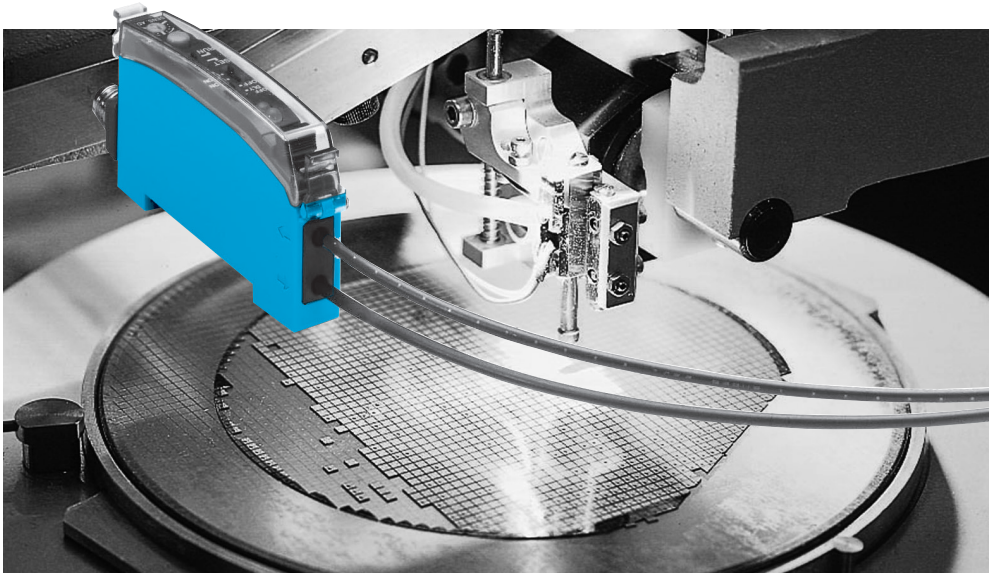


# WLL 170(T) Photoelectric Switches, LL 3 Fiber-Optic: Flexible Solutions with Fiber-Optic Systems



focal points. The Teach In model simplifies handling, because the switching threshold and hysteresis can be optimized automatically at the push of a button. With red or green sender light, they are ideal for detecting color contrasts. WLL 170 with



manual switching threshold adjustment is the inexpensive solution for all standard applications. The WLL 170 high speed with 10,000 switchings per second is optimal for the fastest reactions.

Anti-interference models prevent mutual interference if several devices are installed close to one another.

The WLL 170A with analog output expands the range of products.

The WLL 170(T) can be combined with approximately 50 different fiber-optic cables of the series LL 3. Many users in industries such semiconductor and electronics assembly, packaging technology, handling and assembly systems, special engineering and fine mechanics have chosen the WLL 170(T) for their applications.

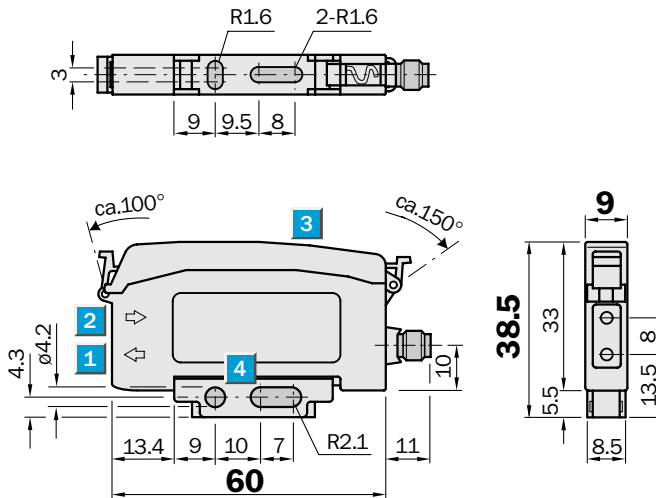
If you need long range, easy handling and multiple system options, but have only a limited amount of installation space available, the WLL 170(T) is the right unit for you. Besides simple detection tasks, these fiber-optic cable photoelectric switches are suitable for highly complex applications, e.g., detection of small objects, recognition of objects with background interference, as well as coloured marks and transparent parts. Take your pick! The optimized WLL 170(T) system features are designed for individual application

	<b>Fiber-Optic Cable Photoelectric Switches (Proximity)</b>
	<b>Fiber-Optic Cable Photoelectric Switches (Through-Beam)</b>

	<b>Scanning range</b> 0 to 460 mm
<b>Through-beam system</b>	
	<b>Scanning distance</b> 0 to 90 mm
<b>Proximity system</b>	

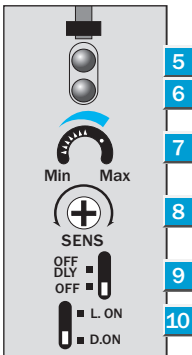
- Emitter LED red for standard applications
- Manual sensitivity setting
- Simple installation and alignment

**Dimension illustration**



**Setting options**

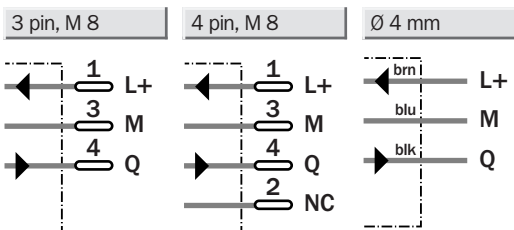
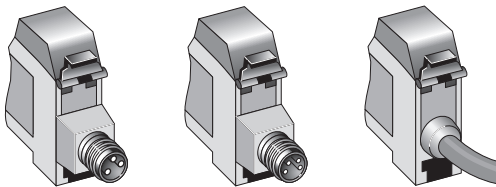
WLL 170-P132	WLL 170-N132
WLL 170-P330	WLL 170-N330
WLL 170-P430	WLL 170-N430



- LED emitter, fiber-optic cable LL 3 mounting (emitter fiber)
- Receiver, fiber-optic cable LL 3 mounting (receiver fiber)
- Protective cover, both sides can be swiveled up, removable
- Fixing bracket, included in delivery (see accessories)
- Orange LED display, lights up when supply connection is active
- Green LED receiver display, lights up when light received is > 1.1 (switching threshold = 1)
- Sensitivity scale
- Sensitivity adjuster (7 rotations)
- OFF delay selector switch: "OFF DLY" (on)/"OFF" (off), 40 ms fix
- Selector switch: "L.ON" (light-switching)/"D.ON" (dark-switching)

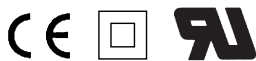
**Connection type**

WLL 170-P330	WLL 170-P430	WLL 170-P132
WLL 170-N330	WLL 170-N430	WLL 170-N132



**Accessories**

Cable receptacles
Mounting bracket
Fiber-optic cable



Technical data		WLL 170-	P132	P330	P430	N132	N330	N430				
<b>Suitable fiber-optic cable</b>	Plastic fiber-optic cable series LL 3											
<b>Scanning range</b>	Dependent on used fiber-optic cable											
<b>Recommended operating range</b>	0 to 460 mm (through-beam system) (with auxiliary lens 0 to 2500 mm)											
<b>Recommended operating distance</b>	0 to 90 mm <sup>1)</sup> (proximity system)											
<b>Sensitivity setting</b>	Potentiometer, 7 rotations <sup>2)</sup>											
<b>Light source<sup>3)</sup></b>	LED, visible red light											
Light spot diameter LL 3	Dependent on scanning range											
Aperture fiber-optic cable LL 3	Approx. 65° <sup>4)</sup>											
<b>Supply voltage V<sub>s</sub><sup>5)</sup></b>	10 to 30 V DC											
Ripple <sup>6)</sup>	10%											
Current consumption <sup>7)</sup>	≤ 50 mA											
<b>Switching outputs</b>	PNP: open collector: Q NPN: open collector: Q											
<b>Output current I<sub>A</sub> max.</b>	100 mA											
<b>Light receiver, switching type</b>	Dark/light-switching <sup>8)</sup>											
<b>Response time<sup>9)</sup></b>	≤ 0.35 ms											
<b>Switching frequency max.<sup>10)</sup></b>	1 430/s											
<b>Time delay t<sub>OFF</sub> (OFF delay)</b>	40 ms fix, selectable by sliding switch											
<b>Type of connection</b>	Connecting cable <sup>11)</sup> PVC, 2 m; 3 x 0.2 mm <sup>2</sup> , Ø 4.0 mm											
Plug	M 8, 3 pin											
Plug	M 8, 4 pin											
<b>Circuit protection<sup>12)</sup></b>	A, B, C, D											
<b>Enclosure rating</b>	IP 50											
<b>Ambient temperature</b>	Operation –25 to +55 °C Storage –40 to +70 °C											
<b>Weight</b>												
with connecting cable 2 m	Approx. 60 g											
with plug M 8, 3 pin/4 pin	Approx. 20 g											
<b>Housing material</b>	ABS											

1) Object with 90 % reflectance (referred to standard white DIN 5033)  
 2) Sensitivity scale 270°  
 3) Average service life 100,000 h at T<sub>U</sub> = +25 °C  
 4) Differences see LL 3 data  
 5) Limit values

6) Must be within V<sub>s</sub> tolerances  
 7) Without load  
 8) By sliding switch  
 9) With light/dark ratio 1:1  
 10) With resistive load  
 11) Do not bend cable below 0 °C

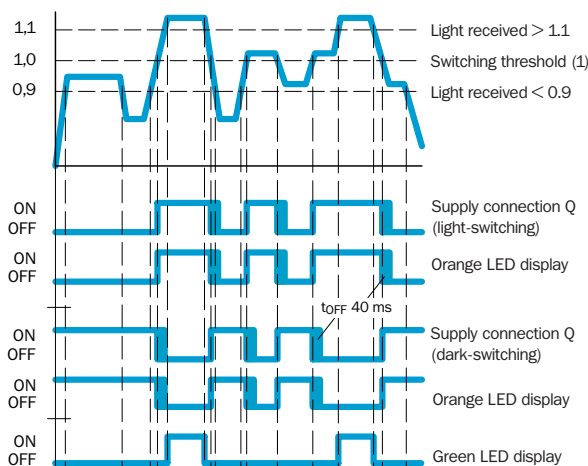
12) A = V<sub>s</sub> connections reverse-polarity protected  
 B = Inputs/outputs reverse-polarity protected  
 C = Interference suppression  
 D = Outputs overcurrent and short-circuit protected

**Function diagram WLL 170, manual sensitivity setting**

**WLL 170**

**Orange LED display:** lights up if supply connection Q is active. Dependent on setting of light/dark-selector switch

**Green LED display:** lights up if light received is > 1.1 (based on the switching threshold Q, switching threshold = 1).



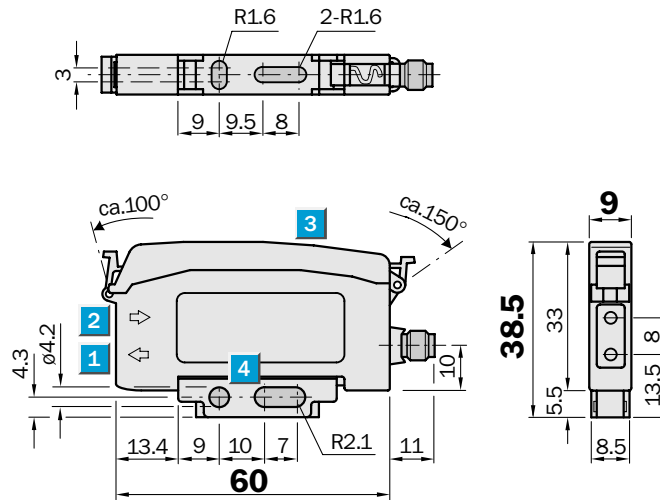
**Order information**

Type	Order no.
WLL 170-P132	6 011 716
WLL 170-P330	6 021 958
WLL 170-P430	6 011 718
WLL 170-N132	6 011 719
WLL 170-N330	6 021 959
WLL 170-N430	6 011 721

	<b>Scanning range</b> 0 to 130 mm
<b>Through-beam system</b>	
	<b>Scanning distance</b> 0 to 25 mm
<b>Proximity system</b>	

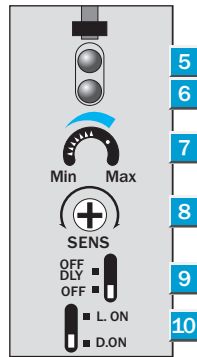
- High-speed 10,000/sec., for extremely fast processes
- Emitter LED red
- Manual sensitivity setting
- Time delays 40 ms for signal extension

**Dimension illustration**



**Setting options**

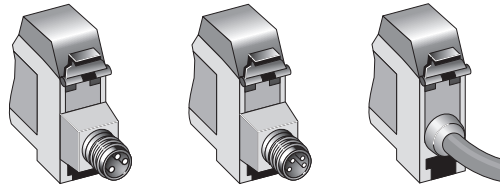
WLL 170-P162	WLL 170-N162
WLL 170-P360	WLL 170-N360
WLL 170-P460	WLL 170-N460



