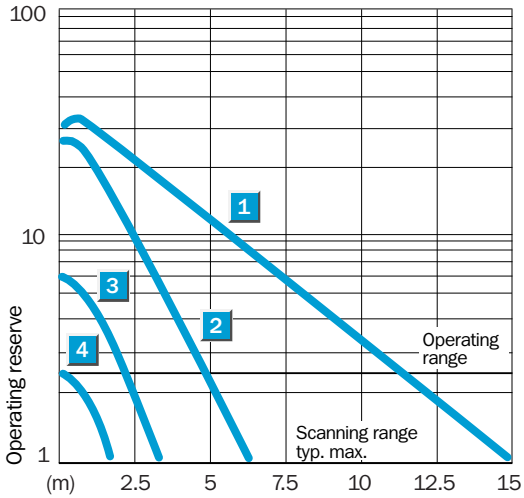
Technical specifications	WS/WE160-	E132	E330	E430	F132	F330	F430
Scanning range typ. max.	0 ... 15 m	■	■	■	■	■	■
Scanning range, recommended	0 ... 11 m	■	■	■	■	■	■
Sensitivity adjustment	Potentiometer, 2 rotations	■	■	■	■	■	■
Light source, light type	LED, red light, 680 nm[1]	■	■	■	■	■	■
Light spot diameter	Approx. 1500 mm at 10 m distance	■	■	■	■	■	■
Angle of dispersion	Approx. 8.5 °	■	■	■	■	■	■
Angle of reception	Approx. 15 °	■	■	■	■	■	■
Supply voltage V_S	DC 10 ... 30 V[2]	■	■	■	■	■	■
Ripple	± 10 %[3]	■	■	■	■	■	■
Power consumption, sender	≤ 20 mA[4]	■	■	■	■	■	■
Power consumption, receiver	≤ 20 mA[4]	■	■	■	■	■	■
Switching outputs	NPN: open collector: Q	■	■	■			
	PNP: open collector: Q				■	■	■
Switching mode	Light-/dark-switching via rotary switch	■	■	■	■	■	■
Signal voltage PNP HIGH / LOW	V_S - 1.8 V / approx. 0 V				■	■	■
Signal voltage NPN HIGH / LOW	Approx. V_S / < 1.8 V	■	■	■			
Output current $I_a$max	100 mA	■	■	■	■	■	■
Response time	≤ 0.5 ms[5]	■	■	■	■	■	■
Switching frequency	1,000 Hz[6]	■	■	■	■	■	■
Connection type	Cable, PVC, 2 m[7]	■			■		
	Connector, M8, 3-pin		■			■	
	Connector, M8, 4-pin			■			■
VDE protection class	⧈	■	■	■	■	■	■
Circuit protection	V_S connections reverse-polarity protected / In-/outputs short-circuit protected / Interference suppression (receiver only) / Outputs overcurrent and short-circuit protected (receiver only)	■	■	■	■	■	■
Enclosure rating	IP 67, IP 69K	■	■	■	■	■	■
Ambient temperature operation	-25 °C ... +55 °C	■	■	■	■	■	■
Ambient temperature storage	-40 °C ... +70 °C	■	■	■	■	■	■
Weight	Approx. 60 g	■			■		
	Approx. 20 g		■	■		■	■
Housing design	Horizontal	■	■	■	■	■	■
Housing material	PBT, PMMA	■	■	■	■	■	■

[1] Average service life 100,000 h at T_a = +25 °C
[2] Limit values, reverse-polarity protected operation in short-circuit protected network max. 8 A
[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

Scanning range and operating reserve



1	Without slotted mask
2	With slotted mask 2 mm, BL-160-SK
3	With slotted mask 1 mm, BL-160-SK
4	With slotted mask 0.5 mm, BL-160-SK



Ordering information

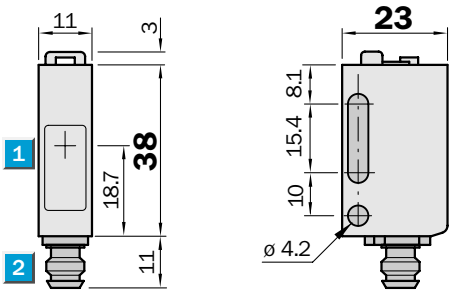
Type	Order no.
WS/WE160-E132	6 022 743
WS/WE160-E330	6 022 747
WS/WE160-E430	6 022 748
WS/WE160-F132	6 022 751
WS/WE160-F330	6 022 755
WS/WE160-F430	6 022 756

Scanning range
0 ... 15 m

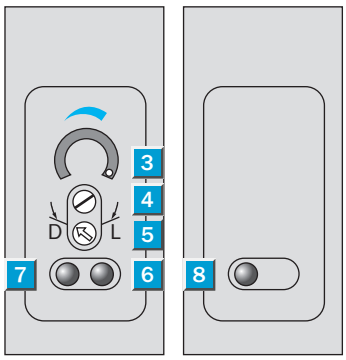
Through-beam photoelectric switch

- Vertical models
- Slotted masks (accessories) for detecting small objects or positioning jobs
- Red light as alignment aid
- Sensitivity adjustable
- LED indicator: operating reserve

Dimensional drawing

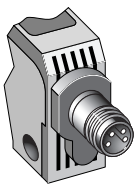
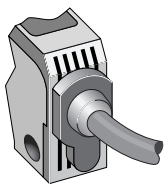
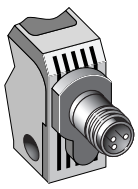
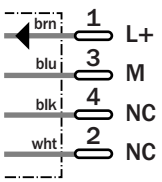
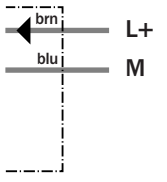
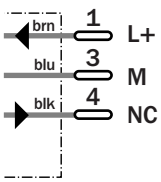
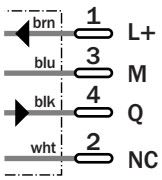
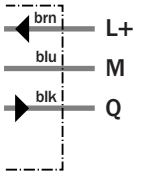
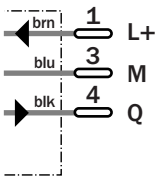


Sender/receiver



1 Centre of optical axis
2 Connector
3 Sensitivity adjuster
4 Scaling 270°
5 Light/dark rotary switch:
L = light switching
D = dark switching
6 LED indicator orange: switching output active
7 LED indicator green: light reception with operating reserve > 1.1 and < 0.9
8 LED indicator red: sender active

Connection type

	WS/WE160-E440 WS/WE160-F440	WS/WE160-E142 WS/WE160-F142	WS/WE160-E340 WS/WE160-F340
			
Sender	M8, 4-pin	2 x 0.2 mm²	M8, 3-pin
			
Receiver	M8, 4-pin	3 x 0.2 mm²	M8, 3-pin
			

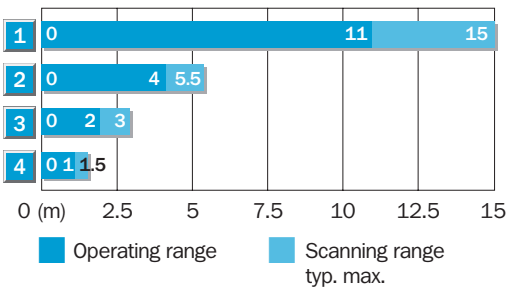
Accessories

Connector, M8, 3-pin
Connector, M8, 4-pin
Mounting systems

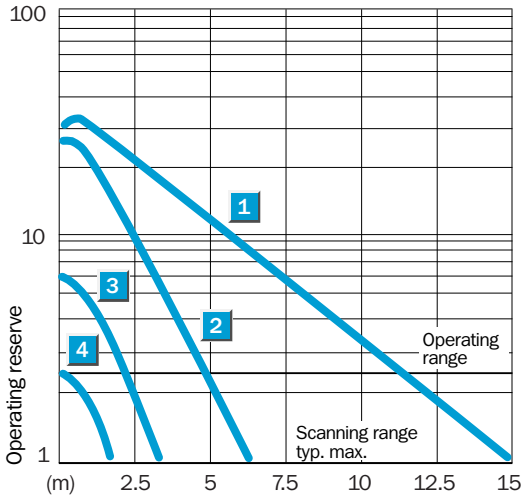
Technical specifications	WS/WE160-	E142	E340	E440	F142	F340	F440
Scanning range typ. max.	0 ... 15 m	■	■	■	■	■	■
Scanning range, recommended	0 ... 11 m	■	■	■	■	■	■
Sensitivity adjustment	Potentiometer, 2 rotations	■	■	■	■	■	■
Light source, light type	LED, red light, 680 nm[1]	■	■	■	■	■	■
Light spot diameter	Approx. 1500 mm at 10 m distance	■	■	■	■	■	■
Angle of dispersion	Approx. 8.5 °	■	■	■	■	■	■
Angle of reception	Approx. 15 °	■	■	■	■	■	■
Supply voltage V_S	DC 10 ... 30 V[2]	■	■	■	■	■	■
Ripple	± 10 %[3]	■	■	■	■	■	■
Power consumption, sender	≤ 20 mA[4]	■	■	■	■	■	■
Power consumption, receiver	≤ 20 mA[4]	■	■	■	■	■	■
Switching outputs	NPN: open collector: Q	■	■	■			
	PNP: open collector: Q				■	■	■
Switching mode	Light-/dark-switching via rotary switch	■	■	■	■	■	■
Signal voltage PNP HIGH / LOW	V_S - 1.8 V / approx. 0 V				■	■	■
Signal voltage NPN HIGH / LOW	Approx. V_S / < 1.8 V	■	■	■			
Output current $I_a$max	100 mA	■	■	■	■	■	■
Response time	≤ 0.5 ms[5]	■	■	■	■	■	■
Switching frequency	1,000 Hz[6]	■	■	■	■	■	■
Connection type	Cable, PVC, 2 m[7]	■			■		
	Connector, M8, 3-pin		■			■	
	Connector, M8, 4-pin			■			■
VDE protection class	⧫	■	■	■	■	■	■
Circuit protection	V_S connections reverse-polarity protected / In-/outputs short-circuit protected / Interference suppression (receiver only) / Outputs overcurrent and short-circuit protected (receiver only)	■	■	■	■	■	■
Enclosure rating	IP 67, IP 69K	■	■	■	■	■	■
Ambient temperature operation	-25 °C ... +55 °C	■	■	■	■	■	■
Ambient temperature storage	-40 °C ... +70 °C	■	■	■	■	■	■
Weight	Approx. 60 g	■			■		
	Approx. 20 g		■	■		■	■
Housing design	Vertical	■	■	■	■	■	■
Housing material	PBT, PMMA	■	■	■	■	■	■

[1] Average service life 100,000 h at T_a = +25 °C
[2] Limit values, reverse-polarity protected operation in short-circuit protected network max. 8 A
[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

Scanning range and operating reserve



1	Without slotted mask
2	With slotted mask 2 mm, BL-160-SK
3	With slotted mask 1 mm, BL-160-SK
4	With slotted mask 0.5 mm, BL-160-SK



Ordering information

Type	Order no.
WS/WE160-E142	6 022 745
WS/WE160-E340	6 022 749
WS/WE160-E440	6 022 750
WS/WE160-F142	6 022 753
WS/WE160-F340	6 022 757
WS/WE160-F440	6 022 758

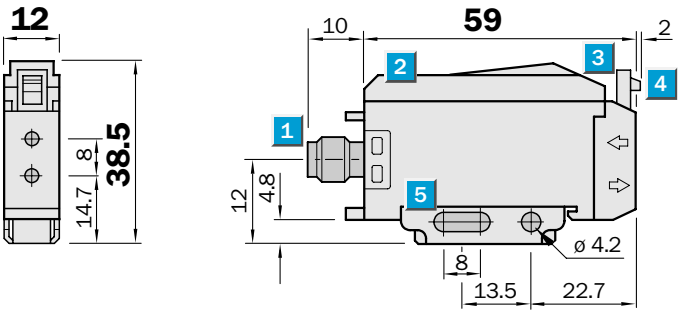
Scanning distance 0 ... 70

Scanning range 0 ... 2.000 mm

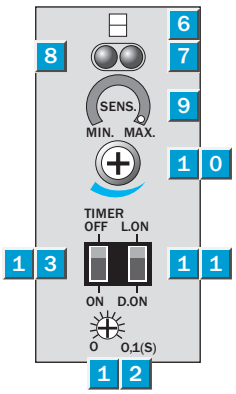
Proximity switch with fibre optic cables

- Sensitivity setting with potentiometer, scaled
- Large selection of LL3 fiber-optic cables
- Switch-off delay 0 to 100 ms
- Contamination control output and test input for equipment and system testing

Dimensional drawing

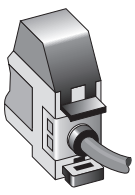
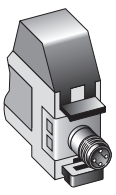
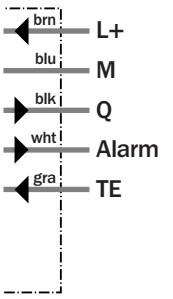
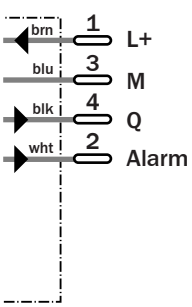


Adjustments possible



1 Connector
2 Protective hood
3 Locking the fiber-optic cables (press down)
4 Releasing the fiber-optic cables (press lug)
5 Mounting bracket (included in delivery)
6 Indication of correct fiber-optic cable mounting
7 LED indicator red (lights when switching threshold is exceeded)
8 LED indicator green (lights when operating reserve is exceeded >1.3)
9 Sensitivity scale 270°
10 Sensitivity adjuster (4 turns)
11 Light/dark slide switch
12 Switch-off delay 0 ...100 ms
13 Time delay on/off switch

Connection type

WLL160-E122 WLL160-F122	WLL160-E420 WLL160-F420
	
5 x 0.2 mm²	M8, 4-pin
	

Accessories

- Adapter for fibre-optic cables
- Connector, M8, 4-pin
- Fibre-optic cables LL3
- Mounting systems
- Tip adaptors

Technical specifications	WLL160-	E122	E420	F122	F420
Operating distance	0 ... 70 mm[1]	■	■	■	■
Fibre-optic cable (proximity system)	LL3-DB01	■	■	■	■
Adjustment of operating distance	Potentiometer, 4 revolutions[2]	■	■	■	■
Scanning range typ. max.	0 ... 2,000 mm	■	■	■	■
Fibre-optic cable (through-beam system)	LL3-TB02 and tip adapter LL3-TA01	■	■	■	■
Scanning range, recommended	0 ... 400 mm	■	■	■	■
Fibre-optic cable (through-beam system)	LL3-TB01	■	■	■	■
Sensitivity adjustment	Potentiometer, 4 revolutions[2]	■	■	■	■
Light source, light type	LED, Red light, 660 nm[3]	■	■	■	■
Light spot diameter	Depending on the scanning range	■	■	■	■
Angle of dispersion	Approx. 65 °	■	■	■	■
Supply voltage V_S	DC 10 ... 30 V[4]	■	■	■	■
Ripple	± 10 %[5]	■	■	■	■
Power consumption	≤ 30 mA[6]	■	■	■	■
Switching outputs	NPN: open collector: Q	■	■		
	PNP: open collector: Q			■	■
Switching mode	Light-/dark-switching via slide switch	■	■	■	■
Output current $I_a$max	100 mA	■	■	■	■
Response time	≤ 0.35 ms[7]	■	■	■	■
Switching frequency	1,500 Hz[8]	■	■	■	■
Time delay	Selectable, via slide switch	■	■	■	■
Time type	Switch-off delay T_{OFF} 0 ... 100 ms	■	■	■	■
Test input sender off	TE to 0 V	■			
	TE to V+			■	
Alarm output	Contamination message, 100mA, static	■	■	■	■
Connection type	Cable, PVC, 2 m[9]	■		■	
	Connector, M8, 4-pin		■		■
VDE protection class	⏚	■	■	■	■
Circuit protection	V_S connections reverse-polarity protected / In-/outputs short-circuit protected / Interference suppression / Outputs overcurrent and short-circuit protected	■	■	■	■
Enclosure rating	IP 66	■	■	■	■
Ambient temperature operation	-25 °C ... +55 °C	■	■	■	■
Ambient temperature storage	-40 °C ... +70 °C	■	■	■	■
Weight	Approx. 80 g	■		■	
	Approx. 30 g		■		■
Housing material	ABS	■	■	■	■

[1] Object with 90 % remission (based on standard white to DIN 5033)
[2] Sensitivity scale 270
[3] Average service life 100,000 h at T_a = +25 °C
[4] Limit values, reverse-polarity protected operation in short-circuit protected network max. 8 A
[5] may not exceed or fall short of V_S tolerances
[6] without load
[7] Signal transit time with resistive load
[8] with light/dark ratio 1:1
[9] do not bend below 0 °C