- LED emitter, fiber-optic cable LL 3 mounting (emitter fiber)
- Receiver, fiber-optic cable LL 3 mounting (receiver fiber)
- Protective cover, both sides can be swiveled up, removable
- Fixing bracket, included in delivery (see accessories)
- Orange LED display, lights up when supply connection is active
- Green LED receiver display, lights up when light received is > 1.1 (switching threshold = 1)
- Sensitivity scale
- Sensitivity adjuster (7 rotations)
- OFF delay selector switch: "OFF DLY" (on)/"OFF" (off), 40 ms fix
- Selector switch: "L.ON" (light-switching)/"D.ON" (dark-switching)

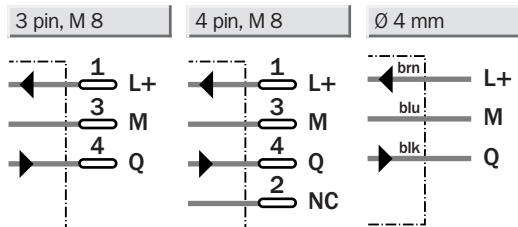
**Connection type**

WLL 170-P360	WLL 170-P460	WLL 170-P162
WLL 170-N360	WLL 170-N460	WLL 170-N162



**Accessories**

Cable receptacles
Mounting bracket
Fiber-optic cable



Technical data		WLL 170-	P162	P360	P460	N162	N360	N460				
<b>Suitable fiber-optic cable</b>	Plastic fiber-optic cable series LL 3											
<b>Scanning range</b>	Dependent on used fiber-optic cable											
<b>Recommended operating range</b>	0 to 130 mm (through-beam system) (with auxiliary lens 0 to 500 mm)											
<b>Recommended operating distance</b>	0 to 25 mm <sup>1)</sup> (proximity system)											
<b>Sensitivity setting</b>	Potentiometer, 7 rotations <sup>2)</sup>											
<b>Light source<sup>3)</sup></b>	LED, visible red light											
Light spot diameter LL 3	Dependent on scanning range											
Aperture fiber-optic cable LL 3	Approx. 65° <sup>4)</sup>											
<b>Supply voltage V<sub>s</sub><sup>5)</sup></b>	10 to 30 V DC											
Ripple <sup>6)</sup>	10%											
Current consumption <sup>7)</sup>	≤ 50 mA											
<b>Switching outputs</b>	PNP: open collector: Q NPN: open collector: Q											
<b>Output current I<sub>A</sub> max.</b>	100 mA											
<b>Light receiver, switching type</b>	Dark/light-switching <sup>8)</sup>											
<b>Response time<sup>9)</sup></b>	≤ 50 μs											
<b>Switching frequency max.<sup>10)</sup></b>	10,000/s											
<b>Time delay t<sub>OFF</sub> (OFF delay)</b>	40 ms fix, selectable by sliding switch											
<b>Type of connection</b>	Connecting cable <sup>11)</sup> PVC, 2 m; 3 x 0.2 mm <sup>2</sup> , Ø 4.0 mm											
Plug	M 8, 3 pin											
Plug	M 8, 4 pin											
<b>Circuit protection<sup>12)</sup></b>	A, B, C, D											
<b>Enclosure rating</b>	IP 50											
<b>Ambient temperature</b>	Operation –25 to +55 °C Storage –40 to +70 °C											
<b>Weight</b>												
with connecting cable 2 m	Approx. 60 g											
with plug M 8, 3 pin/4 pin	Approx. 20 g											
<b>Housing material</b>	ABS											

<sup>1)</sup> Object with 90 % reflectance (referred to standard white DIN 5033)

<sup>2)</sup> Sensitivity scale 270°

<sup>3)</sup> Average service life 100,000 h at T<sub>J</sub> = +25 °C

<sup>4)</sup> Differences see LL 3 data

<sup>5)</sup> Limit values

<sup>6)</sup> Must be within V<sub>s</sub> tolerances

<sup>7)</sup> Without load

<sup>8)</sup> By sliding switch

<sup>9)</sup> With light/dark ratio 1:1

<sup>10)</sup> With resistive load

<sup>11)</sup> Do not bend cable below 0 °C

<sup>12)</sup> A = V<sub>s</sub> connections reverse-polarity protected

B = Inputs/outputs reverse-polarity protected

C = Interference suppression

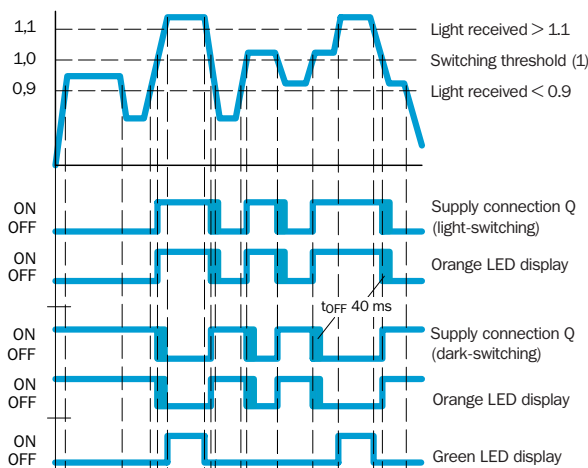
D = Outputs overcurrent and short-circuit protected

**Function diagram WLL 170, manual sensitivity setting**

**WLL 170**



**Orange LED display:** lights up if supply connection Q is active. Dependent on setting of light/dark-selector switch

**Green LED display:** lights up if light received is > 1.1 (based on the switching threshold Q, switching threshold = 1).



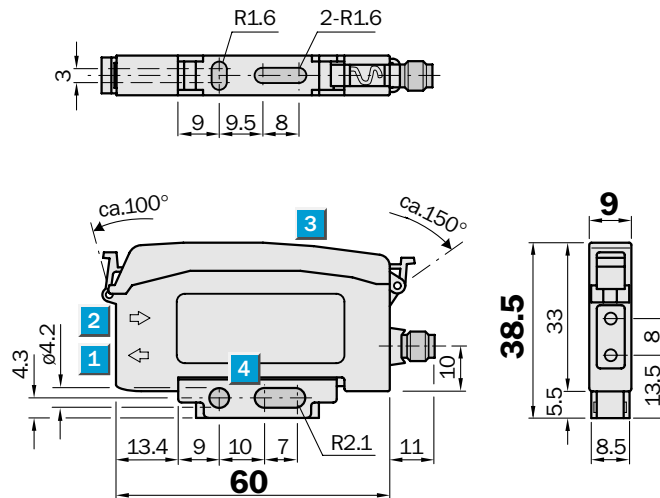
**Order information**

Type	Order no.
WLL 170-P162	6 020 801
WLL 170-P360	6 021 960
WLL 170-P460	6 020 803
WLL 170-N162	6 020 804
WLL 170-N360	6 021 961
WLL 170-N460	6 020 806

	<b>Scanning range</b> 0 to 600 mm
<b>Through-beam system</b>	
	<b>Scanning distance</b> 0 to 100 mm
<b>Proximity system</b>	

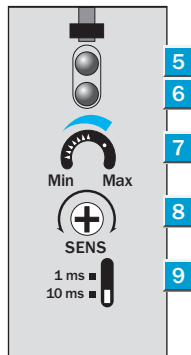
- Analog output voltage: 1 to 5 V
- Large range of suitable fiber-optic cables series LL 3
- Ideal for increased requirements, e.g., for positioning, opacity/transmission measurement and contrast resolutions

### Dimension illustration



### Setting options

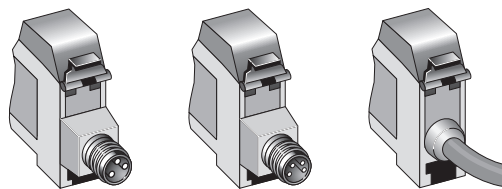
WLL 170A-V132
WLL 170A-V330
WLL 170A-V430



- LED emitter, fiber-optic cable LL 3 mounting (emitter fiber)
- Receiver, fiber-optic cable LL 3 mounting (receiver fiber)
- Protective cover, both sides can be swiveled up, removable
- Fixing bracket, included in delivery (see accessories)
- Orange LED display, analog output in saturation ( $\geq 5$  V)
- Green LED signal strength indicator: lights at light reception
- Sensitivity scale Min/Max = 270°
- Sensitivity adjuster (Min/Max = 7 rotations)
- Selector switch: response time, analog output

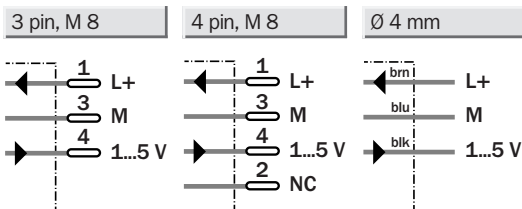
### Connection type

WLL 170A-V330	WLL 170A-V430	WLL 170A-V132
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### Accessories

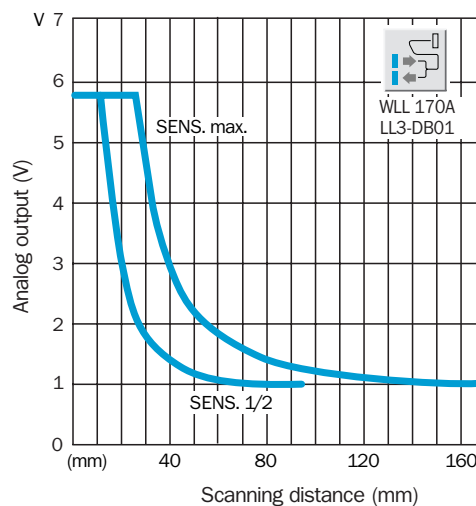
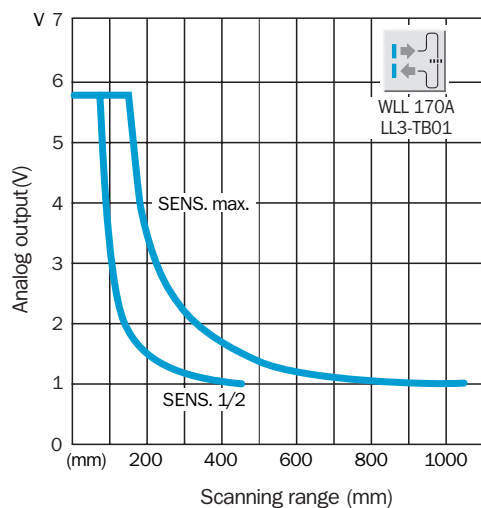
Cable receptacles
Mounting bracket
Fiber-optic cable



Technical data		WLL 170A-	V132	V330	V430						
<b>Suitable fiber-optic cable</b>	Plastic fiber-optic cable series LL 3										
<b>Scanning range<sup>1)</sup></b>	Dependent on used fiber-optic cable										
<b>Possible operating range<sup>1)</sup></b>	max. 0 to 600 mm (through-beam system) (with auxiliary lens 0 to 3200 mm)										
<b>Possible operating distance<sup>1)</sup></b>	max. 0 to 100 mm <sup>2)</sup> (proximity system)										
<b>Light source<sup>3)</sup></b>	LED, visible red light										
Light spot diameter LL 3	Dependent on scanning range										
Aperture fiber-optic cable LL 3	Approx. 65° <sup>4)</sup>										
<b>Supply voltage V<sub>s</sub><sup>5)</sup></b>	10 to 30 V DC										
Ripple <sup>6)</sup>	10%										
Current consumption <sup>7)</sup>	≤ 40 mA										
<b>Analog output</b>											
<b>Voltage output</b>	Output voltage 1 to 5 V 1 V = No light reception 5 V = Saturation										
<b>Load current (max.)</b>	10 mA										
<b>Output resistance (R<sub>i</sub>)</b>	47 Ω										
<b>Load resistance</b>	≥ 5 kΩ (recommendation)										
<b>Response time, selectable<sup>8)</sup></b>	1 ms/10 ms										
<b>Sensitivity, adjustable</b>	Potentiometer, 7 rotations <sup>9)</sup>										
<b>Type of connection</b>	Connecting cable <sup>10)</sup> PVC, 2 m; 3 x 0.2 mm <sup>2</sup> , Ø 4.0 mm										
Plug	M 8, 3 pin										
Plug	M 8, 4 pin										
<b>Cable extension</b>	max. 100 m; Attention: signal loss										
<b>Circuit protection<sup>11)</sup></b>	A, C, D										
<b>Enclosure rating</b>	IP 50										
<b>Ambient temperature</b>	Operation -25 to +55 °C Storage -40 to +70 °C										
<b>Weight</b>											
with connecting cable	Approx. 60 g										
with plug M 8, 3 pin/4 pin	Approx. 20 g										
<b>Housing material</b>	ABS										