Ordering information

Type	Order no.
WLL160-E122	6 009 981
WLL160-E420	6 009 982
WLL160-F122	6 009 989
WLL160-F420	6 009 990

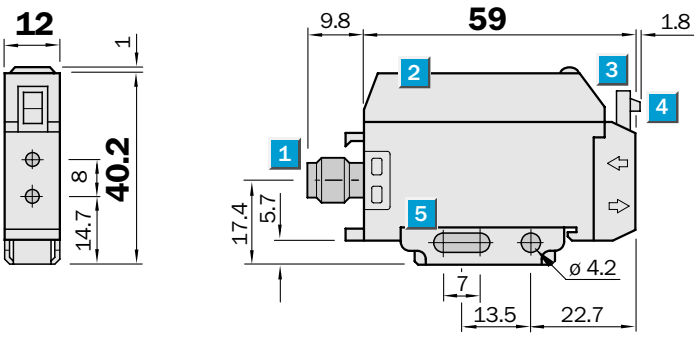
Scanning distance 0 ... 70

Scanning range 0 ... 2.000 mm

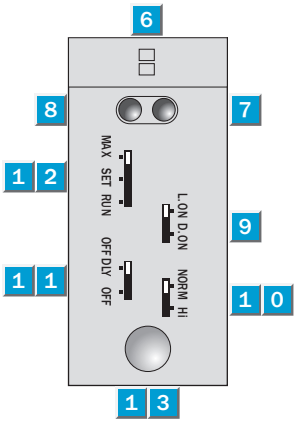
Proximity switch with fibre optic cables

- Automatic setting of the switching threshold and hysteresis with Teach-In per push button or via external control wire ET
- Large selection of LL3 plastic fiber-optic cables
- Switching frequency 830/s or 1660/s, switchable

Dimensional drawing

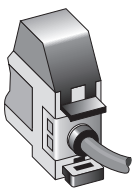
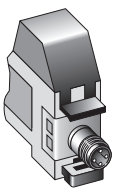
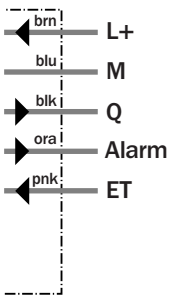
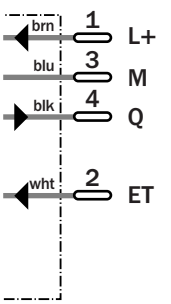


Adjustments possible



1	Connector
2	Protective hood
3	Lock the fiber-optic cables (press down)
4	Release the fiber-optic cables (press lug)
5	Mounting bracket, supplied with equipment
6	Indication of correct fiber-optic cable mounting
7	LED signal strength indicator, red (lights when switching threshold is exceeded)
8	LED signal strength indicator, green
9	Selector switch light ("L.ON") / dark switching ("D.ON")
10	Selector switch response time, NORM (600 µs) / HI (300 µs)
11	Selector switch switch-off delay On ("OFF DLY") / off ("OFF"); 40 ms fix
12	Operating mode selector switch "MAX / SET / RUN"
13	Push button Teach-In

Connection type

WLL160T-E132 WLL160T-F132	WLL160T-E430 WLL160T-F430
	
5 x 0.18 mm²	M8, 4-pin
	
brn L+ blu M blk Q ora Alarm pnk ET	brn 1 L+ blu 3 M blk 4 Q wht 2 ET

Accessories

- Adapter for fibre-optic cables
- Connector, M8, 4-pin
- Fibre-optic cables LL3
- Mounting systems
- Tip adaptors

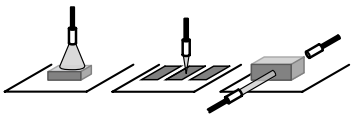
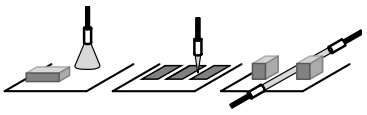
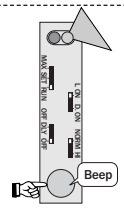
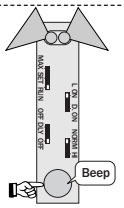
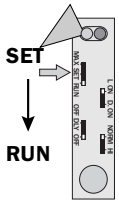
Technical specifications	WLL160T-	E132	E430	F132	F430
Operating distance	0 ... 70 mm[1]	■	■	■	■
Fibre-optic cable (proximity system)	LL3-DB01	■	■	■	■
Adjustment of operating distance	Teach-in: single teach button & cable	■	■	■	■
Scanning range typ. max.	0 ... 2,000 mm	■	■	■	■
Fibre-optic cable (through-beam system)	LL3-TB02 and tip adapter LL3-TA01	■	■	■	■
Scanning range, recommended	0 ... 400 mm	■	■	■	■
Fibre-optic cable (through-beam system)	LL3-TB01	■	■	■	■
Sensitivity adjustment	Teach-in: single teach button & cable	■	■	■	■
Light source, light type	LED, Red light, 660 nm[2]	■	■	■	■
Light spot diameter	depending on the scanning range	■	■	■	■
Angle of dispersion	Approx. 65 °	■	■	■	■
Supply voltage V_S	DC 10 ... 24 V[3]	■	■	■	■
Ripple	≤ 5 V_{PP}[4]	■	■	■	■
Power consumption	≤ 50 mA[5]	■	■	■	■
Switching outputs	NPN: open collector: Q	■	■		
	PNP: open collector: Q			■	■
Switching mode	Light-/dark-switching via slide switch	■	■	■	■
Output current $I_a$max	100 mA	■	■	■	■
Response time	Selectable: 0.3 ms / 0.6 ms	■	■	■	■
Switching frequency	Selectable: 1660/s; 830/s	■	■	■	■
Time delay	Selectable: 40 ms fixed	■	■	■	■
Time type	Switch-off delay T_{OFF}	■	■	■	■
Alarm output	30 mA, one shot, pulse length 40 ms	■	■	■	■
Connection type	Cable, PVC, 2 m[6]	■		■	
	Connector, M8, 4-pin		■		■
VDE protection class	⧈	■	■	■	■
Circuit protection	V_S connections reverse-polarity protected / In-/outputs short-circuit protected / Interference suppression / Outputs overcurrent and short-circuit protected	■	■	■	■
Enclosure rating	IP 66	■	■	■	■
Ambient temperature operation	-25 °C ... +55 °C	■	■	■	■
Ambient temperature storage	-40 °C ... +70 °C	■	■	■	■
Weight	Approx. 80 g	■		■	
	Approx. 30 g		■		■
Housing material	ABS, acrylonitrile butadiene styrene	■	■	■	■

[1] Object with 90 % remission (based on standard white to DIN 5033)
[2] Average service life 100,000 h at T_a = +25 °C
[3] ± 10 %
[4] may not exceed or fall short of V_S tolerances
[5] without load
[6] do not bend below 0 °C

Ordering information	
Type	**Order no.**
WLL160T-E132	6 010 648
WLL160T-E430	6 010 649
WLL160T-F132	6 010 650
WLL160T-F430	6 010 651

1. Precise sensitivity setting (per 2 x push of button); WLL160T

Teach-in steps

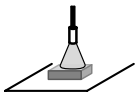
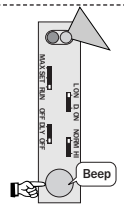
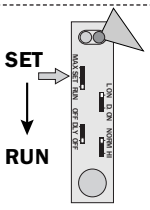
Switching speed	Slide switch NORM or HI			
	1	2	3	4
Positioning of the parts	START Teach-in	Detection system / Through-beam system  Parts present	Detection system / Through-beam system  Parts present	STOP Sensor mode
■ Teach-in manual	Reset: RUN → SET 	Push button 	Push button 	SET → RUN 
■ Teach-in external (ET) per control signal	MODE switch in **RUN pos.**	Activate ET signal 1-3 s	ET signal pause 3-5 s; then activate ET signal > 1 s Alarm impulse 40 ms? Teach-in error, signal difference between part present/absent too small. Check application.	Automatically in sensor operation after 2 s.

The Teach-in button is pressed twice. This operating mode provides **high sensitivity** and is ideal for **very precise switching points.** The WLL160T optimises the switching threshold and hysteresis per µ-processor automatically and stores them in EEPROM. No special experience in precise alignment of opto-electronic components necessary.

Applications:
Through-beam system; even thin or transparent objects are detected.
Detection system; strong background interference, small or dark scanning objects, simple marks with contrast differences.

2. Simple sensitivity setting (per 1 x push of button); WLL160T

Teach-in steps

Switching speed	Slide switch NORM or HI			
	1	2	3	
Positioning of the parts	START Teach-in	Detection system / Through-beam system  Parts in light path / Parts not in light path	STOP Sensor mode	
■ Teach-in manual	Reset: RUN → SET 	Push button 	SET → RUN 	
■ Teach-in external (ET) per control signal	MODE switch in **RUN** pos.	Activate ET signal 1-3 s No alarm output function in Teach-in mode	Automatically in sensor operation after 2 s.	

The Teach-in button is only pressed once. This operating mode provides **simple handling.** The WLL160T system detects existing background interference automatically. The WLL160T optimises the switching thresh-old and stores it in EEPROM. No special experience in setting the sensitivity of opto-electronic components necessary.

Applications:
Through-beam system; even small or partially transparent parts, which do not interrupt the light path completely, are detected. Detection system; background interference considered.

3. Max. scanning range, fixed setting; WLL160T

Scanning range set permanently to MAX

Teach-in Steps

		1	2	3
Switching speed	**Always 830 Hz [1)]**	**NORM or HI (optionally 830 Hz or 1660 Hz)**		
Positioning of the parts	START → STOP	START Teach-in	Detection system / Through-beam system Parts not in light path / Parts in light path	STOP Sensor mode
■ **Teach-in manual**	Slide switch to MAX pos. RUN → MAX*	Reset: RUN → SET	Press button 1x	SET → RUN
■ **Teach-in external (ET)** per control signal	Not possible if selector switch is set to MAX, scanning range internally fixed to MAX.	**MODE switch** in **RUN** pos.	Activate ET signal 1-3 s No alarm output function in Teach-in mode	Automatically in sensor operation after 2 s.

Manual: The **MAXimum scanning range** is set permanently in the MAX pos. with the MODE switch.
[1)] The switching speed is always 830 Hz, independent of the operating mode selector switch NORM/HI.

Per Teach-in: The **Teach-in button** is only pressed once – very simple handling.
The **maximum scanning range** is set per Teach-in. The WLL160 T stores the basic signal in EEPROM and the switching threshold and hysteresis sensor operation. No special experience in precise alignment of opto-electronic components necessary.

Applications:
Very simple handling. This operating mode is ideal for large differences in signals. Through-beam system; objects interrupt the light beam. Detection system; no or little background interference, objects with large differences in contrast.

4. Moving objects; precise sensitivity adjustment (per 2 x push of button); WLL160T

Teach-in steps

	1	2		3
Switching speed	**Slide switch NORM or HI**			
Positioning of the parts	START Teach-in	Detection system / Through-beam system Parts not in light path	Parts move through the light path	STOP Sensor mode
■ **Teach-in manual**	Reset: RUN → SET	Press button > 1 s	Press button > 3 s	SET → RUN
■ **Teach-in external ET** per control signal	**MODE switch** in Pos. **RUN**	Activate ET signal 1-3 s	ET signal pause 3-5 s; then activate ET signal > 1 s Alarm impuls 40 ms? Teach-in error, signal difference between part present/absent too small. Check application.	Automatically in sensor operation after 2 s.

Teach-in for moving objects.
The Teach-in button is pressed twice. The simple Teach-in handling makes precise sensitivity adjustment possible although objects are moving. The WLL160T optimises per µ-processor the switching threshold and hysteresis and stores them in EEPROM.
No special experience in precise alignment of opto-electronic components necessary.

Applications:
Objects can only be taught in during movement (rejection check; equipment cannot be stopped precisely).

Functions WLL160T Teach-in

Response time/ switching speed

NORM: 830 Hz; max. system scanning distance.
HI: 1660 Hz, system scanning distance 70 %. Select before Teach-in!

Switch-off delay T_{OFF}

For switching output Q. Optional connection, 40 ms fixed. To ensure that your control can also detect shorter events.

Selector switch switching output Q

L.ON: light switching
D.ON: dark switching optionally in PNP or NPN.

Connection technique

Optionally M8 plug,
4-pin (no alarm output) or 5-wire connecting cable.

Alarm output

- **Teach-in mode:** signals Teach-in error.
- **Sensor mode** (RUN): signals insufficient signal reserve, e.g., due to soiling or misalignment (not with plug version M8 – 4-pin).

WLL160T Assembly technology

Assembly and disassembly on top hat profile rail mounting by pulling the locking device.

Mounting technique

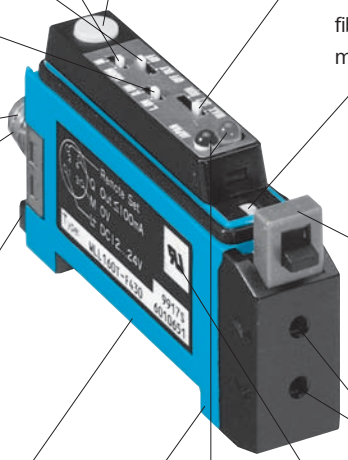
Simple snap-on on top hat profile rails. Mounting bracket supplied with equipment.

µ-Processor technique with EEPROM

Permanent storage of taught-in switching threshold and hysteresis, even when there are longer interruptions of voltage.

Teach-in button

Sensitivity setting at the push of a button. No special knowledge of phototelectric switches required. Only active if MODE selector switch is set to SET pos. (manipulation protection).

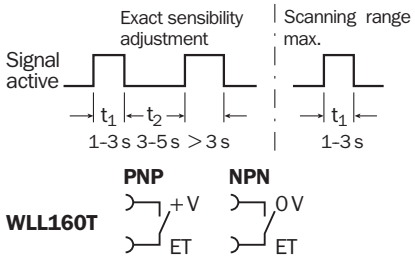


Indicator for correct fibre-optic cable mounting.

LED display red, green

- **Teach-in mode:**
  Signalisation Teach-in process.
  Permanently blinking: Teach-in error.
  Permanently lit: Teach-in OK.
- **Sensor operation:**
  LED red: switching threshold exceeded
  LED green: received signal > 1.1 or < 0.9

External Teach-in signal ET



TEACH-IN mode selector switch

Separate from operating mode functions, and consequently simple and easy-to-understand handling; no double functions.

- **MAX:** Maximum scanning range set permanently. Caution: switching speed independent of operating mode selection; switching speed always 830 Hz.
- **SET:** WLL160T in manual Teach-in mode. Optimum switching point setting at the simple push of a button (1 or 2 times).
- **RUN:** optionally

– Teach-in manual: The taught-in switching threshold and hysteresis are stored in EEPROM.
The WLL160T operates in sensor mode after 2 s.
– External Teach-in (ET):
Optimum system adjustment using external control signal. Ideal if the WLL160T is not accessible or part changes are often aligned automatically.

Fibre-optic cable lock

Press down bracket: fibre-optic cables are locked. Press the lug: fibre-optic cables are released.

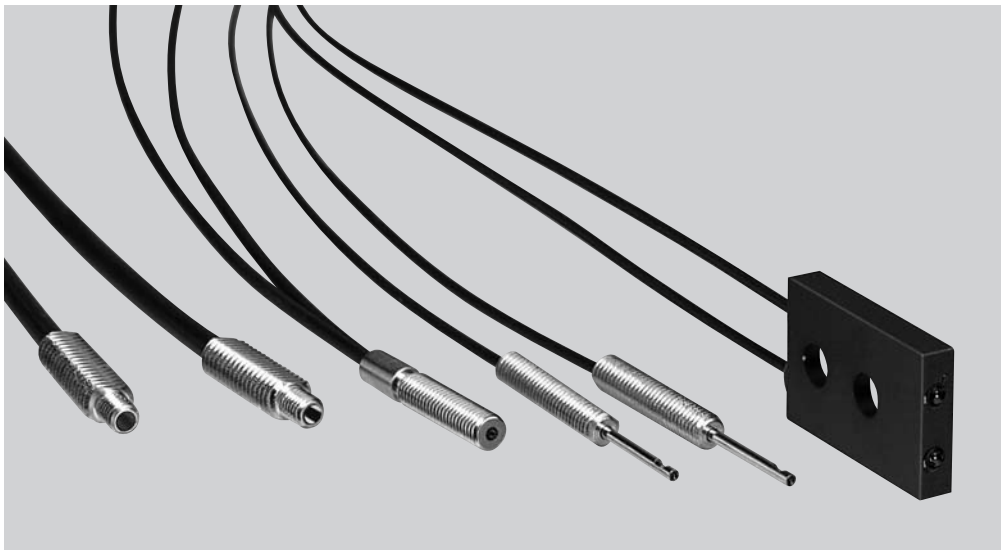
Fibre-optic cable attachment

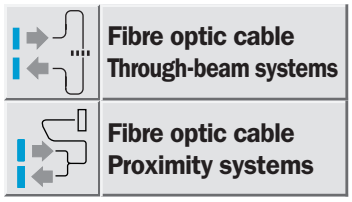
→ Transmitter fibre-optic cable
← Receiver fibre-optic cable
Suitable fibre-optic cable: **plastic fibre-optic cables of the LL3 series** (see the description of the LL3 variants).