- <sup>1)</sup> See accessories; Selection Table for Fiber-Optic Cables LL 3
- <sup>2)</sup> Object with 90% reflectance (referred to standard white DIN 5033)
- <sup>3)</sup> Average service life 100,000 h at T<sub>U</sub> = +25 °C
- <sup>4)</sup> Differences see LL 3 data
- <sup>5)</sup> Limit values
- <sup>6)</sup> Must be within V<sub>s</sub> tolerances
- <sup>7)</sup> Without load
- <sup>8)</sup> Time delay: change light reception/change analog output (90% final value)
- <sup>9)</sup> Scala 270°
- <sup>10)</sup> Do not bend cable below 0 °C
- <sup>11)</sup> A = V<sub>s</sub> connections reverse-polarity protected  
C = Interference suppression  
D = Outputs overcurrent and short-circuit protected

**WLL 170A, analog, characteristic curves**



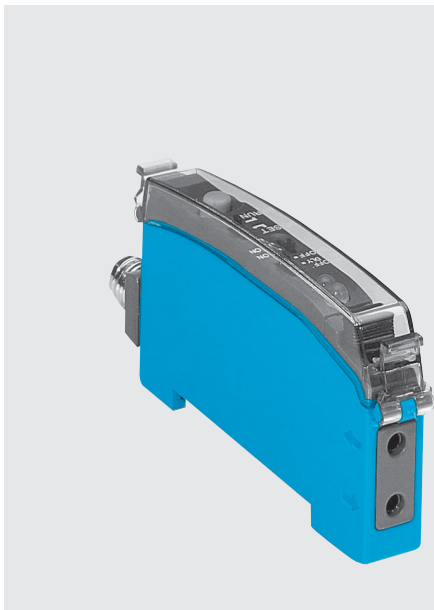
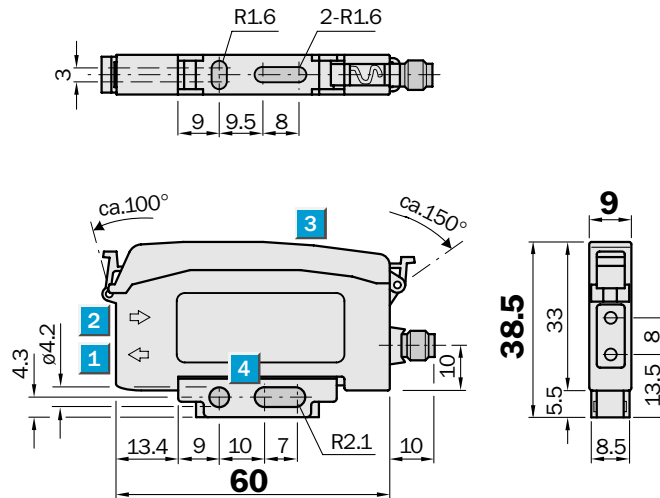
**Order information**

Type	Order no.
WLL 170A-V132	6 021 078
WLL 170A-V330	6 021 962
WLL 170A-V430	6 021 080

	<b>Scanning range</b> 0 to 580 mm
<b>Through-beam system</b>	
	<b>Scanning distance</b> 0 to 100 mm
<b>Proximity system</b>	

- Emitter LED red for standard applications and mark recognition
- Easy alignment and operation startup by Teach In
- Manual fine adjustment, optional
- Anti-interference, optional

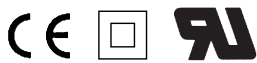
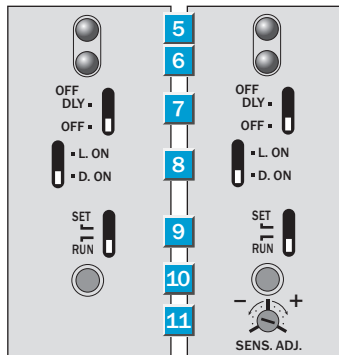
**Dimension illustration**



**Setting options**

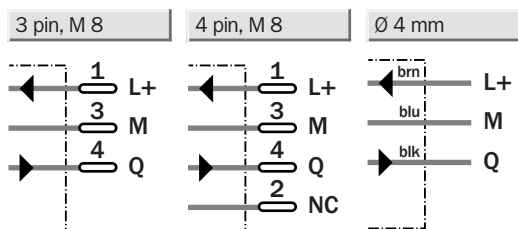
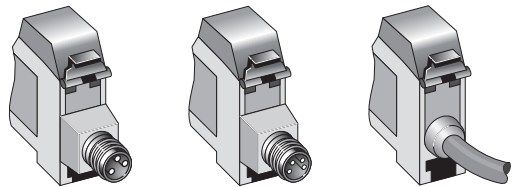
WLL 170T-P132	WLL 170T-F132
WLL 170T-P330	WLL 170T-F330
WLL 170T-P430	WLL 170T-F430
WLL 170T-N132	WLL 170T-E132
WLL 170T-N330	WLL 170T-E330
WLL 170T-N430	WLL 170T-E430

- LED emitter, fiber-optic cable LL 3 mounting (emitter fiber)
- Receiver, fiber-optic cable LL 3 mounting (receiver fiber)
- Protective cover, both sides can be swiveled up, removable
- Fixing bracket, included in delivery (see accessories)
- Orange LED display, lights up when supply connection is active
- Green LED receiver display, lights up when light received is < 0.9 or > 1.1 (switching threshold = 1)
- OFF delay selector switch: "OFF DLY" (on)/"OFF" (off), 40 ms fix
- Selector switch: "L.ON" (light-switching)/"D.ON" (dark-switching)
- Operating mode selector switch: "SET" (Teach In mode)/"RUN" (sensor mode)
- "Teach In" push button
- Sensitivity potentiometer ± 90°, "SENS.ADJ": manual fine adjustment of "taught-in" switching threshold. See selection table for variants, page 14.



**Connection type**

WLL 170T-P330	WLL 170T-P430	WLL 170T-P132
WLL 170T-N330	WLL 170T-N430	WLL 170T-N132
WLL 170T-F330	WLL 170T-F430	WLL 170T-F132
WLL 170T-E330	WLL 170T-E430	WLL 170T-E132



**Accessories**

Cable receptacles
Mounting bracket
Fiber-optic cable



Technical data		WLL 170T-	P132	P330 <sup>1)</sup>	N132	N330 <sup>1)</sup>	F132	F330 <sup>1)</sup>	E132	E330 <sup>1)</sup>		
				P430 <sup>2)</sup>		N430 <sup>2)</sup>		F430 <sup>2)</sup>		E430 <sup>2)</sup>		
<b>Suitable fiber-optic cable</b>	Plastic fiber-optic cable series LL 3											
<b>Scanning range</b>	Dependent on used fiber-optic cable											
<b>Recommended operating range</b>	0 to 580 mm (through-beam system) (with auxiliary lens 0 to 3200 mm)											
<b>Recommended operating distance</b>	0 to 100 mm <sup>3)</sup> (proximity system)											
<b>Sensitivity setting</b>												
Automatically, by Teach In button	Mode switch at pos. "SET" <sup>4)</sup>											
Additional fine alignment, manual	Optionally <sup>5)</sup>											
<b>Mode selector switch</b> position "SET"	Teach In button active											
position "RUN"	Teach In button inactive <sup>6)</sup>											
<b>Basic device WLL 170T</b>												
<b>Anti-interference</b> <sup>7)</sup>	See selection table WLL 170T											
<b>Light source</b> <sup>8)</sup>	LED, visible red light											
Light spot diameter LL3	Dependent on scanning range											
Aperture fiber-optic cable LL3	Approx. 65° <sup>9)</sup>											
<b>Supply voltage</b> V <sub>s</sub> <sup>10)</sup>	10 to 30 V DC											
Ripple <sup>11)</sup>	10%											
Current consumption <sup>12)</sup>	≤ 50 mA											
<b>Switching outputs</b>	PNP: open collector: Q NPN: open collector: Q											
<b>Output current</b> I <sub>A</sub> max.	100 mA											
<b>Light receiver, switching type</b>	Dark/light-switching <sup>13)</sup>											
<b>Response time</b> <sup>14)</sup>	≤ 0.5 ms											
<b>Switching frequency max.</b> <sup>15)</sup>	1000/s											
<b>Time delay</b> t <sub>OFF</sub> (OFF delay)	40 ms fix, selectable by sliding switch											
<b>Type of connection</b> Connecting cable <sup>16)</sup>	PVC, 2 m; 3 x 0.2 mm <sup>2</sup> , Ø 4.0 mm											
Plug	M 8, 3 pin/4 pin											
<b>Circuit protection</b> <sup>17)</sup>	A, B, C, D											
<b>Enclosure rating</b>	IP 50											
<b>Ambient temperature</b>	Operation -25 to +55 °C Storage -40 to +70 °C											
<b>Weight</b>												
with connecting cable 2 m	Approx. 60 g											
with plug M 8, 3 pin/4 pin	Approx. 20 g											
<b>Housing material</b>	ABS											

- <sup>1)</sup> Plug M 8, 3 pin
- <sup>2)</sup> Plug M 8, 4 pin
- <sup>3)</sup> Object with 90 % reflectance (referred to standard white DIN 5033)
- <sup>4)</sup> Teach In active
- <sup>5)</sup> Change of switching threshold at approx. ± 35 %, with potentiometer ± 90°
- <sup>6)</sup> Equipment in sensor mode
- <sup>7)</sup> Optionally, no opposing interference of Basic WLL 170T and WLL 170T Anti-interference (see page 14)
- <sup>8)</sup> Average service life 100,000 h at T<sub>U</sub> = +25 °C
- <sup>9)</sup> Differences see LL 3 data
- <sup>10)</sup> Limit values
- <sup>11)</sup> Must be within V<sub>s</sub> tolerances
- <sup>12)</sup> Without load
- <sup>13)</sup> By sliding switch
- <sup>14)</sup> With light/dark ratio 1:1 without time delay
- <sup>15)</sup> With resistive load
- <sup>16)</sup> Do not bend cable below 0 °C
- <sup>17)</sup> A = V<sub>s</sub> connections reverse-polarity protected  
B = Inputs/outputs reverse-polarity protected  
C = Interference suppression  
D = Outputs overcurrent and short-circuit protected

**Function diagram WLL 170T standard**

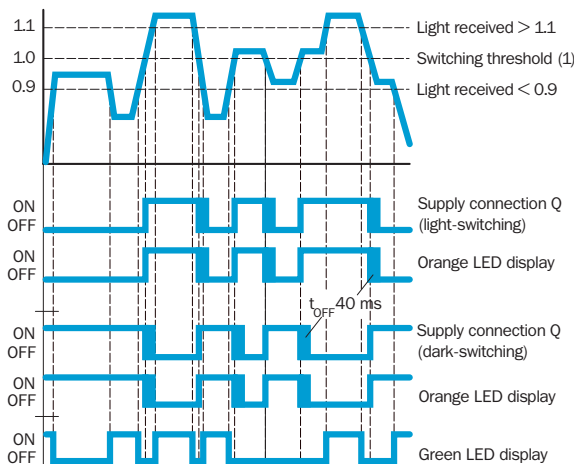
**WLL 170T in sensor mode**

Operating mode selector switch in RUN mode (after setting the switching threshold by means of Teach In).

**Orange LED display:** lights up if supply connection Q is active. Dependent on setting of light/dark-selector switch.

**Green LED display:** lights up if light received is < 0.9 or > 1.1 (based on the switching threshold Q, switching threshold = 1).

LED display in Teach In mode: see Teach In page 13.



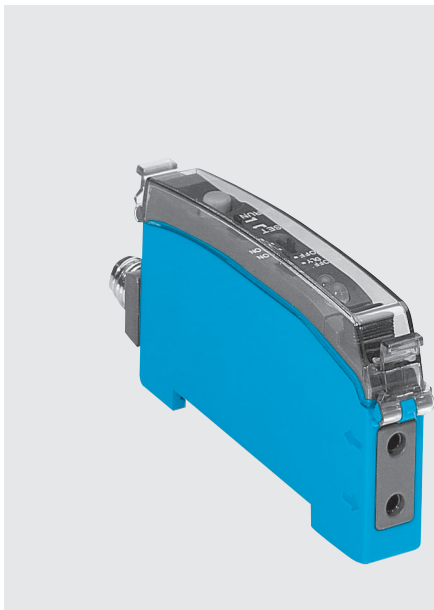
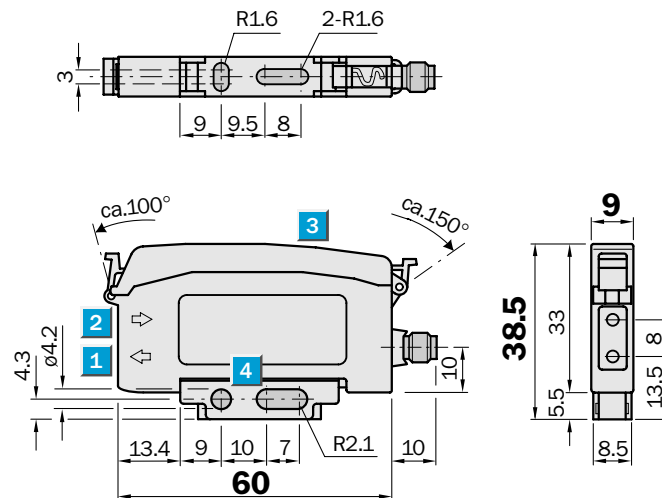
**Order information**

Type	Order no.
WLL 170T-P132	6 011 722
WLL 170T-P330	6 021 963
WLL 170T-P430	6 011 724
WLL 170T-N132	6 011 725
WLL 170T-N330	6 021 964
WLL 170T-N430	6 011 727
WLL 170T-F132	6 020 420
WLL 170T-F330	6 021 965
WLL 170T-F430	6 020 422
WLL 170T-E132	6 020 423
WLL 170T-E330	6 021 966
WLL 170T-E430	6 020 425

	<b>Scanning range</b> 0 to 140 mm
<b>Through-beam system</b>	
	<b>Scanning distance</b> 0 to 25 mm
<b>Proximity system</b>	

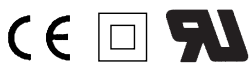
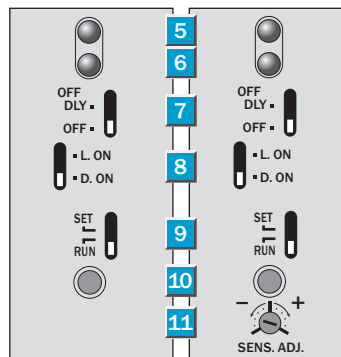
- Emitter LED green
- Ideal for recognition of red marks, contrasts or parts
- Teach In
- Manual fine adjustment, optional
- Anti-interference, optional

### Dimension illustration



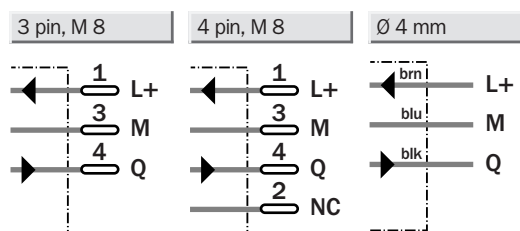
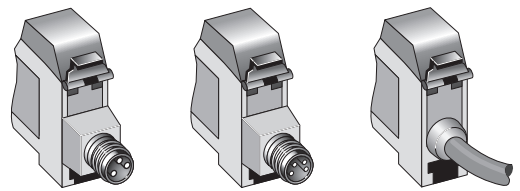
Setting options	
WLL 170T-P192	WLL 170T-F192
WLL 170T-P390	WLL 170T-F390
WLL 170T-P490	WLL 170T-F490
WLL 170T-N192	WLL 170T-E192
WLL 170T-N390	WLL 170T-E390
WLL 170T-N490	WLL 170T-E490

- 1 LED emitter, fiber-optic cable LL 3 mounting (emitter fiber)
- 2 Receiver, fiber-optic cable LL 3 mounting (receiver fiber)
- 3 Protective cover, both sides can be swiveled up, removable
- 4 Fixing bracket, included in delivery (see accessories)
- 5 Orange LED display, lights up when supply connection is active
- 6 Green LED receiver display, lights up when light received is < 0.9 or > 1.1 (switching threshold = 1)
- 7 OFF delay selector switch: "OFF DLY" (on)/"OFF" (off), 40 ms fix
- 8 Selector switch: "L.ON" (light-switching)/"D.ON" (dark-switching)
- 9 Operating mode selector switch: "SET" (Teach In mode)/"RUN" (sensor mode)
- 10 "Teach In" push button
- 11 Sensitivity potentiometer ± 90°, "SENS.ADJ": manual fine adjustment of "taught-in" switching threshold. See selection table for variants, page 14.



### Connection type

WLL 170T-P390	WLL 170T-P490	WLL 170T-P192
WLL 170T-N390	WLL 170T-N490	WLL 170T-N192
WLL 170T-F390	WLL 170T-F490	WLL 170T-F192
WLL 170T-E390	WLL 170T-E490	WLL 170T-E192



Accessories
Cable receptacles
Mounting bracket
Fiber-optic cable

Technical data		WLL 170T-	P192	P390 <sup>1)</sup>	N192	N390 <sup>1)</sup>	F192	F390 <sup>1)</sup>	E192	E390 <sup>1)</sup>		
				P490 <sup>2)</sup>		N490 <sup>2)</sup>		F490 <sup>2)</sup>		E490 <sup>2)</sup>		
<b>Suitable fiber-optic cable</b>	Plastic fiber-optic cable series LL 3											
<b>Scanning range</b>	Dependent on used fiber-optic cable											
<b>Recommended operating range</b>	0 to 140 mm (through-beam system) (with auxiliary lense 0 to 650 mm)											
<b>Recommended operating distance</b>	0 to 25 mm <sup>3)</sup> (proximity system)											
<b>Sensitivity setting</b>												
Automatically, by Teach In button	Mode switch at pos. "SET" <sup>4)</sup>											
Additional fine alignment, manual	Optional <sup>5)</sup>											
<b>Black &amp; white resolution<sup>6)</sup></b>	8 grey levels											
<b>Mode selector switch</b> position "SET"	Teach In button active											
position "RUN"	Teach In button inactive <sup>7)</sup>											
<b>Basic device WLL 170T</b>												
<b>Anti-Interference<sup>8)</sup></b>	See WLL 170T selection table											
<b>Light source<sup>9)</sup></b>	LED, visible red light											
Light spot diameter LL3	Dependent on scanning range											
Aperture fiber-optic cable LL3	Approx. 65° <sup>10)</sup>											
<b>Supply voltage V<sub>s</sub><sup>11)</sup></b>	10 to 30 V DC											
Ripple <sup>12)</sup>	10%											
Current consumption <sup>13)</sup>	≤ 50 mA											
<b>Switching outputs</b>	PNP: open collector: Q NPN: open collector: Q											
<b>Output current I<sub>A</sub> max.</b>	100 mA											
<b>Light receiver, switching mode</b>	Dark/light-switching <sup>14)</sup>											
<b>Response time<sup>15)</sup></b>	≤ 0.5 ms											
<b>Switching frequency max.<sup>16)</sup></b>	1000/s											
<b>Time delay t<sub>OFF</sub></b> (OFF delay)	40 ms fix, selectable by sliding switch											
<b>Type of connection</b> Connecting cable <sup>17)</sup>	PVC, 2 m; 3 x 0.2 mm <sup>2</sup> , Ø 4.0 mm											
Plug	M 8, 3 pin/4 pin											
<b>Circuit protection<sup>18)</sup></b>	A, B, C, D											
<b>Enclosure rating</b>	IP 50											
<b>Ambient temperature</b>	Operation -25 to +55 °C Storage -40 to +70 °C											
<b>Weight</b> with connecting cable 2 m	Approx. 60 g											
with plug M 8, 3 pin/4 pin	Approx. 20 g											
<b>Housing material</b>	ABS											

1) Plug M 8, 3 pin

2) Plug M 8, 4 pin

3) Object with 90% reflectance (referred to standard white DIN 5033)

4) Teach In active

5) Change of switching threshold at approx. ± 35%, with potentiometer ± 90°

6) With fiber-optic cable proximity LL 3-DT01, scanning distance 3 mm

7) Equipment in sensor mode

8) Optionally, no opposing interference of Basic WLL 170T and WLL 170T Anti-Interference (see page 14)

9) Average service life 100,000 h at T<sub>U</sub> = +25 °C

10) Differences see LL 3 data

11) Limit values

12) Must be within V<sub>s</sub> tolerances

13) Without load

14) By sliding switch

15) With light/dark ratio 1:1 without time delay

16) With resistive load

17) Do not bend cable below 0 °C

18) A = V<sub>s</sub> connections reverse-polarity protected

B = Inputs/outputs reverse-polarity protected

C = Interference suppression

D = Outputs overcurrent and short-circuit protected

**Function diagram WLL 170T mark sensor**

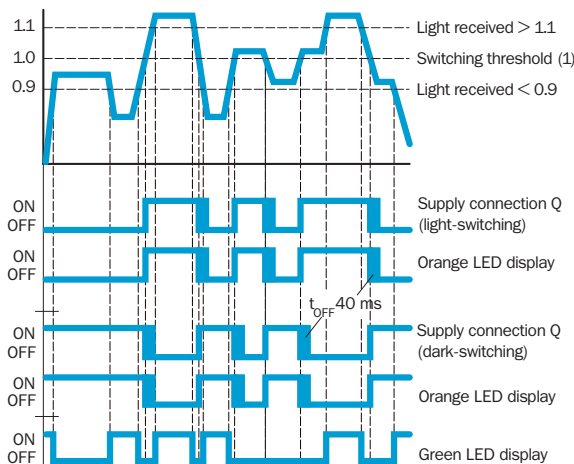
**WLL 170T in sensor mode**

Operating mode selector switch in RUN mode (after setting the switching threshold by means of Teach In).

**Orange LED display:** lights up if supply connection Q is active. Dependent on setting of light / dark-selector switch.

**Green LED display:** lights up if light received is < 0.9 or > 1.1 (based on the switching threshold Q, switching threshold = 1).

LED display in Teach In mode: see Teach In page 13.



**Order information**

Type	Order no.
WLL 170T-P192	6 011 728
WLL 170T-P390	6 021 967
WLL 170T-P490	6 011 730
WLL 170T-N192	6 011 731
WLL 170T-N390	6 021 968
WLL 170T-N490	6 011 733
WLL 170T-F192	6 020 426
WLL 170T-F390	6 021 969
WLL 170T-F490	6 020 428
WLL 170T-E192	6 020 429
WLL 170T-E390	6 021 970
WLL 170T-E490	6 020 431

Functions

■ Sensitivity potentiometer

“SENS.ADJ.”, ± 90°, (optional, see WLL 170T selection table). For fine adjustment of the taught-in switching threshold ± 35 % at a later stage. Ideal for exact adaptation with positioning tasks, mark recognition, transparent or very small objects.

■ Type of switching selector switch Q

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

■ Connection technique

Either M 8, 3 pin/4 pin equipment plug or 2 m connection cable.

■ OFF delay  $t_{off}$

For supply connection Q. Also switchable, 40 ms fix. Enables the control unit to record very short events.

■ Mounting technique WLL 170T

Mounting by means of simply clipping onto profile mounting rail. (Fixing bracket included in delivery).

■ LED display orange, green

- Teach In mode:
  - Signalling Teach In sequence
  - Constantly flashing: Teach error
  - Constantly lit: Teach In OK.
- Sensor mode:
  - Orange LED: supply connection active
  - Green LED: receiver signal > 1.1 or < 0.9; (switching threshold = 1).

■ Teach In key

Sensitivity setting by means of pressing a button. No special photoelectric switch knowledge necessary. Only active when MODE selector switch is in the SET position (manipulation protection).

■ Teach In mode selector switch

Separate for other operating mode selector switches, therefore simple to operate, no double functions.

- “SET”: WLL 170T in manual Teach In mode. Optimum switching point setting by simply pressing a key (once or twice).
- “RUN”: The taught-in switching threshold and switching hysteresis are saved in the EEPROM.
- “Accidental change” of the taught-in parameter is not possible.
- After 2 seconds the WLL 170T operates in the sensor mode. The saved Teach In values are saved for an unlimited period of time even if the voltage is interrupted for a longer time.

■ Protective cover

Both sides can be swiveled up, easy to remove. Easy locking. Also used to check correct fiber-optic cable locking (protective cover cannot be shut otherwise).

■ Quick-shut for fiber-optic cable

- Fiber-optic cable mounting
  - Release fiber-optic cable: snap closure in horizontal position. Insert the fiber-optic cable. Lock the fiber-optic cable: closure in vertical position.
- Removing fiber-optic cable
  - Release the fiber-optic cable: put the snap closure in a horizontal position. Pull out the fiber-optic cable.