BUZZER

For acoustic support. Short tone after Teach-in = OK.
Long tone after Teach-in = error or application not suitable.

LL3:
Fibre-optic cables – solving automation problems





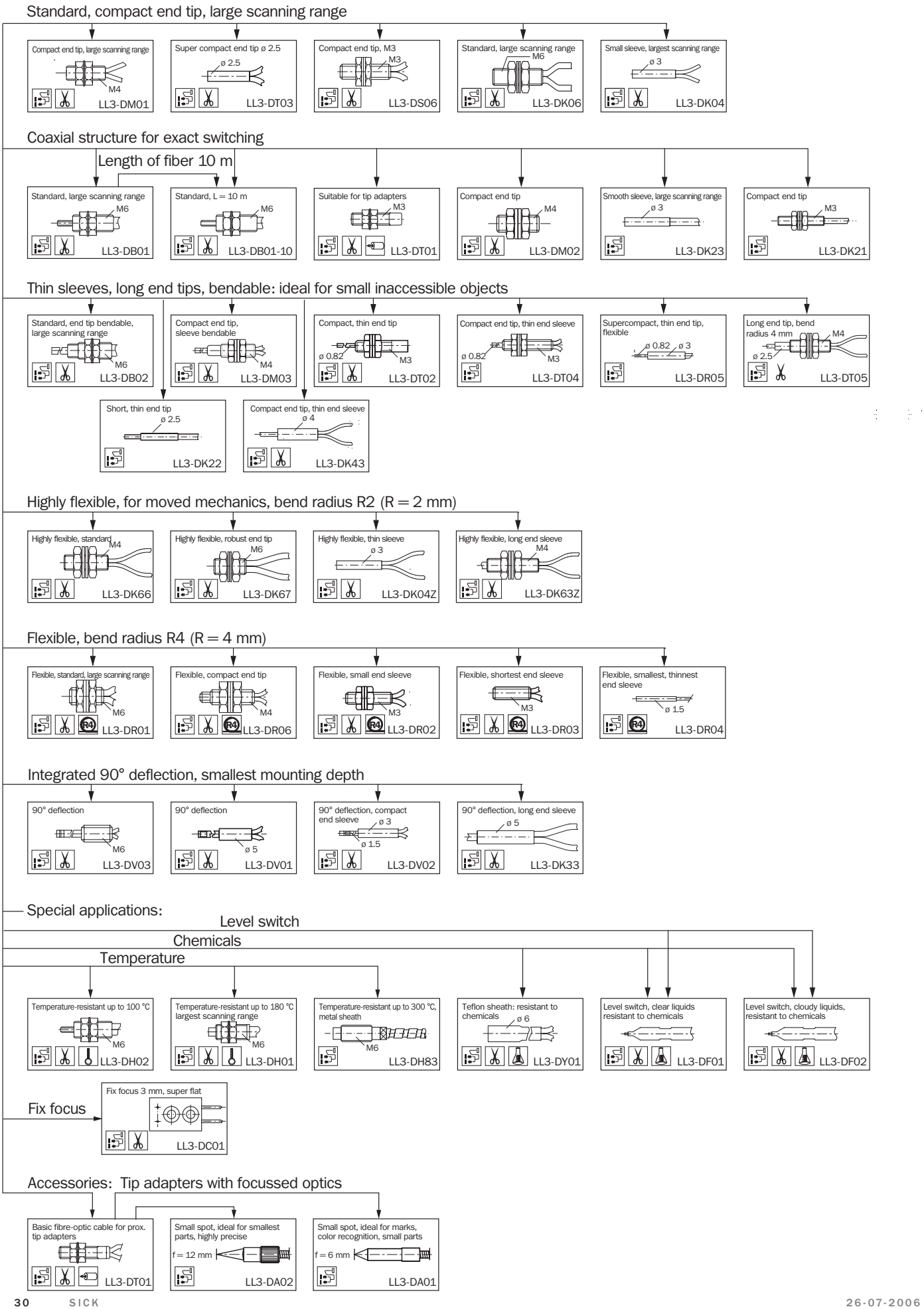
Lack of installation space (even for miniature photoelectric switches) or exposure to chemicals or heat are frequent reasons for using the plastic fibre-optic cable LL3. In combination with the photoelectric switch series WLL170(T), the LL3s assure reliable object detection even under difficult conditions.

Its multiple flexibility is one of the main advantages of the LL3. It has small bending radii and can be easily shortened to the required length. A number of different end sleeves also mean that it is easy to connect and install.

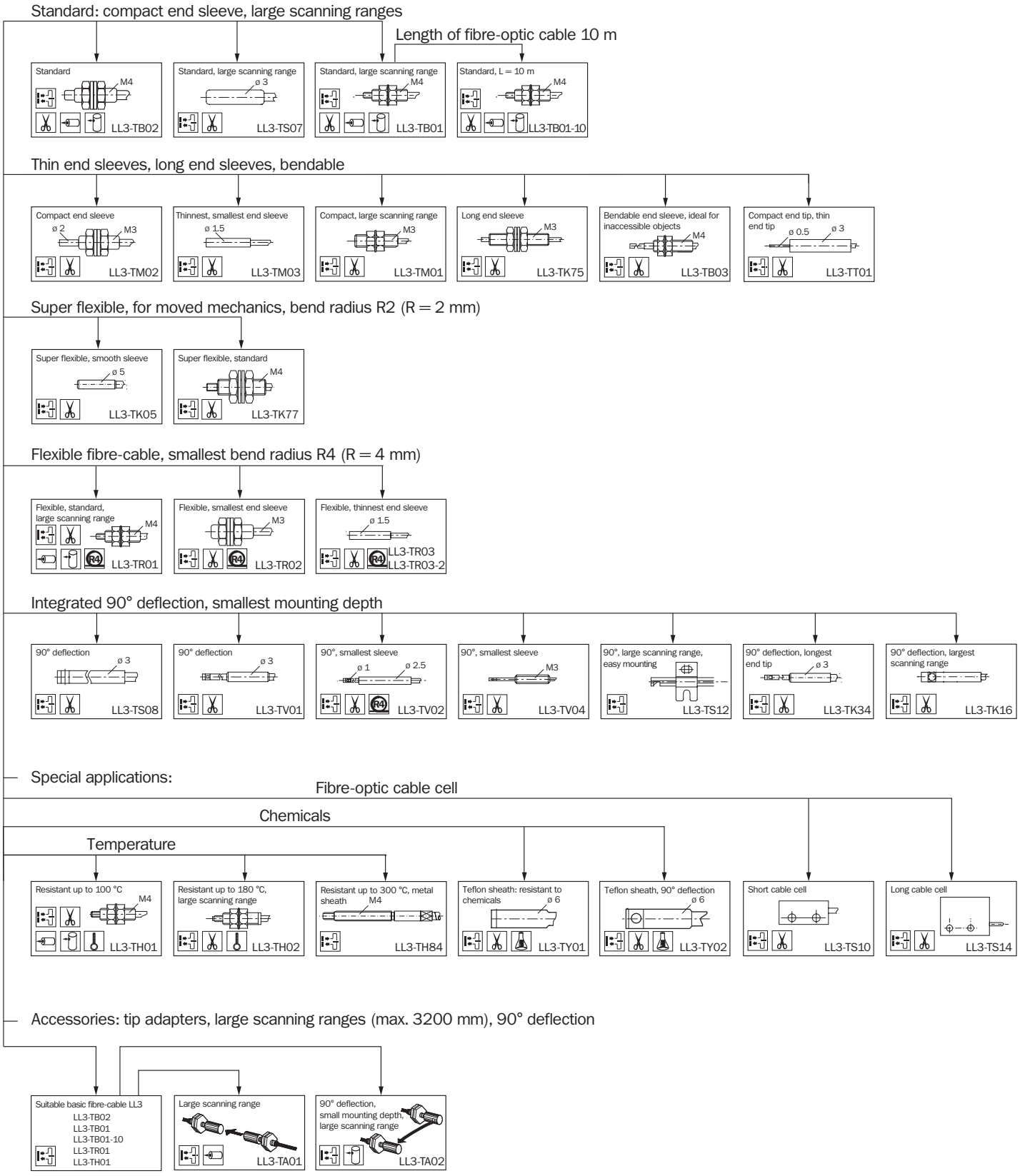
To this should be added the large number of different variants. Around 70 different versions of the LL3 offer optimum alternatives for virtually every application in the optical, mechanical and chemical fields. A number of different attachment lenses extend its field of possible applications even further. The fibre-optic cable of type LL3 and the fibre-optic cable photoelectric switch by SICK are an unbeatable team with a high degree of success in semiconductor and electronics assembly, packaging, handling and assembly systems, special engineering and fine mechanics.

LL3 options:
– Standard optical conductor
– Large range
– Attachment lenses
– Small end sleeves for confined spaces
– Highly flexible with small bending radii
– Integrated 90° deflection
– Temperature resistant up to 300 °C
– Teflon sheath for corrosive surroundings
– Coaxial design
– Flexible end sleeves
– 10 meters in length
– Optical-guide line
– Level switch ...

Flowchart for selection of plastic fibre-optic cable, proximity systems



Flowchart for selection of plastic fibre-optic cable, through-beam systems



LL3 Plastic fibre-optic cables, scanning ranges combined with WLL160 series

Type	Order no.	WLL160, manual sensitivity Operating range [mm]	WLL160T Large scanning range Operating range [mm]	WLL160T High-Speed 1,666 kHz Operating range [mm]
Standard type				
LL3-DM01	5308071	70	70	50
LL3-DT03	5308072	20	20	14
LL3-DS06	5308073	20	20	14
LL3-DK06	5313019	70	70	50
LL3-DK04	5313020	70	70	50
Coaxial cable				
LL3-DB01	5308074	70	70	50
LL3-DB01-10	5308075	40	40	30
LL3-DB03	5313021	70	70	50
LL3-DT01	5308076	25	25	18
LL3-DM02	5308077	25	25	18
LL3-DK23	5313022	70	70	50
LL3-DK21	5313023	8	8	5
Super flexible, bend radius R = 2 mm				
LL3-DK66	5313024	65	65	45
LL3-DK67	5313025	65	65	45
LL3-DK04Z	5313026	65	65	45
LL3-DK63Z	5313027	65	65	45
Flexible, bend radius R = 4 mm				
LL3-DR01	5308078	70	70	50
LL3-DR02	5308079	9	9	6
LL3-DR03	5308080	20	20	14
LL3-DR04	5308081	9	9	6
LL3-DR06	5308082	20	20	14
Long end tips				
LL3-DB02	5308083	70	70	50
LL3-DM03	5308084	20	20	14
LL3-DT02	5308085	5	5	3
LL3-DT04	5308086	9	9	5
LL3-DT05	5313028	20	20	14
LL3-DR05	5308087	5	5	3
LL3-DK22	5313029	30	30	25
LL3-DK43	5313030	20	20	14
Integrated 90° deflection				
LL3-DV01	5308088	40	40	30
LL3-DV02	5308089	9	9	5
LL3-DV03	5308090	40	40	30
LL3-DK33	5313031	40	40	30
Level switch for liquids				
LL3-DF01	5308094	Clear liquid	Clear liquid	Not possible
LL3-DF02	5308095	Cloudy liquid	Cloudy liquid	Not possible
Temperature-resistant				
LL3-DH01	5308091	100	100	70
LL3-DH02	5308092	55	55	50
LL3-DH83	5313032	100	100	70
Teflon sheath				
LL3-DY01	5308093	Not possible	45	Not possible
Fix focus				
LL3-DC01	5313033	3	3	3

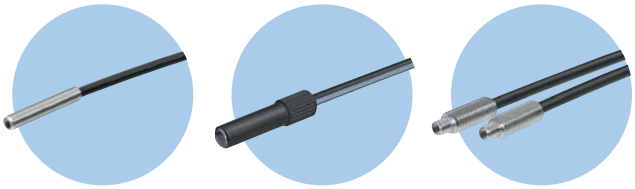
LL3 Plastic fibre-optic cables, scanning ranges combined with WLL160 series

Type	Order no.	WLL160, manual sensitivity Operating range [mm]	WLL160T Large scanning range Operating range [mm]	WLL160T High-Speed 1,660 kHz Operating range [mm]
Standard type				
LL3-TS07	5308049	500	500	360
LL3-TB01	5308050	400	400	280
LL3-TB01-10	5308051	250	250	190
LL3-TB02	5308048	200	200	150
Super flexible, bend radius R = 2 mm				
LL3-TK05	5313034	200	200	150
LL3-TK77	5313035	200	200	150
Flexible, bend radius R = 4 mm				
LL3-TR01	5308052	180	180	130
LL3-TR02	5308053	50	50	40
LL3-TR03	5308054	50	50	40
LL3-TR03-02	5308055	50	50	40
Long end tips				
LL3-TB03	5308056	200	200	150
LL3-TT01	5308057	18	18	10
LL3-TK75	5313036	70	70	50
Integrated 90° deflection				
LL3-TV01	5308058	150	150	130
LL3-TV02	5308059	40	40	30
LL3-TV04	5308060	40	40	30
LL3-TS08	5308061	200	200	150
LL3-TS12	5308062	700	700	400
LL3-TK34	5313037	150	150	130
LL3-TK16	5313038	800	800	500
Fibre-optic cable cell				
LL3-TS10	5308063	260	260	190
LL3-TS14	5313039	260	260	190
Temperature-resistant				
LL3-TH01	5308064	180	180	130
LL3-TH02	5308065	350	350	240
LL3-TH84	5313040	170	170	140
Teflon sheath				
LL3-TY01	5308066	1000	1000	700
LL3-TY02	5308067	250	250	180
Smallest end sleeves				
LL3-TM01	5308068	200	200	150
LL3-TM02	5308069	70	70	50
LL3-TM03	5308070	70	70	50

Tip adapters for LL3 Plastic fibre-optic cables, scanning ranges combined with WLL160 series

Type LL3 proximity, lenses with focussed optic	Order no.	WLL160, manual sensitivity Operating range [mm]	WLL160T Large scanning range Operating range [mm]	WLL160T High-Speed 1,666 kHz Operating range [mm]
Focus 6 mm, spot size Ø 0.25 mm				
LL3-DA01	5308127			
Combined with standard fibre LL3				
LL3-DT01	5308076	6 ± 1	6 ± 1	Not possible
Focus 12 mm, spot size Ø 3.0 mm				
LL3-DA02	5308130			
Combined with standard fibre LL3				
LL3-DT01	5308076	12 ± 3	12 ± 3	Not possible

Type LL3 through-beam, lenses for extended scanning ranges	Order no.	WLL160, manual sensitivity Operating range [mm]	WLL160T Large scanning range Operating range [mm]	WLL160T High-Speed 1,666 kHz Operating range [mm]
Axial optic, largest scanning ranges				
LL3-TA01	5308128			
Combined with standard fibres LL3				
LL3-TB01	5308050	1500	1500	1050
LL3-TB01-10	5308051	900	900	660
LL3-TB02	5308048	2000	2000	1500
Combined with super flexible fibres				
LL3-TK77	5313035	2000	2000	1500
Combined with flexible fibres				
LL3-TR01	5308052	1200	1200	850
Combined with heat resisting fibres (100 °C)				
LL3-TH01	5308064	1500	1500	1050
Integrated 90° deflection, large scanning ranges				
LL3-TA02	5308129			
Combined with standard fibres LL3				
LL3-TB01	5308050	400	400	270
LL3-TB01-10	5308051	250	250	180
LL3-TB02	5308048	350	350	250
Combined with super flexible fibres				
LL3-TK77	5313035	350	350	250
Combined with flexible fibres				
LL3-TR01	5308052	250	250	180
Combined with heat resisting fibres (100 °C)				
LL3-TH01	5308064	250	350	180



Fibre-optic cables – solving automation problems

Fibre-optic cables provide “slimline” and flexible connection between the sensor and the sensing target. They are key to sensing solutions and often the only way to detect inaccessible objects, details, and printed marks.

OPTICAL FIBRE

Optical fibres in plastic or glass. Suitable for all requirements.

Plastic fibre-optic cable
- Mono fibre or fibre bundle
- Smallest bending radii
- Extremely flexible
- Low weight
- Can be cut to desired length
- Ambient temperatures from –40 to +180 °C

Glass fibre-optic cable
- Fibre bundle
- Chemically resistant
- For extreme temperatures from –55 to +315 °C

END SLEEVE

Assembly-oriented end sleeves, enabling the fibre-optic cable to be easily mounted in the required sensing position.