■ Emitter LED:

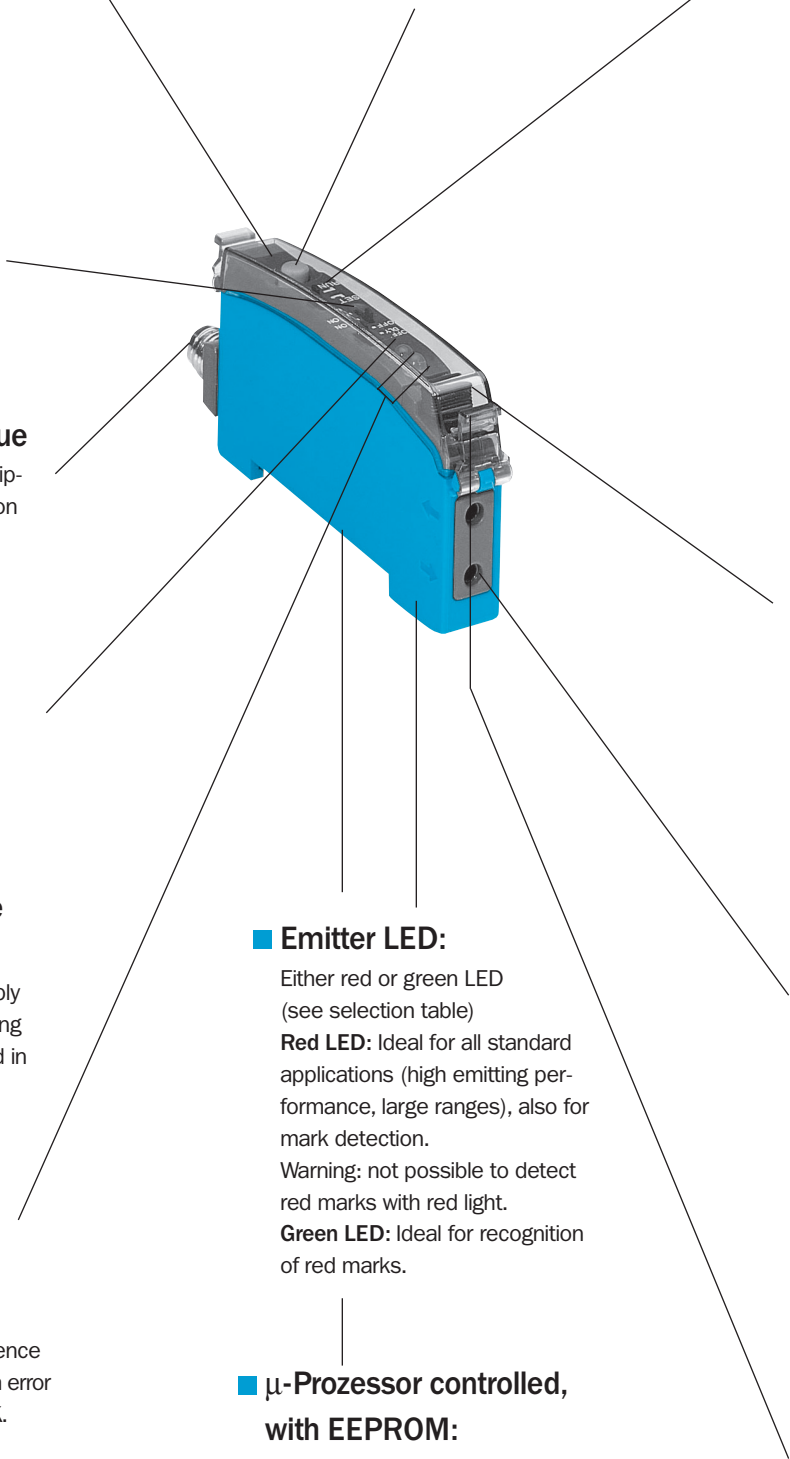
Either red or green LED (see selection table)  
**Red LED:** Ideal for all standard applications (high emitting performance, large ranges), also for mark detection.  
 Warning: not possible to detect red marks with red light.  
**Green LED:** Ideal for recognition of red marks.

■ μ-Prozessor controlled, with EEPROM:

Long-term saving of taught-in switching threshold and hysteresis even if voltage is interrupted for a longer period of time.

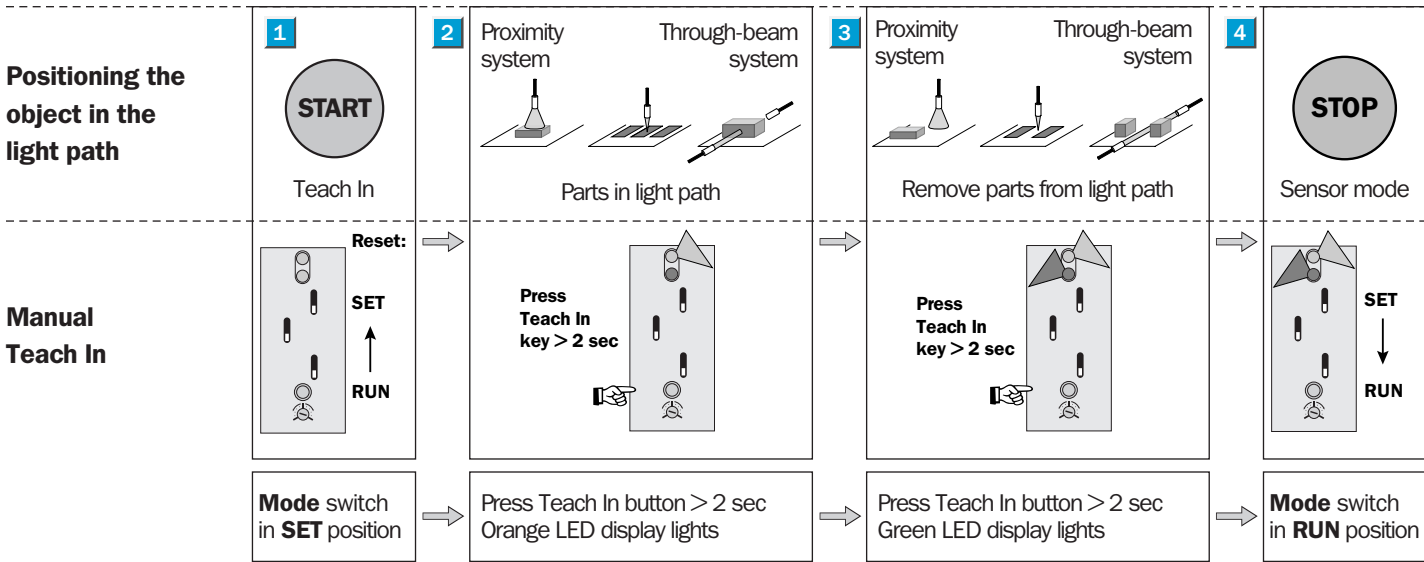
■ Fiber-optic cable receptacle

- ← Fiber-optic cable emitter.
  - Fiber-optic cable receiver.
- Suitable fiber-optic cable: plastic fiber-optic cable series LL 3 (see description of the many LL 3 variants).



**1. Exact sensitivity setting (by pressing button twice); WLL 170T**

**Teach In steps**

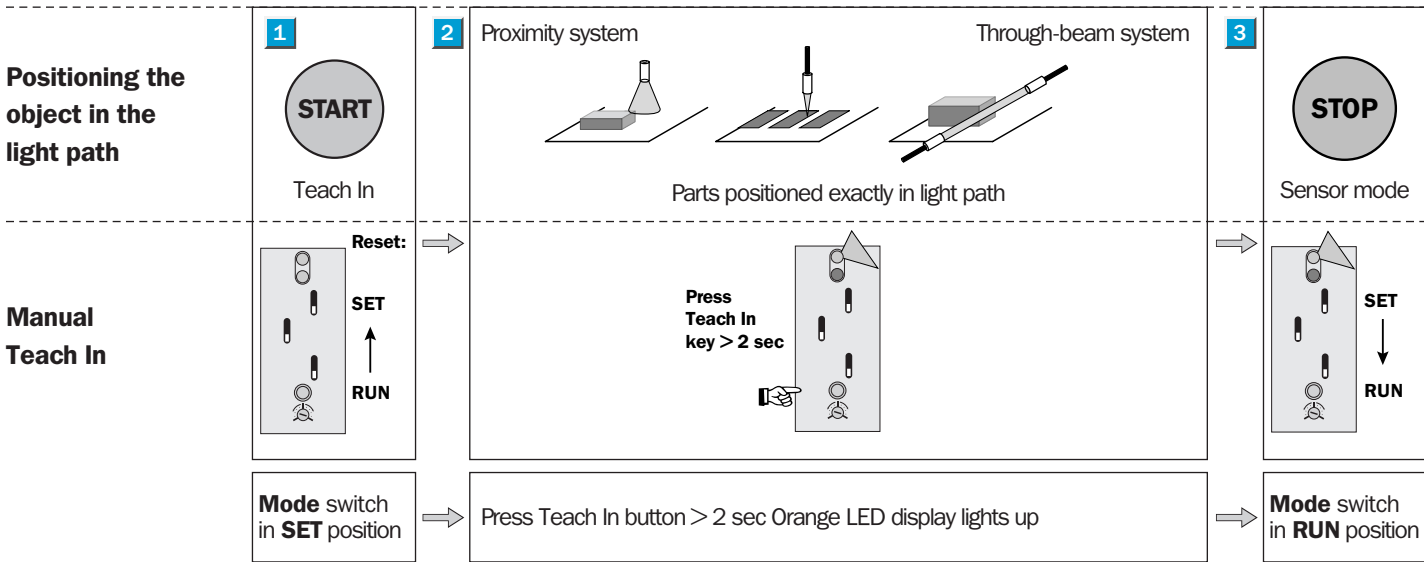


This operating mode is suitable for all applications: large ranges, exact switching points, small hysteresis, transparent objects and contrast marks. The WLL 170T automatically optimizes the switching threshold and hysteresis by means of a  $\mu$ -processor and saves these values long-term in the EEPROM. No special experience with opto-electronic components is necessary. The Teach In key is pressed twice.

**Applications:** Through-beam system: All standard applications, even thin and transparent objects are recognized.  
Proximity system: All standard applications, strong background interference, small or dark sensor objects, simple marks with contrast differences.

**2. Exact positioning of parts or switching positions (by pressing button once); WLL 170T**

**Teach In steps**



This operating mode is particularly suitable for exact positioning tasks. After positioning the object in the desired switching position, the WLL 170T automatically optimizes the switching threshold and hysteresis by means of a  $\mu$ -processor and saves the values long-term in the EEPROM. No special experience with opto-electronic components is necessary. The Teach In key is pressed once.

**Applications:** Through-beam system: Exact positioning of parts.  
Proximity system: Exact positioning of parts, positioning of contrast marks.

**WLL 170T with additional sensitivity potentiometer** (see selection table). The switching threshold taught-in by means of the Teach In key can also be manually changed within a narrow range (adapted). This may be necessary if the exact switching point required is unknown at the time of operation startup.

**Warning:** This "SENS.ADJ" potentiometer must be set to the 0 position during the Teach In (SET mode).

**Selection table WLL 170T**

**Emitter LED red**

■ **WLL 170T**

Applications: Our recommendation for almost all applications with fiber-optic cables. Also as a contrast sensor for color marks, marks on transparent sheets, for detection of thin parts and for exact positioning.  
Warning: Not suitable for red marks.

Order information	
Type	Order no.
WLL 170T-P132	6 011 722
WLL 170T-P330	6 021 963
WLL 170T-P430	6 011 724
WLL 170T-N132	6 011 725
WLL 170T-N330	6 021 964
WLL 170T-N430	6 011 727

**Anti-interference \***

(other system features are identical)

Order information	
Type	Order no.
WLL 170T-P122	6 020 432
WLL 170T-P320	6 021 971
WLL 170T-P420	6 020 434
WLL 170T-N122	6 020 435
WLL 170T-N320	6 021 972
WLL 170T-N420	6 020 437

**Emitter LED green, mark sensor**

■ **WLL 170T – mark sensor**

Applications: All variants with green emitter LEDs are ideal for detection of red contrasts (contrast marks).  
Reduced range/scanning distance.

Order information	
Type	Order no.
WLL 170T-P192	6 011 728
WLL 170T-P390	6 021 967
WLL 170T-P490	6 011 730
WLL 170T-N192	6 011 731
WLL 170T-N390	6 021 968
WLL 170T-N490	6 011 733

**Anti-interference \***

(other system features are identical)

Order information	
Type	Order no.
WLL 170T-P182	6 020 444
WLL 170T-P380	6 021 975
WLL 170T-P480	6 020 446
WLL 170T-N182	6 020 447
WLL 170T-N380	6 021 976
WLL 170T-N480	6 020 449

■ **WLL 170T with additional potentiometer for manual fine adjustment**

Applications: Manual adjustment. An additional potentiometer ( $\pm 90^\circ$ ) allows the taught-in switching points to be changed at a later stage.  
Thin parts, pressure marks and positioning cannot always be preset precisely using a manual procedure.  
You can vary the switching threshold at a later stage by approx.  $\pm 35\%$ .

Order information	
Type	Order no.
WLL 170T-F132	6 020 420
WLL 170T-F330	6 021 965
WLL 170T-F430	6 020 422
WLL 170T-E132	6 020 423
WLL 170T-E330	6 021 966
WLL 170T-E430	6 020 425

**Anti-interference \***

(other system features are identical)

Order information	
Type	Order no.
WLL 170T-F122	6 020 438
WLL 170T-F320	6 021 973
WLL 170T-F420	6 020 440
WLL 170T-E122	6 020 441
WLL 170T-E320	6 021 974
WLL 170T-E420	6 020 443

■ **WLL 170T – mark sensor with additional potentiometer for manual fine adjustment**

Applications: Manual adjustment. An additional potentiometer ( $\pm 90^\circ$ ) allows the taught-in switching points to be changed at a later stage.  
Pressure marks and positioning etc. cannot always be preset precisely using a manual procedure. You can vary the switching threshold at a later stage by approx.  $\pm 35\%$ .