End sleeve options
- Very thin end sleeves from Ø 1.5 mm
- Long, slim end sleeves
- Flexible end tips
- Integral 90° deflection
- Special end sleeves

PROTECTIVE SHEATHING

Protects the fibre core from mechanical or chemical damage.

Plastic sheathing
- Lightweight
- Flexible
- Generally resistant
- For standard applications

Protective metal sheath
- For temperatures up to +315 °C
- Protection from mechanical stress

Teflon sheathing
- Protection from extremely aggressive chemicals

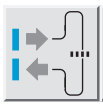
LL3 Plastic fibre-optic cables Proximity systems

Type	Order no.	Object size		Suitable for scanning tip adapter [2]	LL3 – Core structure C = Coaxial, S = Sender, R = Receiver	Can be shortened as required [3]	LL3-Length	LL3-Outside Ø	Bend radius R LL3
		Standard: white 90 %	Minimum [1]						
Standard type									
LL3-DM01	5308071	100 x 100 mm	Ø 0.015 mm	No	2 x : Ø 1.0 mm	Yes	2 m	1.3 mm	R25
LL3-DT03	5308072	30 x 30 mm	Ø 0.015 mm	No	2 x : Ø 0.5 mm	Yes	2 m	1.0 mm	R15
LL3-DS06	5308073	30 x 30 mm	Ø 0.015 mm	No	2 x : Ø 0.5 mm	Yes	2 m	2.2 mm	R15
LL3-DK06	5313019	100 x 100 mm	Ø 0.015 mm	No	2 x : Ø 1.0 mm	Yes	2 m	2.2 mm	R25
LL3-DK04	5313020	100 x 100 mm	Ø 0.015 mm	No	2 x : Ø 1.0 mm	Yes	2 m	1.3 mm	R25
Coaxial cable									
LL3-DB01	5308074	100 x 100 mm	Ø 0.015 mm	No	C, S: Ø 1.0 mm, R: 16 x Ø 0.25 mm	Yes	2 m	2.2 mm	R25
LL3-DB01-10	5308075	100 x 100 mm	Ø 0.015 mm	No	C, S: Ø 1.0 mm, R: 16 x Ø 0.25 mm	Yes	10 m	2.2 mm	R25
LL3-DB03	5313021	100 x 100 mm	Ø 0.015 mm	No	C, S: Ø 1.0 mm, R: 16 x Ø 0.25 mm	Yes	2 m	2.2 mm	R25
LL3-DT01	5308076	30 x 30 mm	Ø 0.015 mm	Yes	C, S: Ø 0.5 mm, R: 9 x Ø 0.25 mm	Yes	2 m	1.3 mm	R15
LL3-DM02	5308077	30 x 30 mm	Ø 0.015 mm	No	C, S: Ø 0.5 mm; R: 9 x Ø 0.25 mm	Yes	2 m	1.3 mm	R15
LL3-DK23	5313022	30 x 30 mm	Ø 0.015 mm	No	C, S: Ø 1.0 mm, R: 16 x Ø 0.25 mm	No	0.5 m	2.6 mm	R25
LL3-DK21	5313023	30 x 30 mm	Ø 0.015 mm	No	C, S: Ø 0.25 mm, R: 10 x Ø 0.125 mm	No	2 m	1.6 mm	R15
Super flexible, bend radius R = 2 mm									
LL3-DK66	5313024	100 x 100 mm	Ø 0.015 mm	No	2 x : Ø 1.0 mm	Yes	2 m	1.3 mm	R2
LL3-DK67	5313025	100 x 100 mm	Ø 0.015 mm	No	2 x : Ø 1.0 mm	Yes	2 m	2.2 mm	R2
LL3-DK04Z	5313026	100 x 100 mm	Ø 0.015 mm	No	2 x : Ø 1.0 mm	Yes	2 m	1.3 mm	R2
LL3-DK63Z	5313027	100 x 100 mm	Ø 0.015 mm	No	2 x : Ø 1.0 mm	Yes	2 m	1.3 mm	R2
Flexible, bend radius R = 4 mm									
LL3-DR01	5308078	100 x 100 mm	Ø 0.015 mm	No	S: 16 x Ø 0.26 mm, R: 16 x Ø 0.26 mm	Yes	2 m	2.2 mm	R4
LL3-DR02	5308079	30 x 30 mm	Ø 0.015 mm	No	S: 2 x Ø 0.25 mm, R: 2 x Ø 0.25 mm	Yes	1 m	1.0 mm	R4
LL3-DR03	5308080	30 x 30 mm	Ø 0.015 mm	No	S: 4 x Ø 0.25 mm, R: 4 x Ø 0.25 mm	Yes	2 m	1.0 mm	R4
LL3-DR04	5308081	30 x 30 mm	Ø 0.015 mm	No	S: 2 x Ø 0.25 mm, R: 2 x Ø 0.25 mm	No	1 m	1.2 mm	R4
LL3-DR06	5308082	30 x 30 mm	Ø 0.015 mm	No	S: 4 x Ø 0.25 mm, R: 4 x Ø 0.25 mm	Yes	2 m	1.0 mm	R4
Long end tips									
LL3-DB02	5308083	100 x 100 mm	Ø 0.015 mm	No	C, S: Ø 1.0 mm, R: 16 x Ø 0.25 mm	Yes	2 m	2.2 mm	R25
LL3-DM03	5308084	30 x 30 mm	Ø 0.015 mm	No	2 x Ø 0.5 mm	Yes	2 m	1.0 mm	R15
LL3-DT02	5308085	30 x 30 mm	Ø 0.015 mm	No	2 x Ø 0.25 mm	Yes	2 m	1.0 mm	R4
LL3-DT04	5308086	30 x 30 mm	Ø 0.015 mm	No	C, S: Ø 0.25 mm, R: 9 x Ø 0.125 mm	No	0.5 m	1.2 mm	R4
LL3-DT05	5313028	30 x 30 mm	Ø 0.015 mm	No	2 x Ø 0.5 mm	Yes	2 m	1.0 mm	R15
LL3-DR05	5308087	30 x 30 mm	Ø 0.015 mm	No	2 x Ø 0.25 mm	No	0.5 m	2.2 mm	R4
LL3-DK22	5313029	30 x 30 mm	Ø 0.015 mm	No	C, S: Ø 0.5 mm, R: 9 x Ø 0.25 mm	No	0.5 m	2.1 mm	R15
LL3-DK43	5313030	30 x 30 mm	Ø 0.015 mm	No	2 x : Ø 0.5 mm	Yes	2 m	1.0 mm	R15
Integrated 90° deflection									
LL3-DV01	5308088	30 x 30 mm	Ø 0.025 mm	No	2 x Ø 1.0 mm	Yes	2 m	2.2 mm	R25
LL3-DV02	5308089	30 x 30 mm	Ø 0.015 mm	No	2 x Ø 0.5 mm	Yes	2 m	1.0 mm	R15
LL3-DV03	5308090	30 x 30 mm	Ø 0.025 mm	No	2 x Ø 1.0 mm	Yes	2 m	2.2 mm	R25
LL3-DK33	5313031	30 x 30 mm	Ø 0.025 mm	No	2 x Ø 1.0 mm	Yes	2 m	2.2 mm	R25
Level switch for liquids									
LL3-DF01	5308094	Clear liquid	–	No	2 x Ø 1.0 mm	Yes	2 m	6 mm	R60
LL3-DF02	5308095	Cloudy liquid	–	No	2 x Ø 1.0 mm	Yes	2 m	6 mm	R60
Temperature-resistant									
LL3-DH01	5308091	100 x 100 mm	Ø 0.015 mm	No	2 x Ø 1.5 mm	Yes	2 m	2.2 mm	R35
LL3-DH02	5308092	100 x 100 mm	Ø 0.015 mm	No	2 x Ø 1.0 mm	Yes	2 m	2.2 mm	R25
LL3-DH83	5313032	100 x 100 mm	Ø 0.015 mm	No	Ø 1.6 (mixed 50 µm)	No	1 m	5 mm	R25
Teflon sheath									
LL3-DY01	5308093	100 x 100 mm	Ø 0.02 mm	No	2 x Ø 1.0 mm	Yes	2 m	6 mm	R60
Fix focus									
LL3-DC01	5313033	30 x 30 mm	Ø 0.015 mm	No	2 x Ø 0.5 mm	Yes	2 m	1.0 mm	R15

[1] Minimum object diameter: scanning range reduction
[2] See also LL3-Accessories: tip adapters
[3] Cutter FC for fibre-optic cables included with delivery

Dimensioning		Fibre material			Operating temperature	General description
Mounting sleeve	End tip	Core	Sheath	End tip [4]		
M4	–	PMMA	PE	1.4305	–40 ... +70 °C	M4, core: 2 x Ø 1.0 mm
Ø 2.5 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	2.5 mm cylindric, core: 2 x Ø 0.5 mm
M3	–	PMMA	PE	1.4305	–40 ... +70 °C	M3, core: 2 x Ø 0.5 mm
M6	–	PMMA	PE	1.4306	–40 ... +70 °C	M6, core: 2 x Ø 1.0 mm
Ø 3 mm	–	PMMA	PE	1.4306	–40 ... +70 °C	Ø 3, core: 2 x Ø 1.0 mm
M6	–	PMMA	PE	1.4305	–40 ... +70 °C	M6, core: S = Ø 1.0 mm/R = 16 x Ø 0.25 mm; fibre length 2 m
M6	–	PMMA	PE	1.4305	–40 ... +70 °C	M6, core: S = Ø 1.0 mm/R = 16 x Ø 0.25 mm; fibre length 10 m
M6	–	PMMA	PE	1.4305	–40 ... +70 °C	M6, core: S = Ø 1.0 mm/R = 16 x Ø 0.25 mm
M3	–	PMMA	PE	1.4305	–40 ... +70 °C	M3, core: S = Ø 0.5 mm/R = 9 x Ø 0.25 mm
M4	–	PMMA	PE	1.4305	–40 ... +70 °C	M4, core: S = Ø 0.5 mm/R = 9 x Ø 0.25 mm
Ø 3 mm	–	PMMA	PE	1.4306	–40 ... +70 °C	Ø 3 mm, core: S = Ø 1.0 mm/R = 16 x Ø 0.25 mm
M3	–	PMMA	PE	1.4306	–40 ... +70 °C	M3, core: S = Ø 0.25 mm/R = 10 x Ø 0.125 mm
M4	–	PMMA	PE	1.4305	–40 ... +70 °C	M4, core: 2 x Ø 1.0 mm; R = 2
M6	–	PMMA	PE	1.4305	–40 ... +70 °C	M6, core: 2 x Ø 1.0 mm; R = 2
Ø 3 mm	–	PMMA	PE	1.4306	–40 ... +70 °C	Ø 3 mm, core: 2 x Ø 1.0 mm; R = 2
M4	Ø 2.5 mm	PMMA	PE	1.4306	–40 ... +70 °C	M4, Ø 2.5 end tip (bendable R = 10); core 2 x Ø 1.0 mm
M6	–	PMMA	PE	CuZn	–40 ... +70 °C	M6; core: S = 16 x Ø 0.26 mm/R = 16 x Ø 0.26 mm, mixed; R = 4
M3	–	PMMA	PE	1.4305	–40 ... +70 °C	M3; core: S = 2 x Ø 0.25 mm/R = 2 x Ø 0.25 mm, mixed; R = 4
Ø 3 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	Ø 3 cylindric, core: S = 4 x Ø 0.25 mm/R = 4 x Ø 0.25 mm mixed; R = 4
Ø 1.5 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	Ø 1.5 cylindric, core: S = 2 x Ø 0.25 mm/R = 2 x Ø 0.25 mm mixed; R = 4
M4	–	PMMA	PE	1.4305	–40 ... +70 °C	M4; core: S = 4 x Ø 0.25 mm/R = 4 x Ø 0.25 mm splitted; R = 4
M6	Ø 2.5 mm	PMMA	PE	1.4305	–40 ... +70 °C	M6, Ø 2.5 end tip, bendable; coaxial: S = Ø 1.0 mm/R = 16 x Ø 0.25 mm
M4	–	PMMA	PE	1.4305	–40 ... +70 °C	M4, Ø 1.5 end tip, bendable; core: 2 x Ø 0.5 mm
M3	–	PMMA	PE	1.4305	–40 ... +70 °C	M3, Ø 0.82 end tip; core: 2 x Ø 0.25 mm; R = 4
M3	–	PMMA	PE	1.4305	–40 ... +70 °C	M3, Ø 0.82 end tip; coax: 1 x Ø 0.25 mm/9 x Ø 0.125 mm; fibre length 0.5 m; R = 4
M4	–	PMMA	PE	1.4305	–40 ... +70 °C	M4, Ø 1.5 end tip, not bendable; core: 2 x Ø 0.5 mm;
Ø 3 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	Ø 3 cylindric, Ø 0.82 end tip; core: 2 x Ø 0.25 mm; fibre length 0.5 m; R = 4
Ø 2.5 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	Ø 2.5 mm cylindric, Ø 1.5 mm end tip; core: S = Ø 0.5 mm/R = 9 x Ø 0.25 mm;
Ø 4.0 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	Ø 4 mm, Ø 1.5 end tip, core: 2 x Ø 0.5 mm
Ø 5 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	Ø 5 mm cylindric, side view, Ø 2.7 mm short sleeve; core: 2 x Ø 1.0 mm
Ø 3 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	Ø 3 mm cylindric, side view, Ø 1.5 mm end tip; core: 2 x Ø 0.5 mm
M6	–	PMMA	PE	1.4305	–40 ... +70 °C	M6, side view, Ø 2.5 mm end tip; core: 2 x Ø 1.0 mm
Ø 5 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	Ø 5 mm cylindric, side view, Ø 2.7 mm lange sleeve; core: 2 x Ø 1.0 mm
Ø 6 mm	–	PTEE (Teflon sheath)			–40 ... +70 °C	Ø 6 mm cylindric, Teflon jacket; for clear liquid detection
Ø 6 mm	–	PTEE (Teflon sheath)			–40 ... +70 °C	Ø 6 mm cylindric, Teflon jacket; for cloudy liquid detection
M6	–	Si	FEP	1.4305	–40 ... +180 °C	Heat resist to 180 °C; M6; core: 2 x Ø 1.5 mm
M6	–	PC	PVC	1.4305	–40 ... +100 °C	Heat resist to 105 °C; M6; core: 2 x Ø 1.0 mm
M6	–	Glas	1.4305	1.4305	–40 ... +300 °C	Heat resist to 300 °C; M6; core: Ø 1.6 (mixed 50 µ)
Ø 6 mm	–	PTEE (Teflon sheath)			–40 ... +100 °C	Ø 6 mm cylindric, Teflon sheath
19 x 12 x 3	–	PMMA	PE	Al	–40 ... +70 °C	Fix focussed 3mm

[4] 1.4305 (German materials no.) stainless steel, resistant to rusting and acids



Fibre-optic cables
Through-beam systems

LL3 Plastic fibre-optic cables
Through-beam systems

Type	Order no.	Object size		Suitable for scanning tip adapter [2]	LL3 – Core structure	Can be shortened as required [3]	LL3-Length	LL3-Outside Ø	Bend radius R	
		Standard	Minimum [1]						LL3	Sleeve
Standard type										
LL3-TS07	5308049	Ø 1.5 mm	Ø 0.5 mm	No	Ø 1.5 mm	Yes	2 m	2.2 mm	R30	–
LL3-TB01	5308050	Ø 1.5 mm	Ø 0.5 mm	Yes	Ø 1.5 mm	Yes	2 m	2.2 mm	R30	–
LL3-TB01-10	5308051	Ø 1.5 mm	Ø 0.5 mm	Yes	Ø 1.5 mm	Yes	10 m	2.2 mm	R30	–
LL3-TB02	5308048	Ø 1 mm	Ø 0.2 mm	Yes	Ø 1.0 mm	Yes	2 m	2.2 mm	R25	–
Super flexible, bend radius R = 2 mm										
LL3-TK05	5313034	Ø 1 mm	Ø 0.2 mm	No	Ø 1.0 mm (multi-core)	Yes	2 m	2.2 mm	R2	–
LL3-TK77	5313035	Ø 1 mm	Ø 0.2 mm	Yes	Ø 1.0 mm (multi-core)	Yes	2 m	2.2 mm	R2	–
Flexible, bend radius R = 4 mm										
LL3-TR01	5308052	Ø 1 mm	Ø 0.3 mm	Yes	Ø 0.265 mm x 16	Yes	2 m	2.2 mm	R4	–
LL3-TR02	5308053	Ø 0.5 mm	Ø 0.1 mm	No	Ø 0.25 mm x 4	Yes	2 m	1.0 mm	R4	–
LL3-TR03	5308054	Ø 0.5 mm	Ø 0.1 mm	No	Ø 0.25 mm x 4	Yes	1 m	1.0 mm	R4	–
LL3-TR03-02	5308055	Ø 0.5 mm	Ø 0.1 mm	No	Ø 0.25 mm x 4	Yes	2 m	1.0 mm	R4	–
Long end tips										
LL3-TB03	5308056	Ø 1 mm	Ø 0.2 mm	No	Ø 1.0 mm	Yes	2 m	2.2 mm	R25	10
LL3-TT01	5308057	Ø 0.25 mm	Ø 0.1 mm	No	Ø 0.25 mm	Yes	2 m	1.0 mm	R15	–
LL3-TK75	5313036	Ø 0.5 mm	Ø 0.1 mm	No	Ø 0.5 mm	Yes	2 m	1.0 mm	R15	–
Integrated 90° deflection										
LL3-TV01	5308058	Ø 1 mm	Ø 0.2 mm	No	Ø 1.0 mm	Yes	2 m	2.2 mm	R25	–
LL3-TV02	5308059	Ø 0.5 mm	Ø 0.1 mm	No	Ø 0.5 mm	Yes	2 m	1.0 mm	R15	–
LL3-TV04	5308060	Ø 0.5 mm	Ø 0.1 mm	No	Ø 0.5 mm	Yes	2 m	1.0 mm	R15	–
LL3-TS08	5308061	Ø 1 mm	Ø 0.2 mm	No	Ø 1.0 mm	Yes	2 m	2.2 mm	R25	–
LL3-TS12	5308062	Ø 1.7 mm	Ø 0.5 mm	No	Ø 0.75 mm	Yes	2 m	2.2 mm	R25	–
LL3-TK34	5313037	Ø 1 mm	Ø 0.2 mm	No	Ø 1.0 mm	Yes	2 m	2.2 mm	R25	–
LL3-TK16	5313038	Ø 1 mm	Ø 0.2 mm	No	Ø 1.0 mm	Yes	2 m	2.2 mm	R25	–
Fibre-optic cable cell										
LL3-TS10	5308063	Ø 2 mm	Ø 1 mm	No	Ø 0.25 mm x 16	Yes	2 m	2.2 mm	R25	–
LL3-TS14	5313039	Ø 1.5 mm	Ø 0.5 mm	No	Ø 0.25 mm x 16	Yes	2 m	2.2 mm	R25	–
Temperature-resistant										
LL3-TH01	5308064	Ø 1 mm	Ø 0.2 mm	Yes	Ø 1.0 mm	Yes	2 m	2.2 mm	R25	–
LL3-TH02	5308065	Ø 1.5 mm	Ø 0.5 mm	No	Ø 1.5 mm	Yes	2 m	2.2 mm	R35	–
LL3-TH84	5313040	Ø 1 mm	Ø 0.2 mm	No	Ø 1.1 mm (multi-core Ø 50 µm)	No	1 m	2.2 mm	R25	–
Teflon sheath										
LL3-TY01	5308066	Ø 4 mm	Ø 0.3 mm	No	Ø 1.0 mm	Yes	2 m	6 mm	R60	–
LL3-TY02	5308067	Ø 4 mm	Ø 0.3 mm	No	Ø 1.0 mm	Yes	2 m	6 mm	R60	–
Smallest end sleeves										
LL3-TM01	5308068	Ø 1 mm	Ø 0.2 mm	No	Ø 1.0 mm	Yes	2 m	1.3 mm	R25	–
LL3-TM02	5308069	Ø 0.5 mm	Ø 0.1 mm	No	Ø 0.5 mm	Yes	2 m	1.0 mm	R15	–
LL3-TM03	5308070	Ø 0.5 mm	Ø 0.1 mm	No	Ø 0.5 mm	Yes	2 m	1.0 mm	R15	–

1) Minimum object diameter: scanning range reduction
2) See also LL3-Accessories: tip adapters
3) Cutter FC for fibre-optic cables included with delivery

Dimensioning		Fibre material			Operating temperature	General description
Mounting sleeve	End tip	Core	Sheath	End tip [4]		
Ø 3 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	Ø 3 mm cylindric
M4	–	PMMA	PE	1.4305	–40 ... +70 °C	M4, long range, fibre length 2 m
M4	–	PMMA	PE	1.4305	–40 ... +70 °C	M4, long range, fibre length 10 m
M4	–	PMMA	PE	CuZn	–40 ... +70 °C	M4, standard
Ø 3 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	Ø 3 mm cylindric, multicore, tubular
M4	–	PMMA	PE	CuZn	–40 ... +70 °C	M4 cylindric, multicore, tubular
M4	–	PMMA	PE	CuZn	–40 ... +70 °C	Flexible, R4 mm, M4
M3	–	PMMA	PE	1.4305	–40 ... +70 °C	Flexible, R4 mm, M3
Ø 1.5 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	Flexible, R4 mm, Ø 1.5 mm cylindric, fibre length 1 m
1.5 mm	–	PMMA	PE	1.4305		Flexible, R4 mm, Ø 1.5 mm cylindric, fibre length 2 m
M4	Ø 1.5 mm	PMMA	PE	1.4305	–40 ... +70 °C	M4, Ø 1.5 mm end tip bendable
Ø 3 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	Ø 3 mm cylindric, Ø 0.5 mm end tip
M3	–	PMMA	PE	1.4305	–40 ... +70 °C	M3, Ø 1.0 mm end tip
Ø 3 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	3 mm cylindric, side view 90°, Ø 2.0 mm end tip
Ø 2.5 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	Ø 2.5 mm cylindric, side view 90°, Ø 1.0 mm end tip
M3	–	PMMA	PE	1.4305	–40 ... +70 °C	M3, side view 90°, Ø 1.0 mm end tip
Ø 3 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	Ø 3 mm cylindric, side view 90°, Ø 2.0 mm end tip
Ø 4 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	Ø 4 mm cylindric, side view 90°, special mounting
Ø 3 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	Ø 3 mm cylindric, side view 90°, Ø 1.5 mm end tip
Ø 4 mm	–	PMMA	PE	1.4305	–40 ... +100 °C	Ø 4 mm cylindric, side view 90°, short end tip, heat resist to 100 °C
10 x 20 x 5	–	PMMA	PE	CuZn	–40 ... +70 °C	Fibre-optic cable cell 5.25 mm
19 x 25 x 5	–	PMMA	PE	CuZn	–40 ... +70 °C	Fibre-optic cable cell 10.5 mm
M4	–	PC	PE	CuZn	–40 ... +100 °C	Heat resist to 100°, M4-sleeve
M4	–	Si	FEP	1.4305	–40 ... +180 °C	Heat resist to 180°, M4-sleeve
M4	–	Glas	1.4305	1.4305	–40 ... +300 °C	Heat resist to 300°, M4-sleeve, glass/metal
Ø 6 mm	–	PTEE (Teflon sheath)			–40 ... +70 °C	Ø 6 mm cylindric, Teflon sheath
Ø 6 mm	–	PTEE (Teflon sheath)			–40 ... +70 °C	Ø 6 mm cylindric, side view 90°, Teflon sheath
M3	–	PMMA	PE	1.4305	–40 ... +70 °C	M3, Ø LL-core: 1 mm
M3	–	PMMA	PE	1.4305	–40 ... +70 °C	M3, Ø LL-core: 0.5 mm
Ø 1.5 mm	–	PMMA	PE	1.4305	–40 ... +70 °C	1.5 mm cylindric, Ø LL-core: 0.5 mm

[4] 1.4305 (German materials no.) stainless steel, resistant to rusting and acids

Accessories
LL3 plastic fibre-optic cables

LL3 Plastic fibre-optic cables
Accessories – Tip adapters

Type LL3 proximity, lenses with focussed optic	Order no.	Object size (White 90 %) Standard	 Minimum	Dimensioning Thread	 Outside Ø	Material Lens	 Housing	Operating temperature	Remark
Focus 6 mm, spot size Ø 0.25 mm									
LL3-DA01	5308127			M3	Ø 5.0 mm			–40 ... +70 °C	■ For detection of very small parts, ■ focused, very small light spot diameter, ■ high sensitivity (6 % remission), ■ for suppressing interference-causing backgrounds
Combined with standard fibre LL3									
LL3-DT01	5308076	Ø 0.25 mm	Ø 0.1 mm			Glass	Al	–40 ... +70 °C	
Focus 12 mm, spot size Ø 3.0 mm									
LL3-DA02	5308130			M3	Ø 5.0 mm			–40 ... +70 °C	■ Suitable as a mark sensor for color marks, ■ focused, very small light spot diameter, ■ high sensitivity (6 % remission), ■ for suppressing interference-causing backgrounds
Combined with standard fibre LL3									
LL3-DT01	5308076	Ø 3.0 mm	Ø 0.1 mm			Glass	Al	–40 ... +70 °C	

Type LL3 through-beam, lenses for extended scanning ranges	Order no.	Object size Standard	 Minimum	Dimensioning Thread	 Outside Ø	Lens material Lens	 Housing	Operating temperature	Remark
Axial optic, largest scanning ranges									
LL3-TA01	5308128			M2.6	Ø 5.0 mm	Glass	CuZn	–40 ... +300 °C	■ For through-beam systems, ■ for increased scanning ranges (up to factor 10 x), ■ light spot diameter: approx. 170 mm at 1,000 mm ■ aperture: approx. 15°
Combined with standard fibres LL3									
LL3-TB01	5308050	–	Ø 3 mm[1]/4 mm[2]					–40 ... +70 °C	
LL3-TB01-10	5308051	–	Ø 3 mm[1]/4 mm[2]					–40 ... +70 °C	
LL3-TB02	5308048	–	Ø 3 mm[1]/4 mm[2]					–40 ... +70 °C	
Combined with super flexible fibres									
LL3-TK77	5313035	–	Ø 3 mm[1]/4 mm[2]					–40 ... +70 °C	
Combined with flexible fibres									
LL3-TR01	5308052	–	Ø 3 mm[1]/4 mm[2]					–40 ... +70 °C	
Combined with heat resisting fibres (100 °C)									
LL3-TH01	5308064	–	Ø 3 mm[1]/4 mm[2]					–40 ... +100 °C	
Integrated 90° deflection, large scanning ranges									
LL3-TA02	5308129			M2.6	Ø 5.0 mm	Glas	CuZn	–40 ... +300 °C	■ For through-beam systems, ■ integrated 90° deflection, ■ for increased scanning ranges, ■ light spot diameter: x-axis approx. 110 mm, y-axis ca. 170 mm (for 200 mm in each case), ■ aperture: x-axis approx. 30°, y-axis approx. 40°
Combined with standard fibres LL3									
LL3-TB01	5308050	–	Ø 3 mm					–40 ... +70 °C	
LL3-TB01-10	5308051	–	Ø 3 mm					–40 ... +70 °C	
LL3-TB02	5308048	–	Ø 3 mm					–40 ... +70 °C	
Combined with super flexible fibres									
LL3-TK77	5313035	–	Ø 3 mm					–40 ... +70 °C	
Combined with flexible fibres									
LL3-TR01	5308052	–	Ø 3 mm					–40 ... +70 °C	
Combined with heat resisting fibres (100 °C)									
LL3-TH01	5308064	–	Ø 3 mm					–40 ... +100 °C	

[1] For devices WLL190T

[2] For devices WLL170, WLL160 and VLL 18T

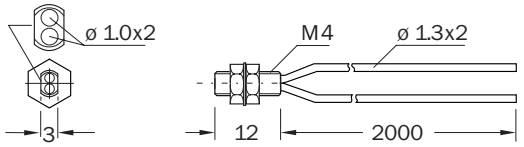
Dimensional drawings and order information

Fibre-optic cables
Proximity systems

Dimensional drawings for LL3 plastic fibre-optic cables, proximity systems

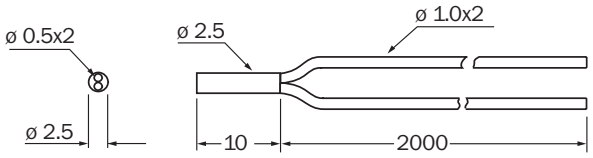
Standard type

Type	Order no.
LL3-DM01	5308071



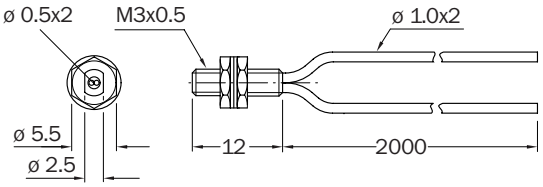
Standard type

Type	Order no.
LL3-DT03	5308072



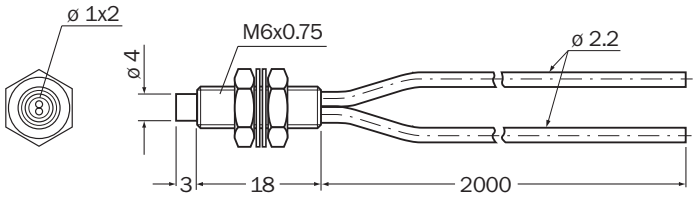
Standard type

Type	Order no.
LL3-DS06	5308073



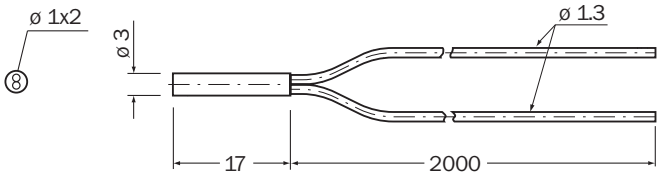
Standard type

Type	Order no.
LL3-DK06	5313019



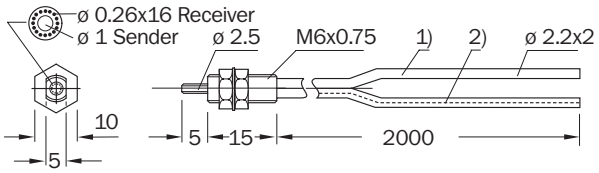
Standard type

Type	Order no.
LL3-DK04	5313020



Coaxial cable

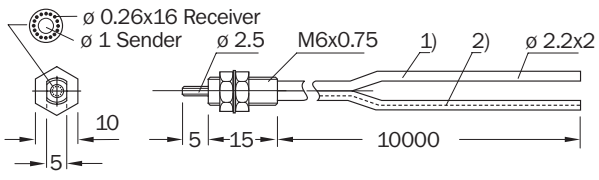
Type	Order no.
LL3-DB01	5308074



1) Sender
2) Receiver

Coaxial cable

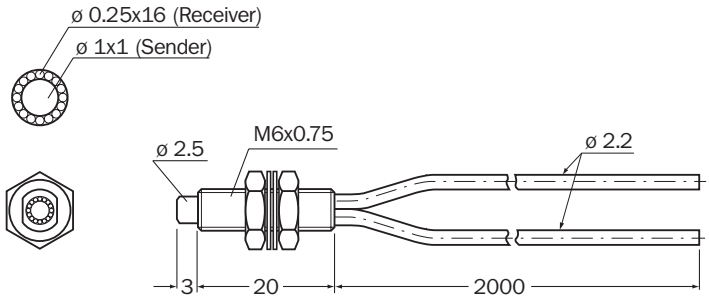
Type	Order no.
LL3-DB01-10	5308075



1) Sender
2) Receiver

Coaxial cable

Type	Order no.
LL3-DB03	5313021



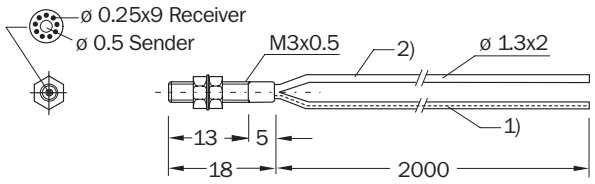
Dimensional drawings and order information