Order information	
Type	Order no.
WLL 170T-F192	6 020 426
WLL 170T-F390	6 021 969
WLL 170T-F490	6 020 428
WLL 170T-E192	6 020 429
WLL 170T-E390	6 021 970
WLL 170T-E490	6 020 431

**Anti-interference \***

(other system features are identical)

Order information	
Type	Order no.
WLL 170T-F182	6 020 450
WLL 170T-F380	6 021 977
WLL 170T-F480	6 020 452
WLL 170T-E182	6 020 453
WLL 170T-E380	6 021 978
WLL 170T-E480	6 020 455

\* **Anti-interference**



Are built-in components or several fiber-optic ends installed close to one another? Do the photoelectric switches interfere with one another?  
The solution: WLL 170T anti-interference!  
Two WLL 170Ts, one basic version and one anti-interference version operate without opposing interference.  
All versions listed above are also available as anti-interference versions.

# LL 3

## Plastic Fiber-optic Cable – Flexible in Every Way



To this should be added the large number of different variants. Around 50 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 fiber-optic cable of type LL 3 and the fiber-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.

	<b>Fiber optic cable Through-beam systems</b>
	<b>Fiber optic cable Proximity systems</b>

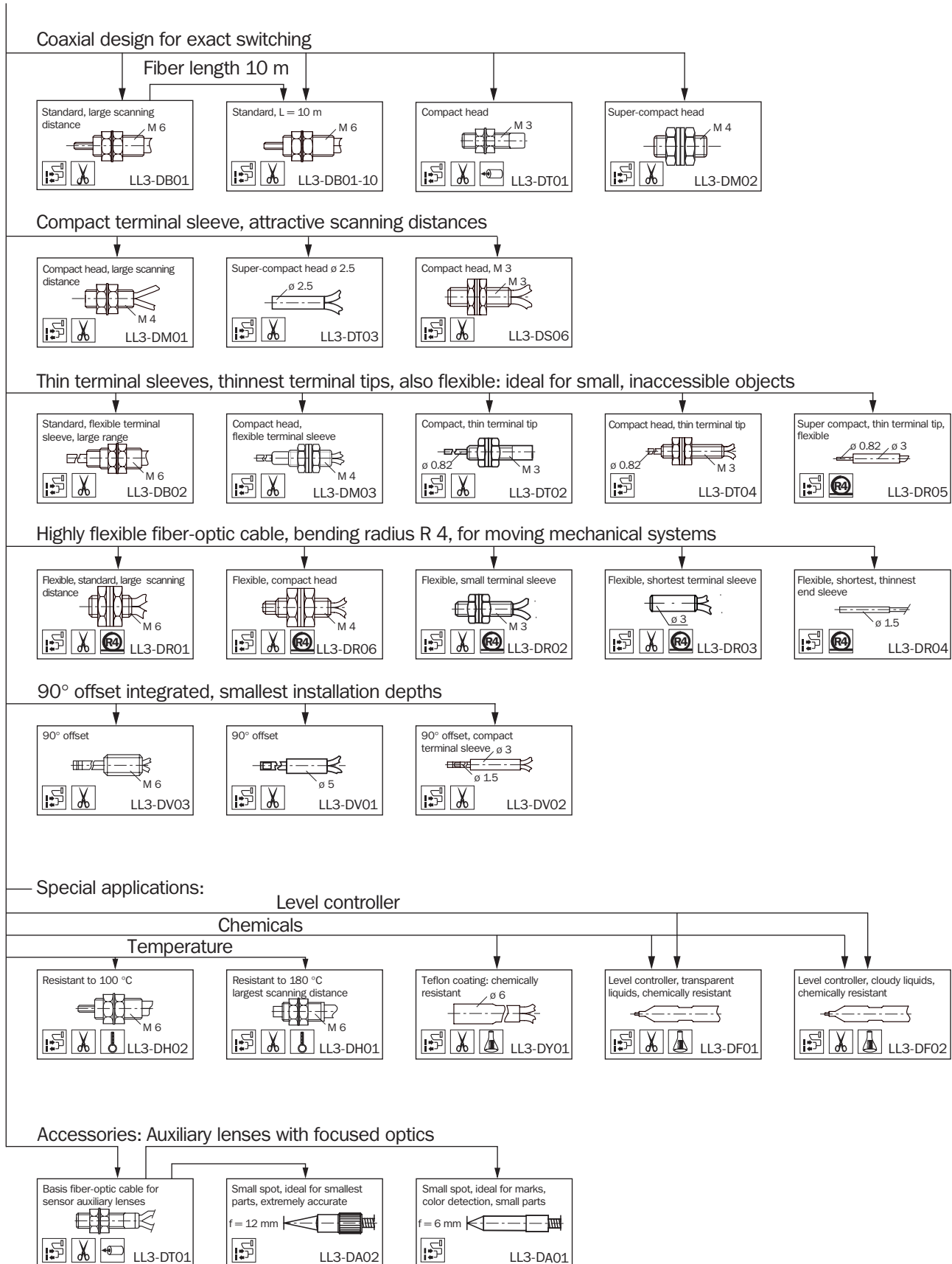
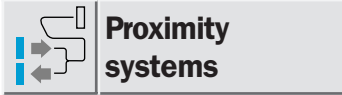
Lack of installation space (even for miniature photoelectric switches) or exposure to chemicals or heat are frequent reasons for using the plastic fiber-optic cable LL 3. In combination with the photoelectric switch series WLL 170(T), the LL3s assure reliable object detection even under difficult conditions.

Its multiple flexibility is one of the main advantages of the LL 3. 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.

LL 3 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 to 180 °C
- Teflon sheath for corrosive surroundings
- Coaxial design
- Flexible end sleeves
- 10 meters in length
- Optical-guide line
- Level switch ...

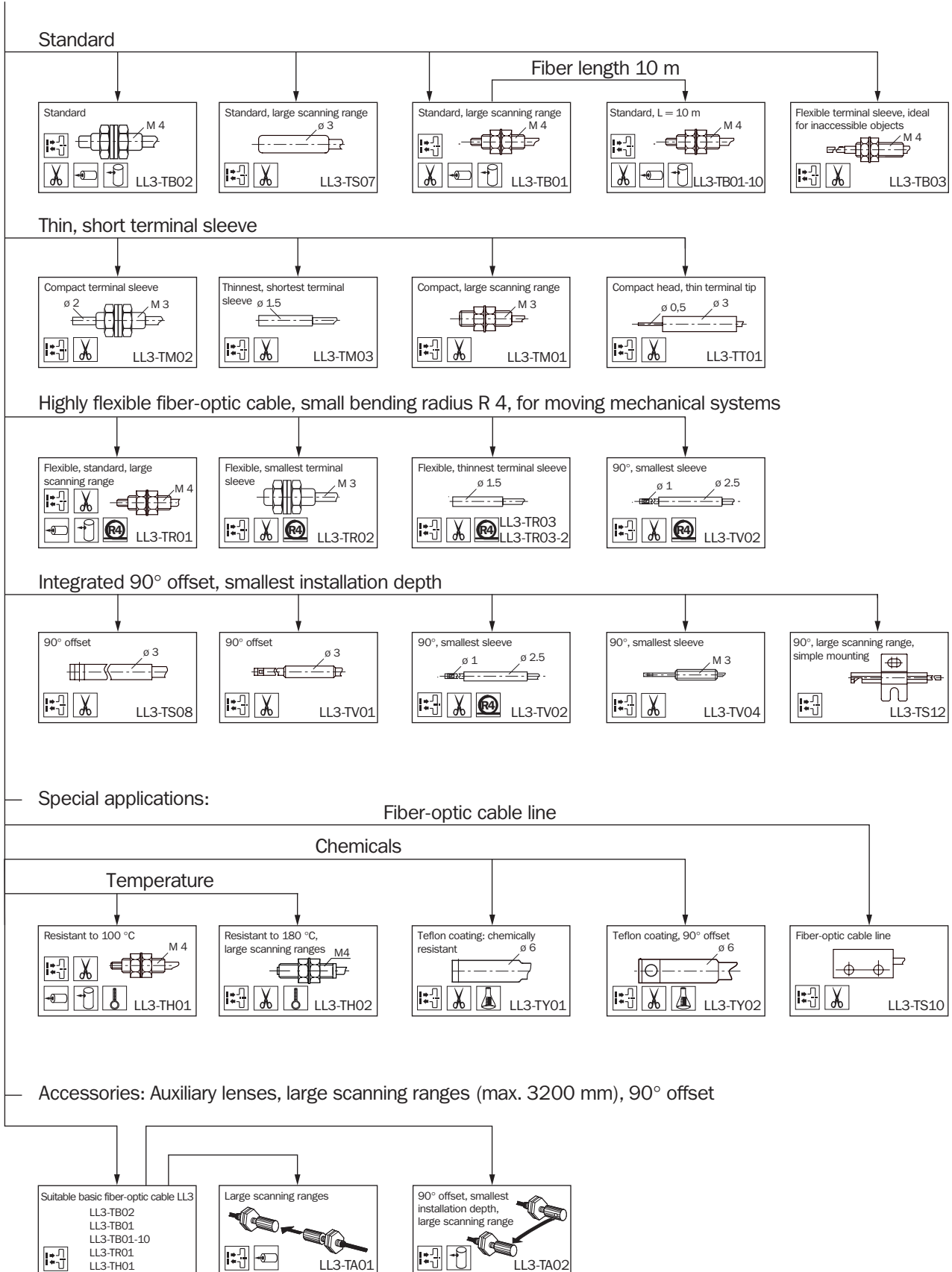
## Flowchart for selection of fiber-optic cable

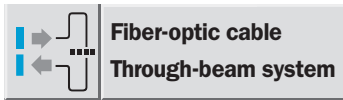




Flowchart for selection of fiber-optic cable

**Through-beam systems**





## Features

- Highly flexible
- Small bending radii
- Fiber-optic cable length can be shortened easily in most cases with cutting apparatus (included in package)
- Ambient operating temperature – 40 to +70 °C  
Special models up to 180 °C

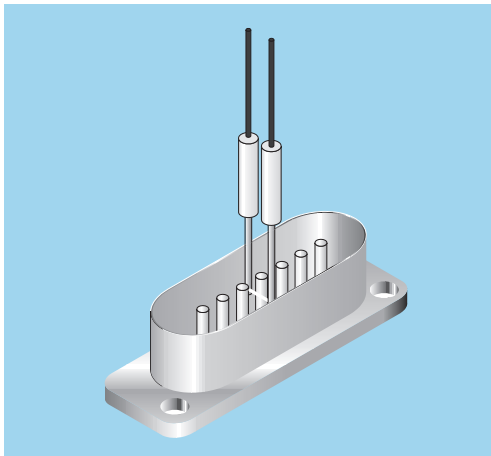
## Selection table: sensors, fiber optic cable, scanning ranges

### Through-beam systems

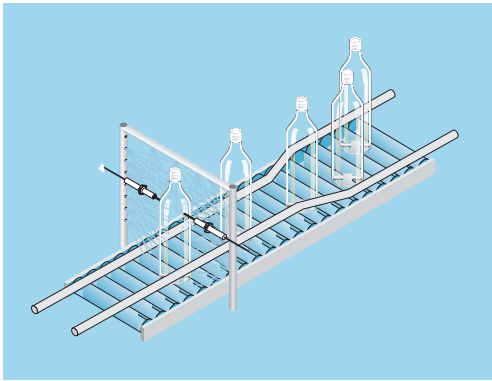
#### Fiber-optic cable LL 3

Description	Bending ra.	Type	Order no.
	mm		
Standard, M 4	25	LL 3-TB 02	5 308 048
Standard, $\varnothing$ 3 mm, large ranges	35	LL 3-TS 07	5 308 049
Standard, M 4, large ranges	25	LL 3-TB 01	5 308 050
Standard, M 4, length 10 m	25	LL 3-TB 01-10	5 308 051
Highly flexible, M 4, large ranges	4	LL 3-TR 01	5 308 052
Highly flexible, M 3	4	LL 3-TR 02	5 308 053
Small sleeve, $\varnothing$ 1.5 mm, highly flexible, length 1 m	4	LL 3-TR 03	5 308 054
Small sleeve, $\varnothing$ 1.5 mm, highly flexible, length 2 m	4	LL 3-TR 03-2	5 308 055
Flexible end sleeve, M 4	25/10 <sup>3)</sup>	LL 3-TB 03	5 308 056
Compact, M 3, Final piece $\varnothing$ 1.0 mm	15	LL 3-TT 01	5 308 057
90° offset, standard, $\varnothing$ 3 mm	25	LL 3-TV 01	5 308 058
90° offset, compact, $\varnothing$ 2.5 mm	15	LL 3-TV 02	5 308 059
90° offset, compact, M 3	15	LL 3-TV 04	5 308 060
90° offset, standard, $\varnothing$ 3 mm	25	LL 3-TS 08	5 308 061
90° offset, large ranges	25	LL 3-TS 12	5 308 062
Fiber optic cable line	25	LL 3-TS 10	5 308 063
Temperature resistant, M 4	25	LL 3-TH 01 <sup>4)</sup>	5 308 064
Temperature resistant to 180 °C, M 4	30	LL 3-TH 02 <sup>5)</sup>	5 308 065
Teflon sheath, $\varnothing$ 6.0 mm, chemically resistant	40	LL 3-TY 01	5 308 066
Teflon sheath, $\varnothing$ 6.0 mm, chemically resistant, 90° offset	40	LL 3-TY 02	5 308 067
Small end sleeve, M 3, large ranges	25	LL 3-TM 01	5 308 068
Small end sleeve, M 3	15	LL 3-TM 02	5 308 069
Small end sleeve, $\varnothing$ 1.5 mm	15	LL 3-TM 03	5 308 070

- 1) Unshorted fiber-optic cable
- 2) With auxiliary lenses for LL 3, see also auxiliary lenses for LL 3
- 3) Bending radius of flexible end sleeve
- 4) Ambient operating temperature –40 to +100 °C
- 5) Ambient operating temperature –40 to +180 °C
- 6) Minimum object  $\varnothing$ : range reduction!