Fibre-optic cables
Proximity systems

Dimensional drawings for LL3 plastic fibre-optic cables, proximity systems

Coaxial cable

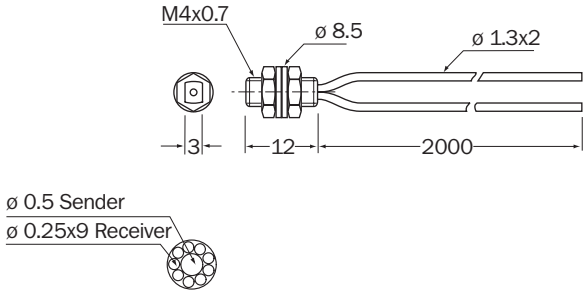
Type	Order no.
LL3-DT01	5308076



1) Sender
2) Receiver

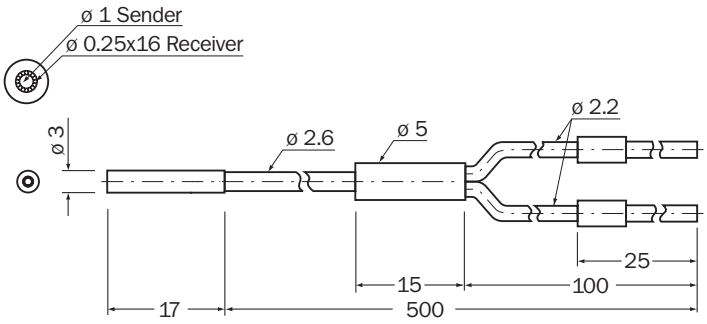
Coaxial cable

Type	Order no.
LL3-DM02	5308077



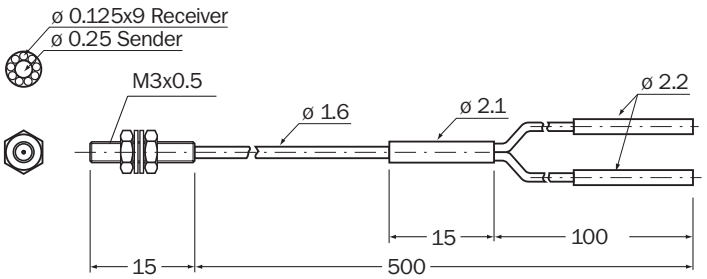
Coaxial cable

Type	Order no.
LL3-DK23	5313022



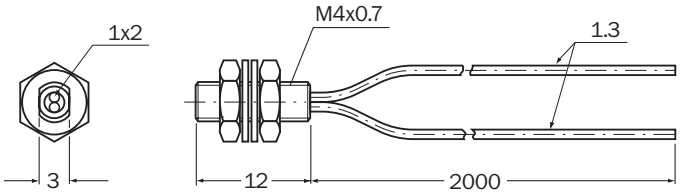
Coaxial cable

Type	Order no.
LL3-DK21	5313023



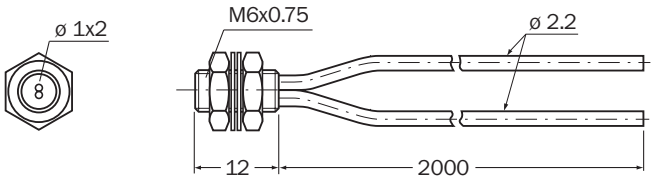
Super flexible, bend radius R = 2 mm

Type	Order no.
LL3-DK66	5313024



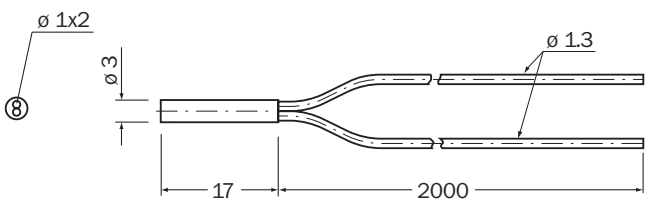
Super flexible, bend radius R = 2 mm

Type	Order no.
LL3-DK67	5313025



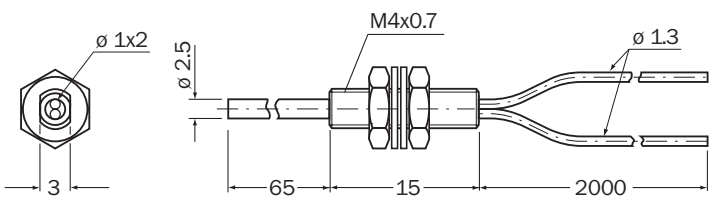
Super flexible, bend radius R = 2 mm

Type	Order no.
LL3-DK04Z	5313026



Super flexible, bend radius R = 2 mm

Type	Order no.
LL3-DK63Z	5313027



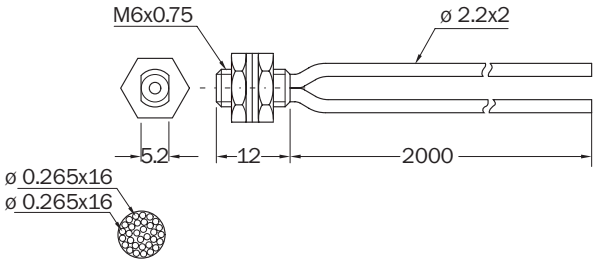
Dimensional drawings and order information

Fibre-optic cables
Proximity systems

Dimensional drawings for LL3 plastic fibre-optic cables, proximity systems

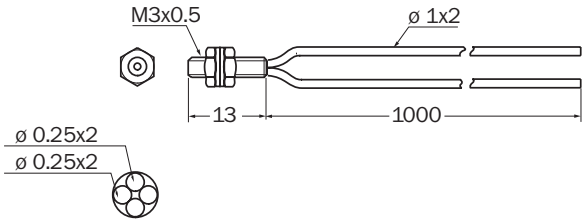
Flexible, bend radius R = 4 mm

Type	Order no.
LL3-DR01	5308078



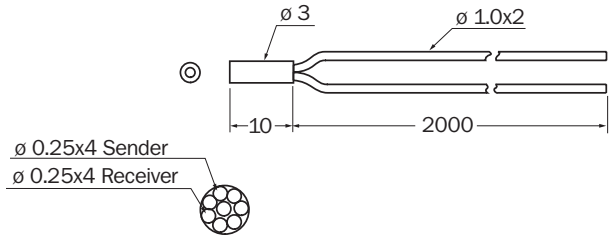
Flexible, bend radius R = 4 mm

Type	Order no.
LL3-DR02	5308079



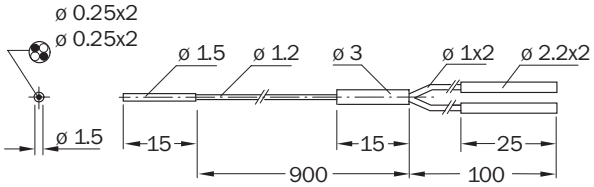
Flexible, bend radius R = 4 mm

Type	Order no.
LL3-DR03	5308080



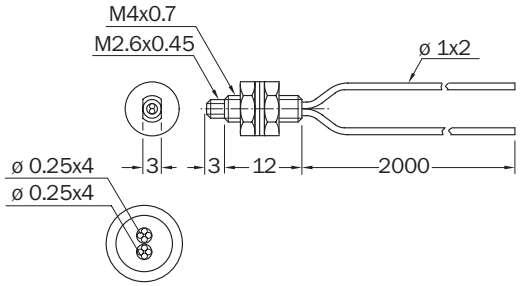
Flexible, bend radius R = 4 mm

Type	Order no.
LL3-DR04	5308081



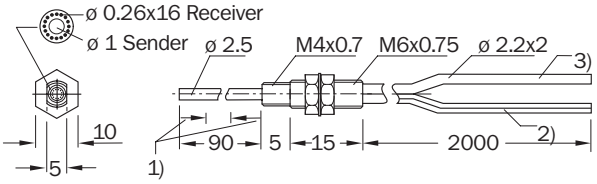
Flexible, bend radius R = 4 mm

Type	Order no.
LL3-DR06	5308082



Long end tips

Type	Order no.
LL3-DB02	5308083



1) Flexible end tip, do not bend in this region (10 mm), bend radius R 10
2) Sender (marked blue)
3) Receiver

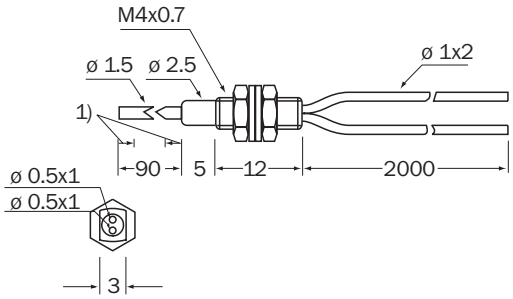
Dimensional drawings and order information

Fibre-optic cables
Proximity systems

Dimensional drawings for LL3 plastic fibre-optic cables, proximity systems

Long end tips

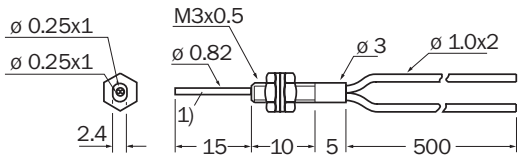
Type	Order no.
LL3-DM03	5308084



1) Flexible end tip, do not bend in this region (10 mm), bend radius R 10

Long end tips

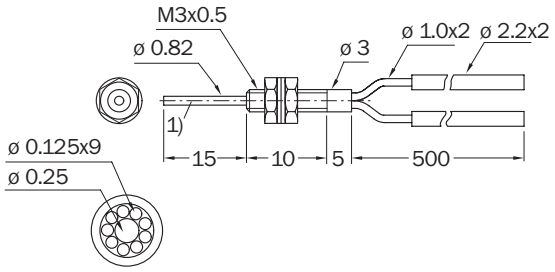
Type	Order no.
LL3-DT02	5308085



1) End tip cannot be bent

Long end tips

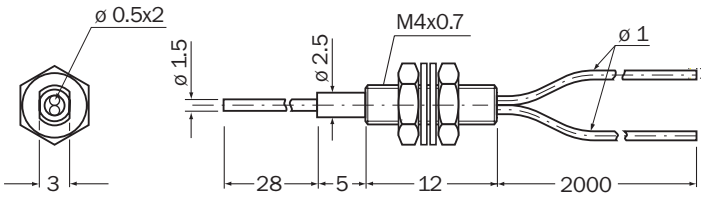
Type	Order no.
LL3-DT04	5308086



1) End tip cannot be bent

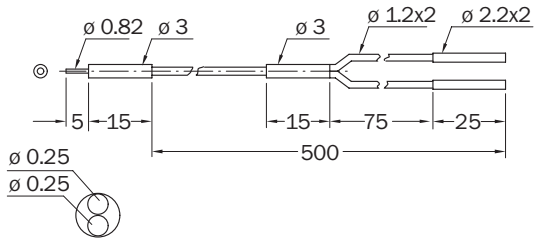
Long end tips

Type	Order no.
LL3-DT05	5313028



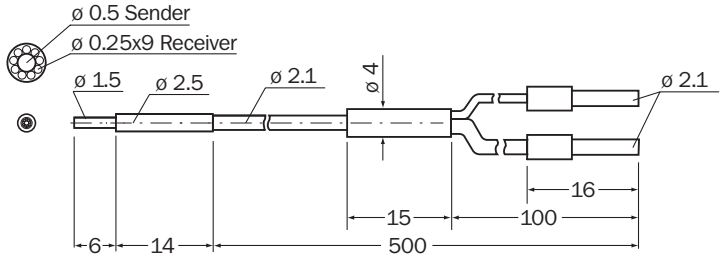
Long end tips

Type	Order no.
LL3-DR05	5308087



Long end tips

Type	Order no.
LL3-DK22	5313029



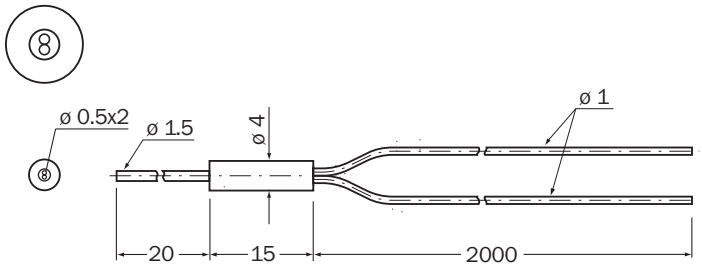
Dimensional drawings and order information

Fibre-optic cables
Proximity systems

Dimensional drawings for LL3 plastic fibre-optic cables, proximity systems

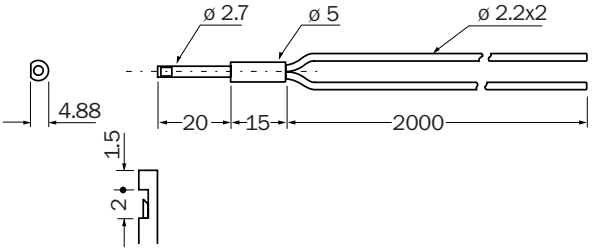
Long end tips

Type	Order no.
LL3-DK43	5313030



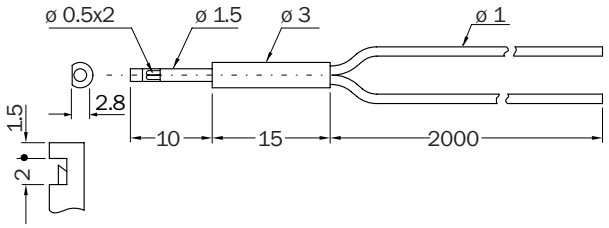
Integrated 90° deflection

Type	Order no.
LL3-DV01	5308088



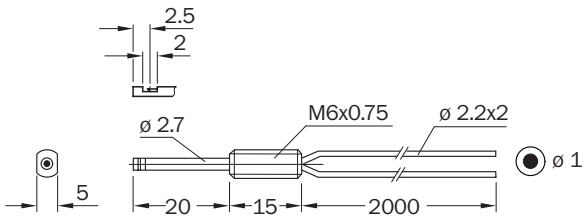
Integrated 90° deflection

Type	Order no.
LL3-DV02	5308089



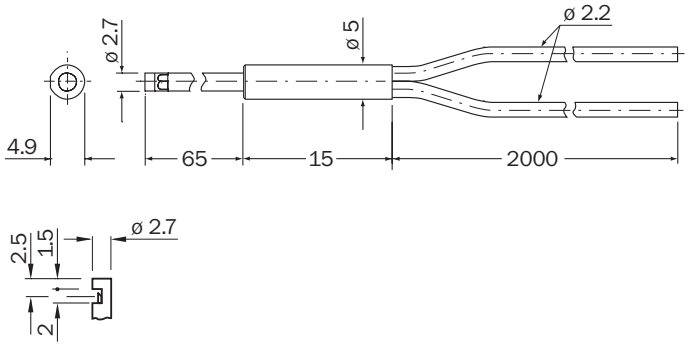
Integrated 90° deflection

Type	Order no.
LL3-DV03	5308090



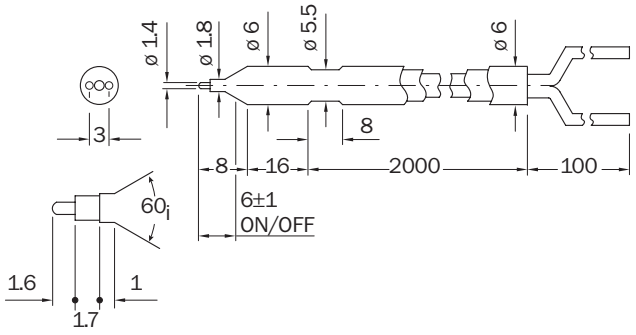
Integrated 90° deflection

Type	Order no.
LL3-DK33	5313031



Level switch for liquids

Type	Order no.
LL3-DF01	5308094 [1]
LL3-DF02	5308095 [2]



[1] For transparent liquids
[2] For cloudy liquids

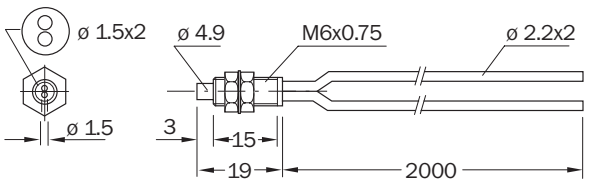
Dimensional drawings and order information

Fibre-optic cables
Proximity systems

Dimensional drawings for LL3 plastic fibre-optic cables, proximity systems

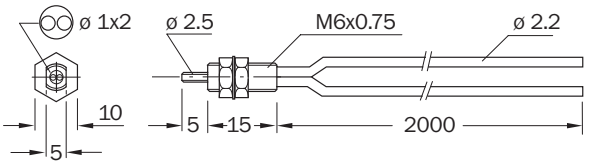
Temperature-resistant

Type	Order no.
LL3-DH01	5308091



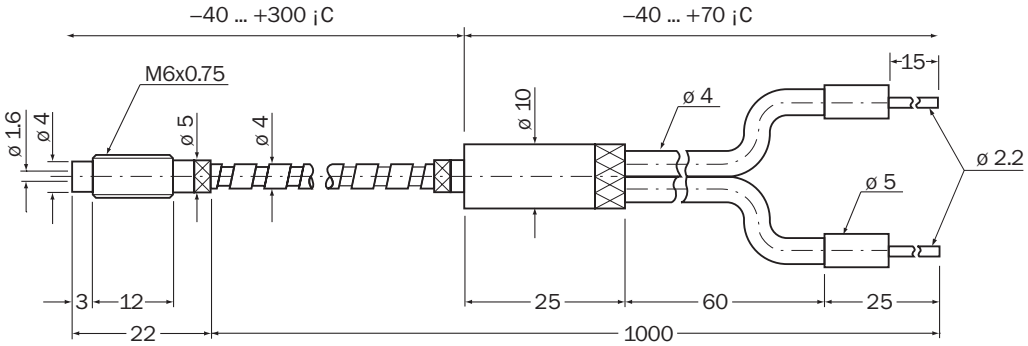
Temperature-resistant

Type	Order no.
LL3-DH02	5308092



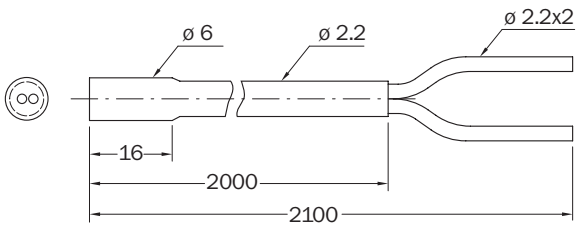
Temperature-resistant

Type	Order no.
LL3-DH83	5313032



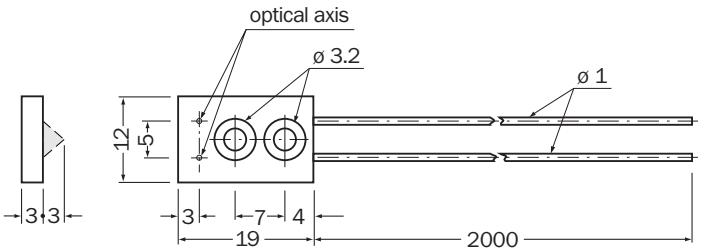
Teflon sheath

Type	Order no.
LL3-DY01	5308093



Fix focus

Type	Order no.
LL3-DC01	5313033



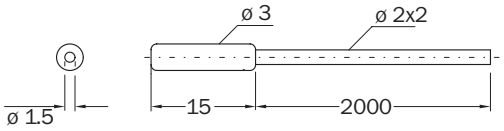
Dimensional drawings and order information

Fibre-optic cables Through-beam systems

Dimensional drawings for LL3 plastic fibre-optic cables, through-beam systems

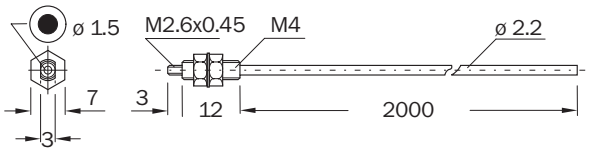
Standard type

Type	Order no.
LL3-TS07	5308049



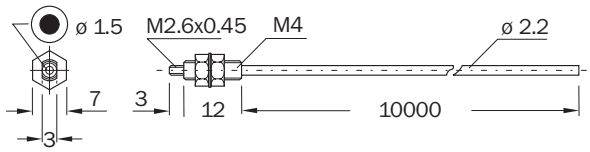
Standard type

Type	Order no.
LL3-TB01	5308050



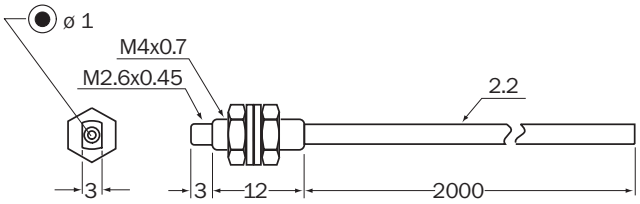
Standard type

Type	Order no.
LL3-TB01-10	5308051



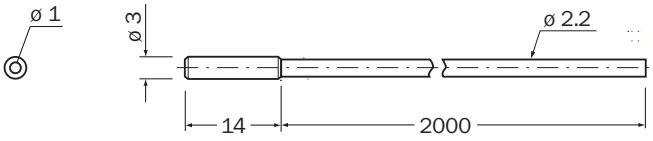
Standard type

Type	Order no.
LL3-TB02	5308048



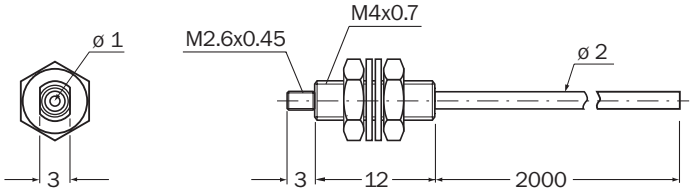
Super flexible, bend radius R = 2 mm

Type	Order no.
LL3-TK05	5313034



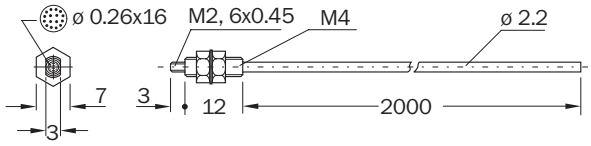
Super flexible, bend radius R = 2 mm

Type	Order no.
LL3-TK77	5313035



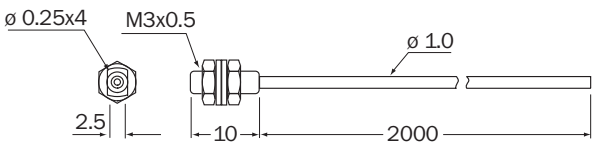
Flexible, bend radius R = 4 mm

Type	Order no.
LL3-TR01	5308052



Flexible, bend radius R = 4 mm

Type	Order no.
LL3-TR02	5308053



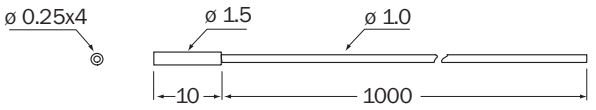
Dimensional drawings and order information

Fibre-optic cables Through-beam systems

Dimensional drawings for LL3 plastic fibre-optic cables, through-beam systems

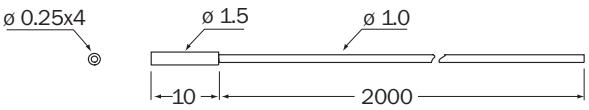
Flexible, bend radius R = 4 mm

Type	Order no.
LL3-TR03	5308054



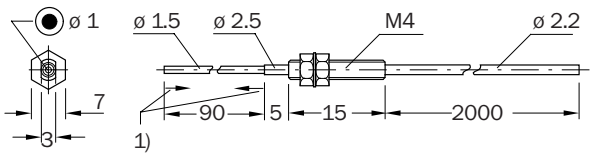
Flexible, bend radius R = 4 mm

Type	Order no.
LL3-TR03-02	5308055



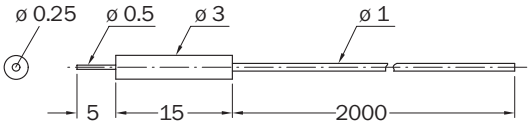
Long end tips

Type	Order no.
LL3-TB03	5308056



Long end tips

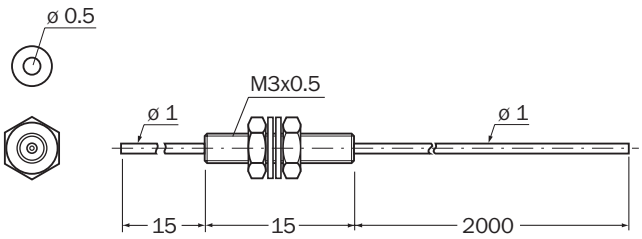
Type	Order no.
LL3-TT01	5308057



[1] Flexible end tip, do not bend in this region (10 mm), bend radius R 10

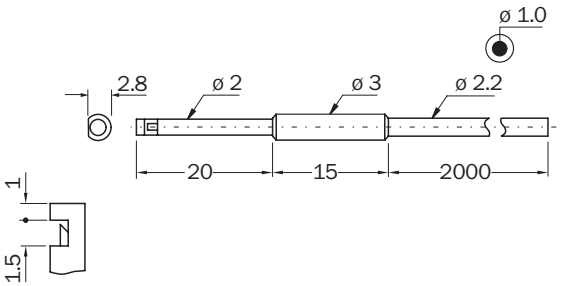
Long end tips

Type	Order no.
LL3-TK75	5313036



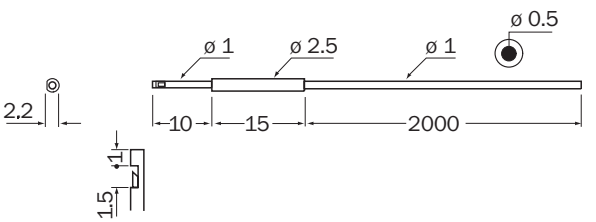
Integrated 90° deflection

Type	Order no.
LL3-TV01	5308058



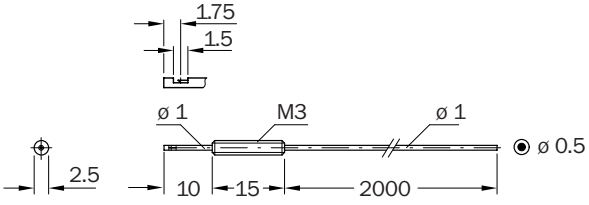
Integrated 90° deflection

Type	Order no.
LL3-TV02	5308059



Integrated 90° deflection

Type	Order no.
LL3-TV04	5308060



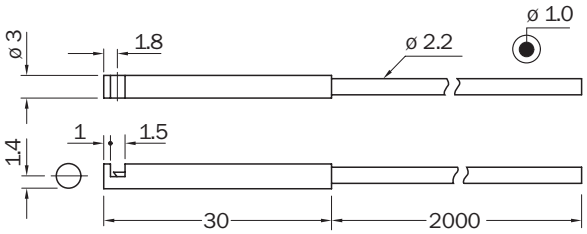
Dimensional drawings and order information

Fibre-optic cables Through-beam systems

Dimensional drawings for LL3 plastic fibre-optic cables, through-beam systems

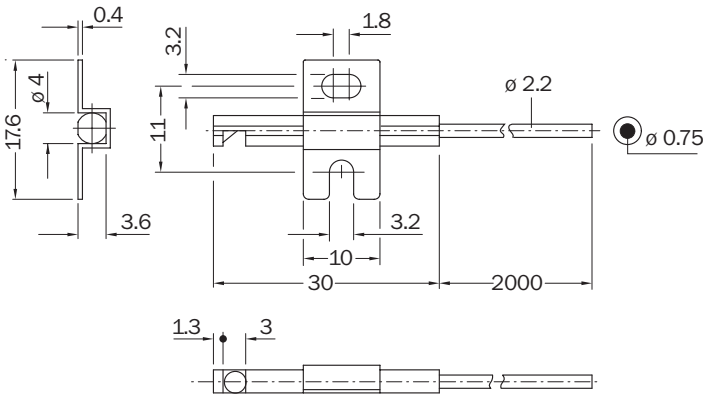
Integrated 90° deflection

Type	Order no.
LL3-TS08	5308061



Integrated 90° deflection

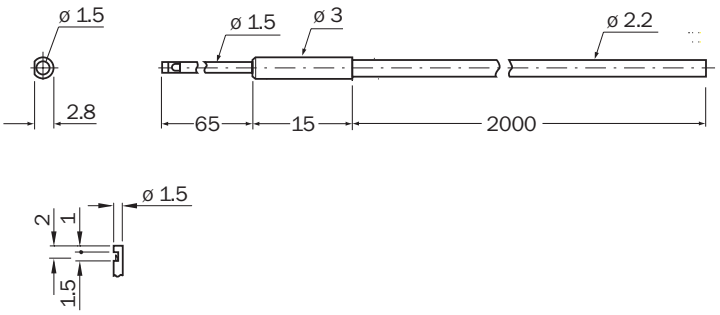
Type	Order no. *)
LL3-TS12	5308062



*) Mounting bracket included with delivery

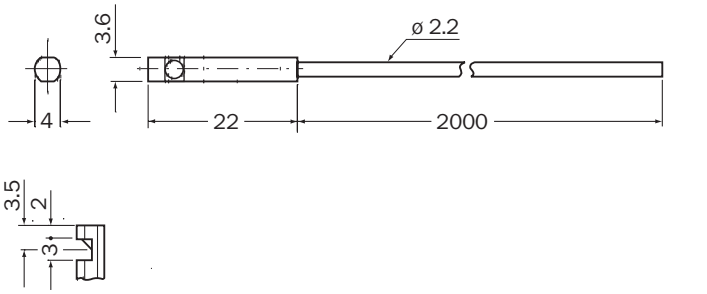
Integrated 90° deflection

Type	Order no.
LL3-TK34	5313037



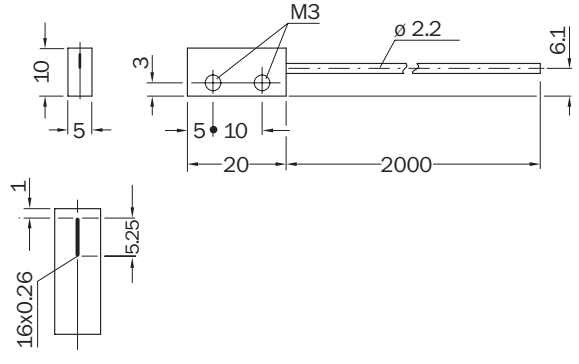
Integrated 90° deflection

Type	Order no.
LL3-TK16	5313038



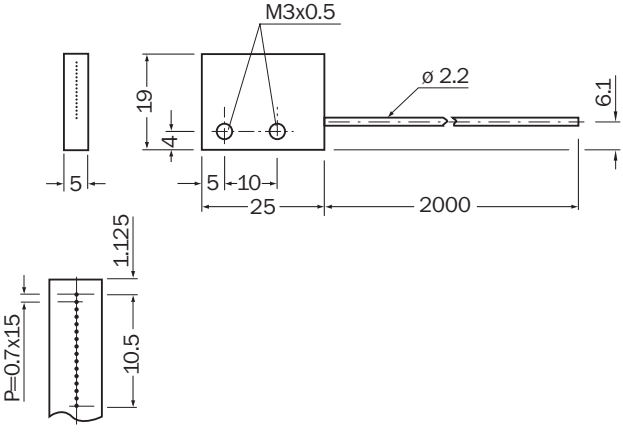
Fibre-optic cable cell

Type	Order no.
LL3-TS10	5308063



Fibre-optic cable cell

Type	Order no.
LL3-TS14	5313039



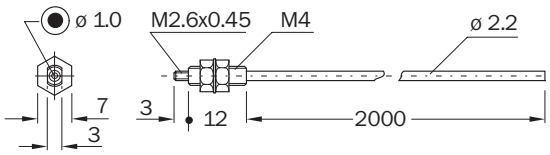
Dimensional drawings and order information

Fibre-optic cables Through-beam systems

Dimensional drawings for LL3 plastic fibre-optic cables, through-beam systems

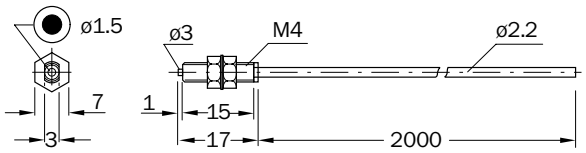
Temperature-resistant

Type	Order no.
LL3-TH01	5308064



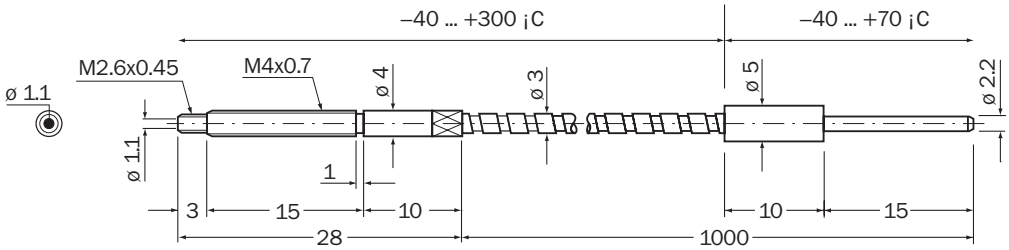
Temperature-resistant

Type	Order no.
LL3-TH02	5308065



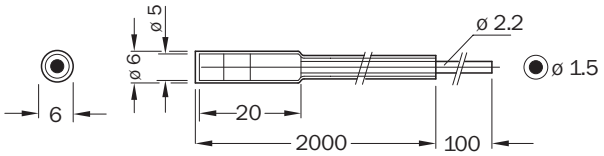
Temperature-resistant

Type	Order no.
LL3-TH84	5313040



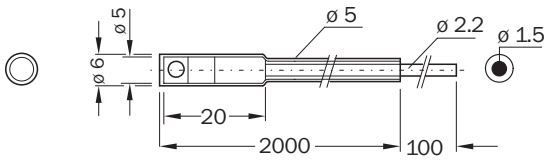
Teflon sheath

Type	Order no.
LL3-TY01	5308066



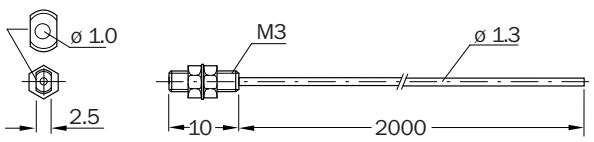
Teflon sheath

Type	Order no.
LL3-TY02	5308067



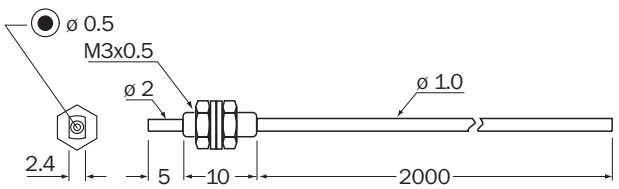
Smallest end sleeves

Type	Order no.
LL3-TM01	5308068



Smallest end sleeves

Type	Order no.
LL3-TM02	5308069



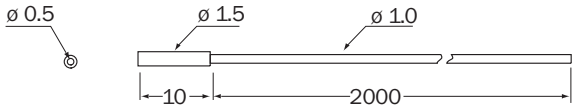
Dimensional drawings and order information