▲ The electronics industry is one branch where fiber-optic cables are used, e.g., fiber-optic cables with integrated 90° deviation are used for detecting contact pins in cramped spaces.

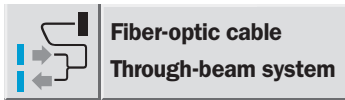


▲ Fiber-optic cables LL 3 for special applications: A LL 3 with Teflon-coating is the right choice here for use in a corrosive environment, e.g., contact with acids, caustic solutions, detergents or oils.

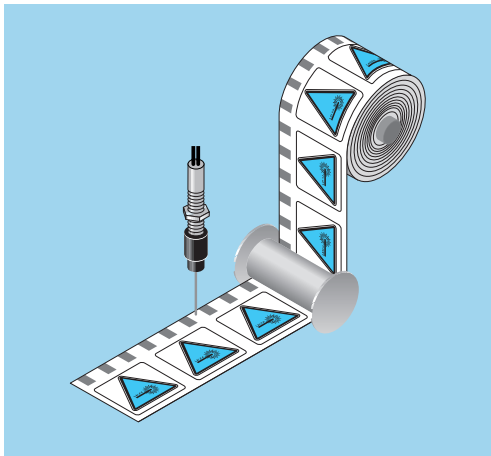
Scanning ranges SR<sup>4)</sup> and minimum object diameter MO<sup>6)</sup> in mm in connection with sensor type

WLL 170 red light		WLL 170 red light high speed		WLL 170 A analog			WLL 170 T red light		WLL 170 T green light	
SR	MO	SR	MO	5 V	3 V		SR	MO	SR	MO
				SR	SR	MO				
280/2500 <sup>2)</sup>	0.2	80/500 <sup>2)</sup>	0.2	95	135	0.2	350/3200 <sup>2)</sup>	0.2	75/650 <sup>2)</sup>	0.2
460	0.5	130	0.5	160	230	0.5	580	0.5	140	0.5
460/2000 <sup>2)</sup>	0.5	130/400 <sup>2)</sup>	0.5	160	230	0.5	580/2500 <sup>2)</sup>	0.5	140/600 <sup>2)</sup>	0.5
250/1000 <sup>2)</sup>	0.5	75/200 <sup>2)</sup>	0.5	80	110	0.5	300/1200 <sup>2)</sup>	0.5	120/500 <sup>2)</sup>	0.5
230/2000 <sup>2)</sup>	0.3	60/400 <sup>2)</sup>	0.3	80	110	0.3	270/2500 <sup>2)</sup>	0.3	60/550 <sup>2)</sup>	0.3
60	0.1	15	0.1	25	35	0.1	80	0.1	15	0.1
60	0.1	15	0.1	25	35	0.1	80	0.1	15	0.1
60	0.1	15	0.1	25	35	0.1	80	0.1	15	0.1
280	0.2	80	0.2	90	125	0.2	330	0.2	75	0.2
18	0.1	●	●	6	8	0.1	23	0.1	●	●
160	0.2	30	0.2	80	110	0.2	230	0.2	55	0.2
50	0.1	15	0.1	23	33	0.1	60	0.1	15	0.1
50	0.1	15	0.1	23	33	0.1	60	0.1	15	0.1
200	0.2	65	0.2	80	110	0.2	250	0.2	55	0.2
800	0.5	340	0.5	550	800	0.5	1000	0.5	450	0.5
230	0.1	70	0.1	85	120	0.1	330	0.1	60	0.1
180/2000 <sup>2)</sup>	0.2	60/400 <sup>2)</sup>	0.2	70	95	0.2	250/2500 <sup>2)</sup>	0.2	25/300 <sup>2)</sup>	0.2
400	0.5	120	0.5	130	180	0.5	500	0.5	85	0.5
800	0.3	300	0.3	●	●	●	1800	0.3	200	0.3
280	0.3	60	0.3	●	●	●	380	0.3	120	0.3
280	0.2	80	0.2	95	135	0.2	350	0.2	75	0.2
80	0.1	20	0.1	27	38	0.1	100	0.1	15	0.1
80	0.1	20	0.1	27	38	0.1	100	0.1	15	0.1

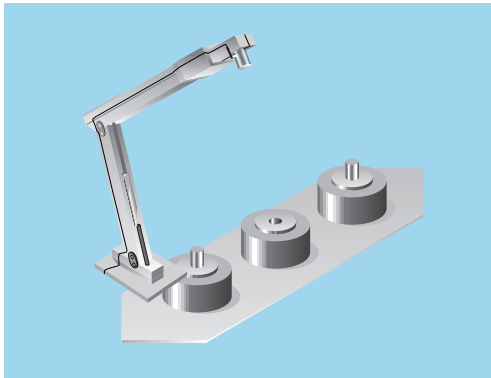
● cannot be used



- Highly flexible
- Small bending radii
- Fiber-optic cable length can be shortened easily in most cases with cutting apparatus (included in package)
- Ambient operating temperature – 40 to +70 °C  
Special models up to 180 °C



▲ WLL 170(T) with red or green sender light and plastic fiber-optic cable LL 3 detect print marks for controlling labeling machines.



▲ In pick-and-place systems, WLL 170(T) photoelectric switches with many different models of plastic fiber-optic cables LL 3 monitor the presence or even the position itself of the smallest parts.

## Features

### Selection table: sensors, fiber optic cable, scanning distances

#### Through-beam systems

#### Fiber optic cable LL 3

Description	Bending ra.	Type	Order no.
	mm		
Compact sleeve, M 4, large scanning distances	25	LL 3-DM 01	5 308 071
Super compact sleeve, $\varnothing$ 2.5 mm	15	LL 3-DT 03	5 308 072
Super compact, sleeve M 3	10	LL 3-DS 06	5 308 073
Large scanning distance, M 6, coaxial fiber optic cable	25	LL 3-DB 01	5 308 074
Length 10 m, M 6, coaxial fiber optic cable	25	LL 3-DB 01-10	5 308 075
For auxiliary lenses, M 3	15	LL 3-DT 01	5 308 076
Thin, short sleeve, M 4, coaxial fiber optic cable	25	LL 3-DM 02	5 308 077
Highly flexible, M 6, large scanning distances	4	LL 3-DR 01	5 308 078
Highly flexible, small sleeve, M 3	4	LL 3-DR 02	5 308 079
Highly flexible, $\varnothing$ 3 mm, thin sleeve	4	LL 3-DR 03	5 308 080
Highly flexible, $\varnothing$ 1.5 mm, thin sleeve	4	LL 3-DR 04 <sup>4)</sup>	5 308 081
Highly flexible, M 4, compact sleeve	4	LL 3-DR 06	5 308 082
Flexible sleeve, M 6, large scanning distances	25/10 <sup>3)</sup>	LL 3-DB 02	5 308 083
Flexible sleeve, M 4	25/10 <sup>3)</sup>	LL 3-DM 03	5 308 084
Thin, large end tip, M 3	15	LL 3-DT 02	5 308 085
Thin, large end tip, M3, coaxial fiber optic cable	15	LL 3-DT 04 <sup>4)</sup>	5 308 086
$\varnothing$ 3.0 mm, thin end tip, $\varnothing$ 0.82 mm	4	LL 3-DR 05 <sup>4)</sup>	5 308 087
90° offset, $\varnothing$ 5.0 mm	25	LL 3-DV 01	5 308 088
90° offset, small sleeve, $\varnothing$ 3.0 mm	15	LL 3-DV 02	5 308 089
90° offset, M 6	25	LL 3-DV 03	5 308 090
Temperature resistant to 180 °C, M 6, large scanning dist.	30	LL 3-DH 01 <sup>5)</sup>	5 308 091
Temperature resistant to 100 °C, M 6	25	LL 3-DH 02 <sup>6)</sup>	5 308 092
Teflon sheath, chemically resistant, $\varnothing$ 6.0 mm	40	LL 3-DY 01	5 308 093
Level controller, transparent liquids, $\varnothing$ 6.0 mm	50	LL 3-DF 01	5 308 094
Level controller, cloudy liquids, $\varnothing$ 6.0 mm	50	LL 3-DF 02	5 308 095

1) Based on proximity object white, 90 % remission, minimum object  $\varnothing$  = light spot size (Aperture LL: approx. 65°.) Unshorted fiber optic cable

2) For proximity auxiliary lenses LL 3, see auxiliary lenses for LL 3

3) Bending radius of flexible end sleeve

4) Unshortable

5) Ambient operating temperature –40 to +180 °C

6) Ambient operating temperature –40 to +100 °C

7) Minimum object  $\varnothing$ : scanning distance reduction!

Scanning distance SD<sup>1)</sup> and minimum object diameter MO<sup>7)</sup> in mm in connection with sensor type

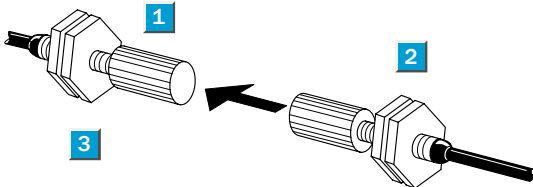
WLL 170 red light		WLL 170 red light high speed		WLL 170 A analog			WLL 170 T red light		WLL 170 T green light	
SD	MO	SD	MO	5 V	3 V	MO	SD	MO	SD	MO
				SD	SD					
90	0.015	25	0.015	30	45	0.015	90	0.015	25	0.015
22	0.015	7	0.015	11	15	0.015	25	0.015	4	0.015
22	0.015	7	0.015	11	15	0.015	25	0.015	4	0.015
90	0.015	25	0.015	28	40	0.015	100	0.015	25	0.015
40	0.015	8	0.015	15	20	0.015	50	0.015	20	0.015
30/12 <sup>2)</sup>	0.015	8/12 <sup>2)</sup>	0.015	15	20	0.015	35/12 <sup>2)</sup>	0.015	7/12 <sup>2)</sup>	0.015
30	0.015	8	0.015	15	20	0.015	35	0.015	7	0.015
75	0.015	25	0.015	25	35	0.015	85	0.015	20	0.015
8	0.015	●		●	●		14	0.015	●	
22	0.015	4	0.015	7	10	0.015	25	0.015	3	0.015
8	0.015	●		●	●		14	0.015	●	
22	0.015	4	0.015	7	10	0.015	25	0.015	3	0.015
90	0.015	25	0.015	30	40	0.015	100	0.015	25	0.015
22	0.015	6	0.015	11	15	0.015	25	0.015	4	0.015
5	0.015	●		●	●		6	0.015	●	
10	0.015	●		●	●		13	0.015	●	
5	0.015	●		●	●		8	0.015	●	
40	0.025	10	0.025	17	24	0.025	50	0.025	10	0.025
9	0.015	●		●	●		12	0.015	●	
40	0.025	10	0.025	17	24	0.025	50	0.025	10	0.025
110	0.015	40	0.015	45	65	0.015	135	0.015	25	0.015
60	0.015	18	0.015	22	30	0.015	75	0.015	5	0.015
50	0.02	●		●	●		60	0.02	●	
ja		●		●	●		ja		●	
ja		●		●	●		ja		●	

● cannot be used

## Auxiliary lenses for through-beam systems

### Large ranges

- 1 Light spot  $\varnothing$ : approx. 170 mm at 1000 mm
- 2 Aperture: approx.  $15^\circ$
- 3 Material: CuZn (nickel-plated)/glass

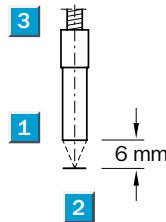


Order information	
Type	Order no.
LL 3-TA01	5 308 128

## Auxiliary lenses for proximity systems

- For detection of small parts
- Focused, very small light spot  $\varnothing$
- High sensitivity (6% reflectance)
- For suppressing background interference

- 1 Light spot  $\varnothing$ : approx. 0.25 mm in focus = 6 mm
- 2 Aperture: focus = 6 mm
- 3 Material: Al (aluminum)/glass