Fibre-optic cables Through-beam systems

Dimensional drawings for LL3 plastic fibre-optic cables, through-beam systems

Smallest end sleeves

Type	Order no.
LL3-TM03	5308070

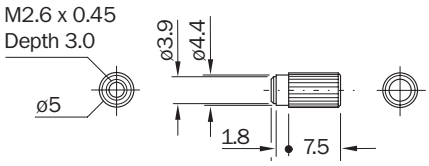


Accessories LL3 Plastic fibre-optic cables

Dimensional drawings for tip adapters LL3 plastic fibre-optic cables

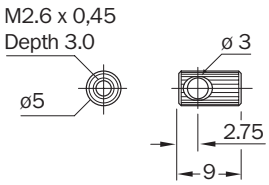
Order information

Type	Order no.
LL3-TA01	5308128



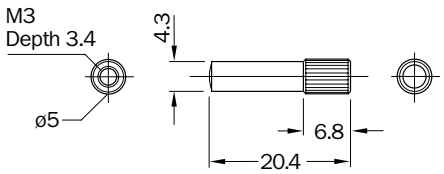
Order information

Type	Order no.
LL3-TA02	5308129



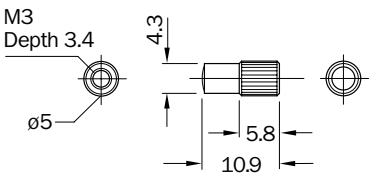
Order information

Type	Order no.
LL3-DA01	5308127



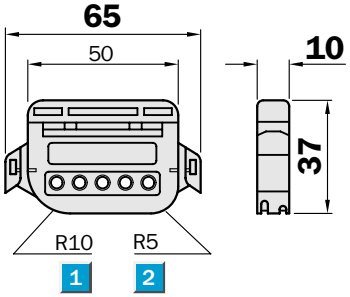
Order information

Type	Order no.
LL3-DA02	5308130



Cutter for fibre-optic cables [1)]

Type	Order no.
FC	5304141



1 Templing for bend radius R 10 mm, for end tips Ø 1.5 mm and Ø 2.5 mm

2 Bend radius R 5 mm

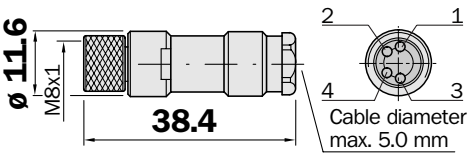
[1)] Supplied with fibre-optic cable for cutting to length

Dimensional drawings and ordering information

SENSICK circular screwing system M8, 3-/4-pin, enclosure rating IP 67

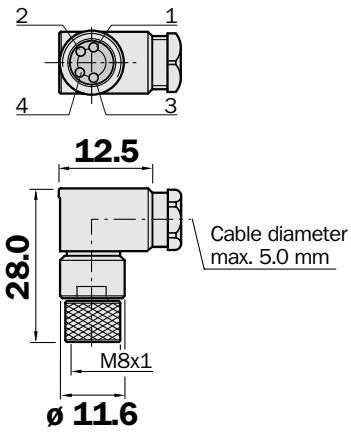
M8 cable receptacle, 3-/4-pin, straight

Type	Order no.	Contacts
DOS-0803-G	7902077	3
DOS-0804-G	6009974	4



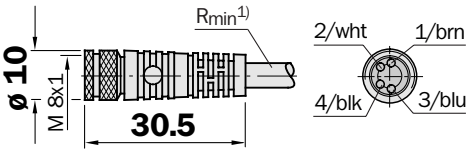
M8 cable receptacle, 3-/4-pin, angled

Type	Order no.	Contacts
DOS-0803-W	7902078	3
DOS-0804-W	6009975	4



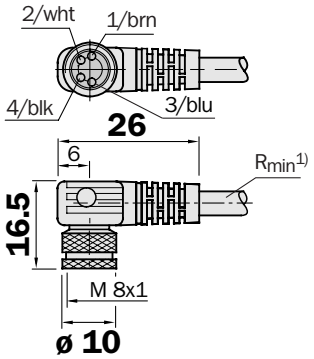
M8 cable receptacle, 3-/4-pin, straight
3 x 0.34 mm² or 4 x 0,25 mm², PVC coating

Type	Order no.	Contacts	Cable length
DOL-0803-G02M	6010785	3	2 m
DOL-0803-G05M	6022009	3	5 m
DOL-0803-G10M	6022011	3	10 m
DOL-0804-G02M	6009870	4	2 m
DOL-0804-G05M	6009872	4	5 m
DOL-0804-G10M	6010754	4	10 m



M8 cable receptacle, 3-/4-pin, angled
3 x 0.34 mm² or 4 x 0,25 mm², PVC coating

Type	Order no.	Contacts	Cable length
DOL-0803-W02M	6008489	3	2 m
DOL-0803-W05M	6022010	3	5 m
DOL-0803-W10M	6022012	3	10 m
DOL-0804-W02M	6009871	4	2 m
DOL-0804-W05M	6009873	4	5 m
DOL-0804-W10M	6010755	4	10 m



1) Minimum bending radius with dynamic use
R_{min} = 20 x cable diameter

Dimensional drawings and ordering information

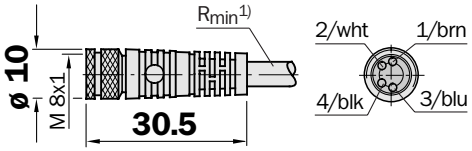
SENSICK circular screwing system M8, 3-/4-pin, enclosure rating IP 67

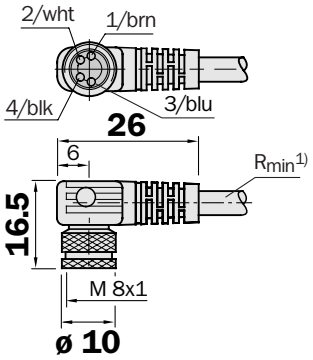
M8 cable receptacle, 3-/4-pin, straight
3/4 x 0.34 mm², PUR coating halogen free

Type	Order no.	Contacts	Cable length
DOL-0803-G02MC	6025888	3	2 m
DOL-0803-G05MC	6025889	3	5 m
DOL-0803-G10MC	6025890	3	10 m
DOL-0804-G02MC	6025894	4	2 m
DOL-0804-G05MC	6025895	4	5 m
DOL-0804-G10MC	6025896	4	10 m

M8 cable receptacle, 3-/4-pin, angled
3/4 x 0.34 mm², PUR coating halogen free

Type	Order no.	Contacts	Cable length
DOL-0803-W02MC	6025891	3	2 m
DOL-0803-W05MC	6025892	3	5 m
DOL-0803-W10MC	6025893	3	10 m
DOL-0804-W02MC	6025897	4	2 m
DOL-0804-W05MC	6025898	4	5 m
DOL-0804-W10MC	6025899	4	10 m

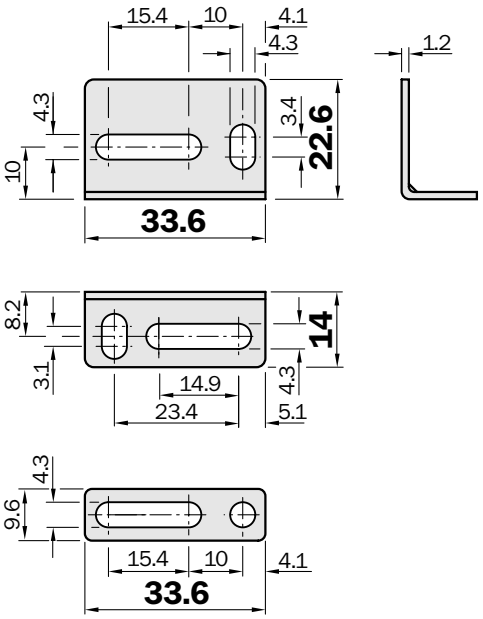




1) Minimum bending radius with dynamic use
R_{min} = 20 x cable diameter

Mounting bracket for W160

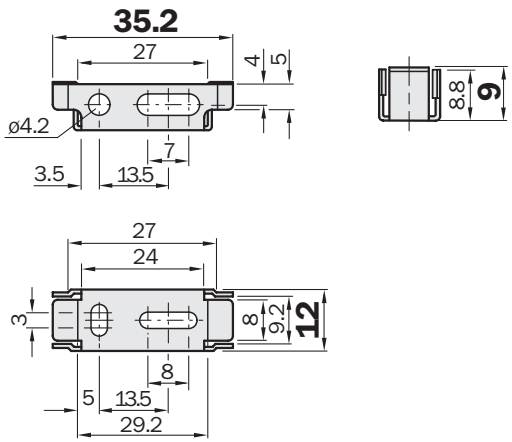
Type	Order no.
BEF-W160	5305197



Included in delivery WS/WE160, WL160 and WT160.

Mounting bracket for WLL160

Type	Order no.
BEF-WLL160	5305400

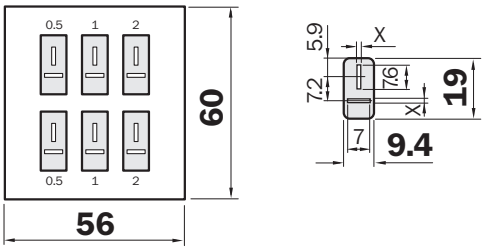


Included in delivery WLL160 and WLL160T.

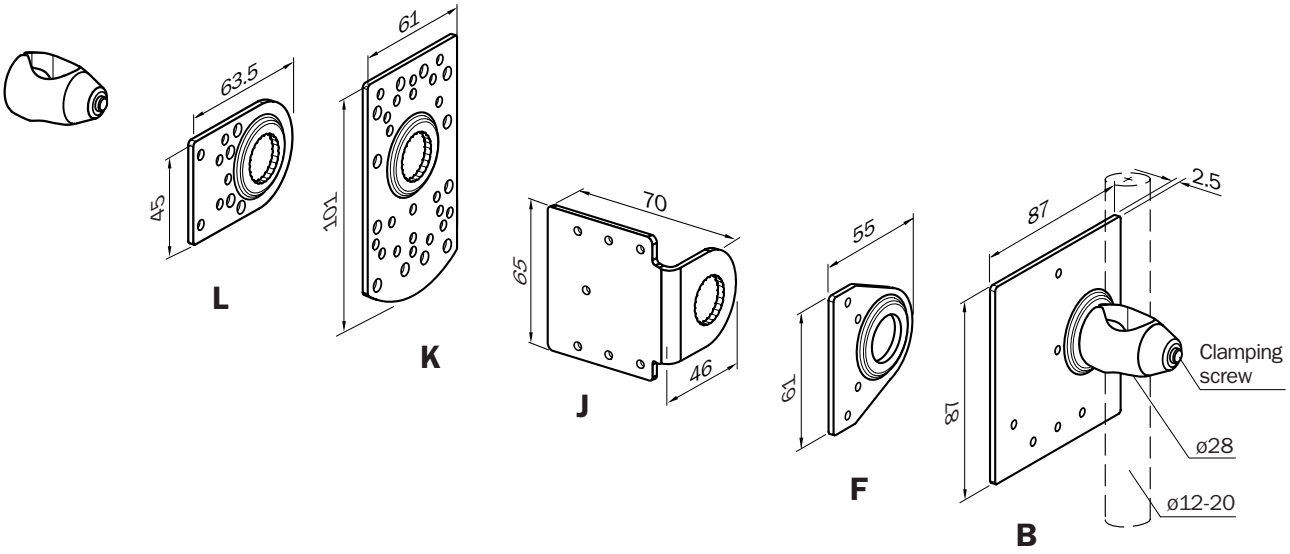
Dimensional drawings and ordering information

Slotted masks for WS/WE160

Type	Order no.
BL-160-SK	5310718



Universal bar clamps (rod mounting) for sensors and reflectors



Mounting plates	Type	Order no. [2]	For device/reflector type
B	BEF-KHS-B01	2022459	P250, PL30A, PL40A, PL50A, PL80A, C110
F	BEF-KHS-F01	2022463	W260, PL20A, P250
J	BEF-KHS-J01	2022719	PL20A, PL40A, PL50A, P250, C110
K	BEF-KHS-K01	2022718	W11, W12-2, W12L-2, W14, W18-2, W23, W24-2, W27-2, W30, W32, W34, W36, KT2, KT5, KT10, CS, LUT3, DS60, PL20A, PL30A, PL40A, PL50A, PL80, A, P250, C110
L	BEF-KHS- L01	2023057	W9-2, W140, W160, W250, P250
	BEF-KHS-KH1	2022726	Clamp bracket rod mounting without attachment plate and mounting material

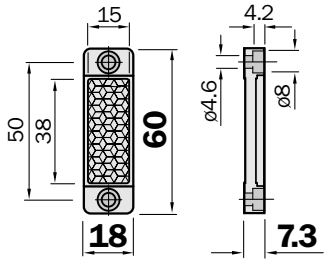
[2] Order no. includes bar support and mounting material

Dimensional drawings and ordering information

Plastic design for temperatures up to 65 °C

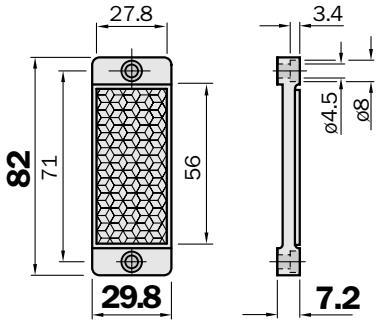
Reflector 20 x 40 mm²

Type	Order no.
PL20A	1012719



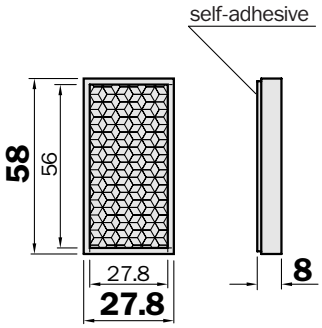
Reflector 30 x 50 mm²

Type	Order no.
PL30A	1002314



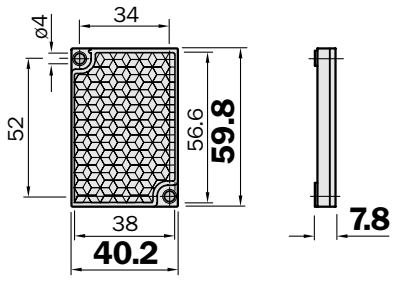
Reflector 30 x 50 mm² self-adhesive

Type	Order no.
PL31A	1002315



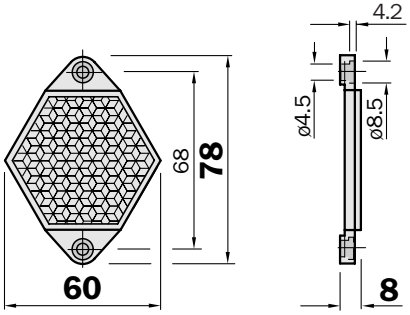
Reflector 40 x 60 mm²

Type	Order no.
PL40A	1012720



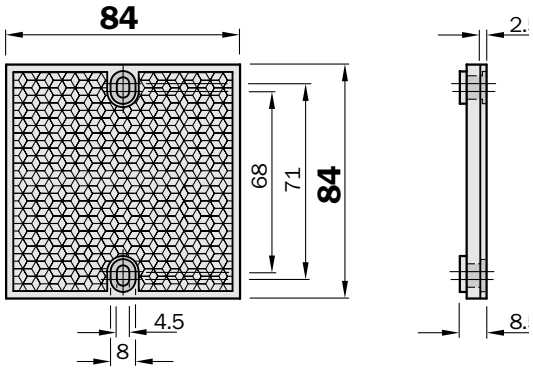
Reflector, hexagonal
Opening width 48 mm

Type	Order no.
PL50A	1000132



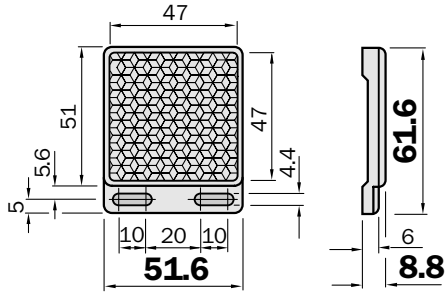
Reflector 80 x 80 mm²

Type	Order no.
PL80A	1003865



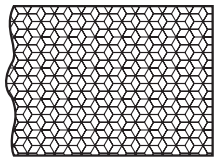
Reflector 47 x 47 mm² *)

Type	Order no.
P250	5304812



Reflective tape

Type	Order no.	
REF-DG-K	4019634	cut to size
REF-DG	5304334	Sheet 749 x 914 mm



*) Included in delivery WL160

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