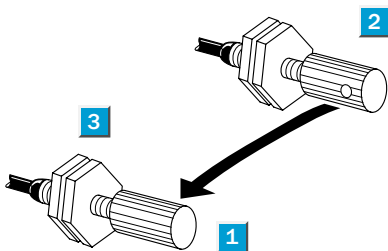


Order information	
Type	Order no.
LL 3-DA01	5 308 127

## Auxiliary lenses for through-beam systems

### Compact 90° offset

- 1 Light spot  $\varnothing$ : X-axis: approx. 110 mm, Y-axis: approx. 170 mm, at SD = 200 mm
- 2 Aperture: X-axis: approx.  $30^\circ$ , Y-axis: approx.  $40^\circ$
- 3 Material: CuZn (nickel-plated)/glass

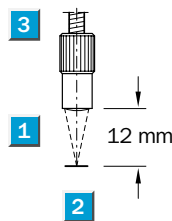


Order information	
Type	Order no.
LL 3-TA02	5 308 129

## Auxiliary lenses for proximity systems

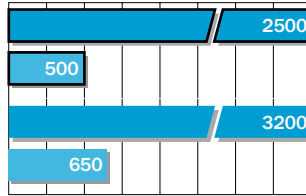
- Suitable as "mark sensor" for color marks
- Focused, very small light spot  $\varnothing$
- High sensitivity (6% reflectance)
- For suppressing background interference

- 1 Light spot  $\varnothing$ : 3 mm in focus = 12 mm
- 2 Aperture: focus = 12 mm
- 3 Material: Al (aluminum)/glass

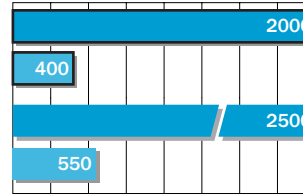


Order information	
Type	Order no.
LL 3-DA02	5 308 130

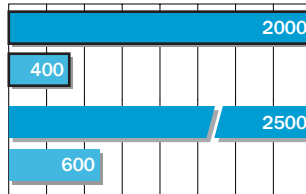
**Operating range (in mm) auxiliary lens LL 3-TA01<sup>1)</sup>**



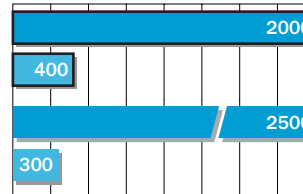
recommended type of fiber-optic cable: LL 3-TB02



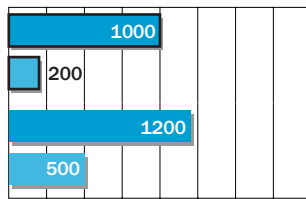
recommended type of fiber-optic cable: LL 3-TR01



recommended type of fiber-optic cable: LL 3-TB01



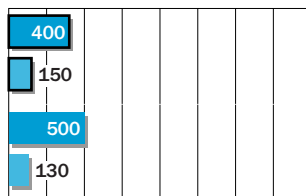
recommended type of fiber-optic cable: LL 3-TH01



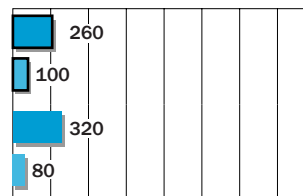
recommended type of fiber-optic cable: LL 3-TB01-10

Operating ranges LL 3 with WLL 170, emitter LED red  
 Operating ranges LL 3 with WLL 170, high-speed  
 Operating ranges LL 3 with WLL 170T, emitter LED red  
 Operating ranges LL 3 with WLL 170T, emitter LED green  
<sup>1)</sup> Unshortened fiber-optic cable

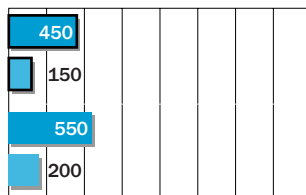
**Operating range (in mm) auxiliary lens LL 3-TA02<sup>1)</sup>**



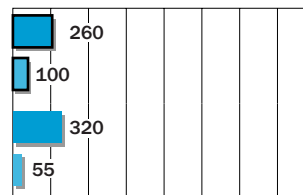
recommended type of fiber-optic cable: LL 3-TB02



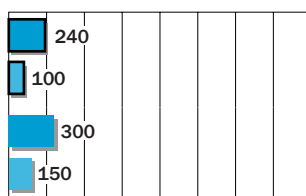
recommended type of fiber-optic cable: LL 3-TR01



recommended type of fiber-optic cable: LL 3-TB01



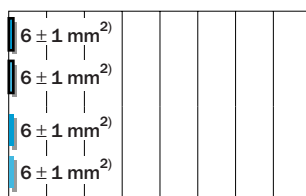
recommended type of fiber-optic cable: LL 3-TH01



recommended type of fiber-optic cable: LL 3-TB01-10

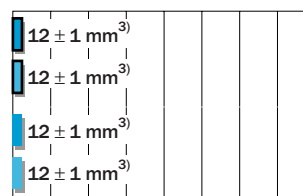
Operating ranges LL 3 with WLL 170, emitter LED red  
 Operating ranges LL 3 with WLL 170, high-speed  
 Operating ranges LL 3 with WLL 170T, emitter LED red  
 Operating ranges LL 3 with WLL 170T, emitter LED green  
<sup>1)</sup> Unshortened fiber-optic cable

**Operating distance (in mm) auxiliary lenses LL 3-DA01<sup>1)</sup>**



recommended type of fiber-optic cable: LL 3-DT01

**Operating distance (in mm) auxiliary lenses LL 3-DA02<sup>1)</sup>**



recommended type of fiber-optic cable: LL 3-DT01

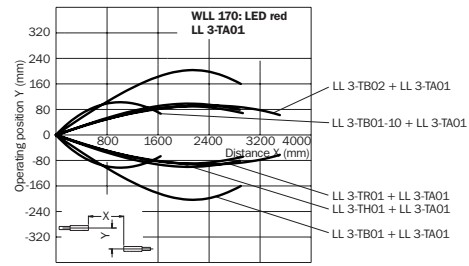
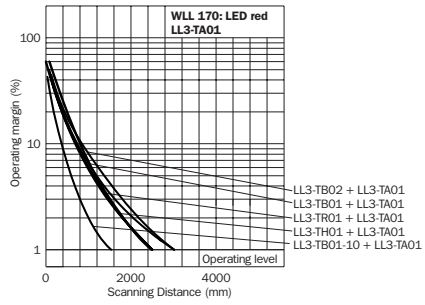
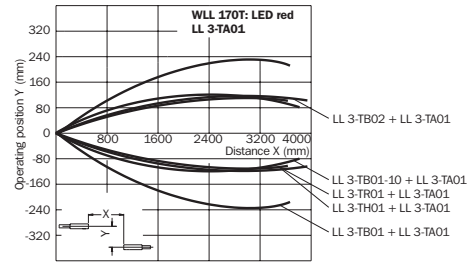
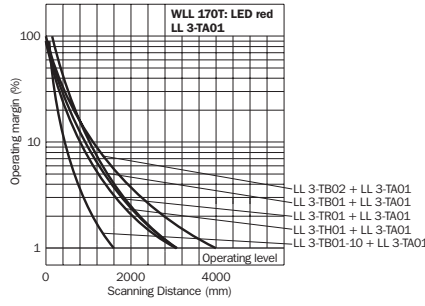
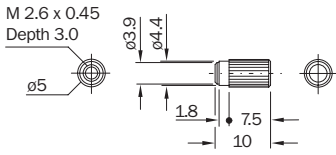
Operating ranges LL 3 with WLL 170, emitter LED red  
 Operating ranges LL 3 with WLL 170, high-speed  
 Operating ranges LL 3 with WLL 170T, emitter LED red  
 Operating ranges LL 3 with WLL 170T, emitter LED green

<sup>1)</sup> Unshortened fiber-optic cable, proximity fiber-optic cable: Object with 90% reflectance (in accordance with DIN 5033)  
<sup>2)</sup> Light spot diameter 0.25 mm in focus 6 mm  
<sup>3)</sup> Light spot diameter 3 mm in focus 12 mm

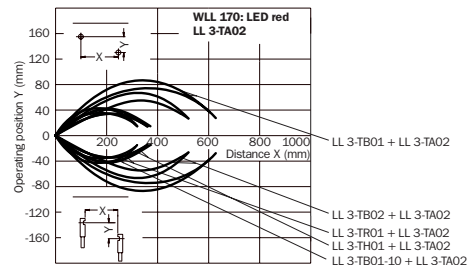
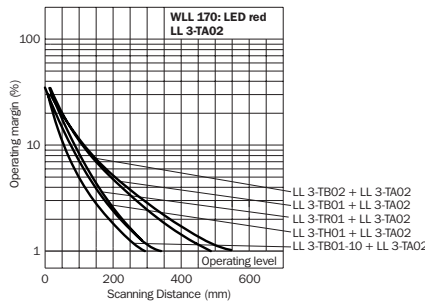
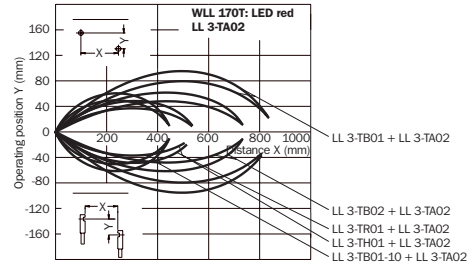
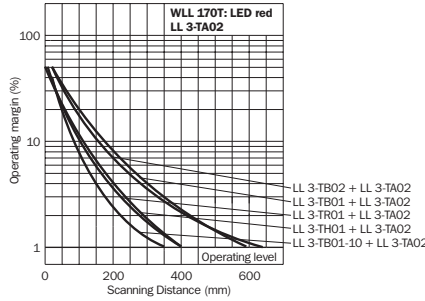
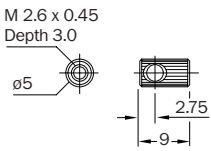
# LL 3 auxiliary lenses

## Dimension illustrations and characteristic curves for auxiliary lenses for LL 3 fiber-optic cable

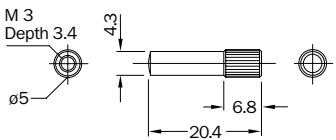
Order information	
Type	Order no.
LL 3-TA01	5 308 128



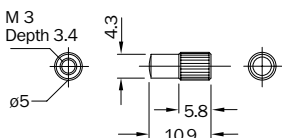
Order information	
Type	Order no.
LL 3-TA02	5 308 129



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



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

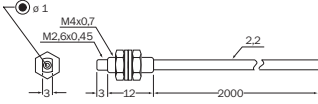




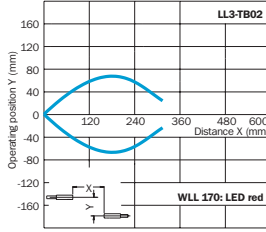
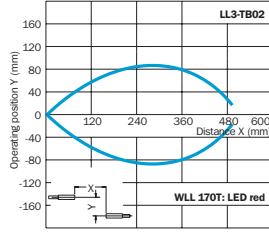
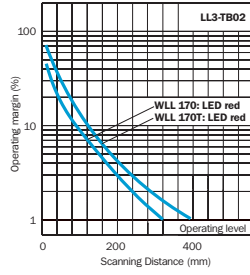
Dimension illustrations and characteristic curves for LL 3 fiber-optic cable – through-beam systems

Order information

Type	Order no.
LL 3-TB02	5 308 048

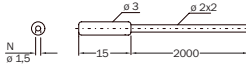


Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel

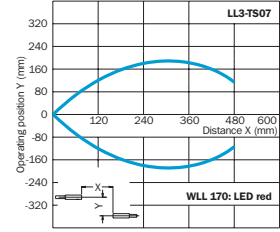
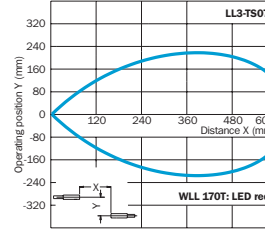
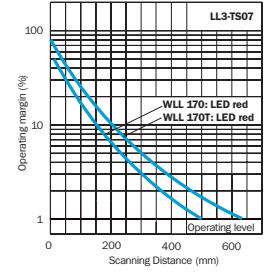


Order information

Type	Order no.
LL 3-TS07	5 308 049

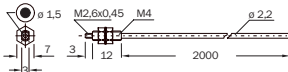


Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel

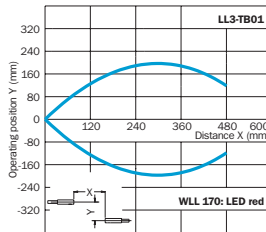
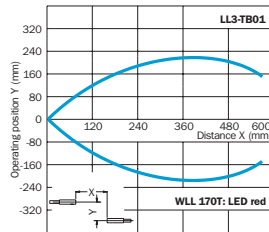
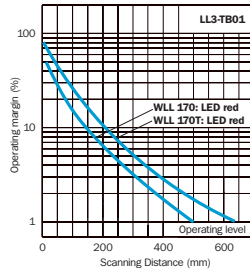


Order information

Type	Order no.
LL 3-TB01	5 308 050

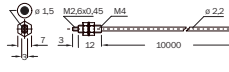


Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel

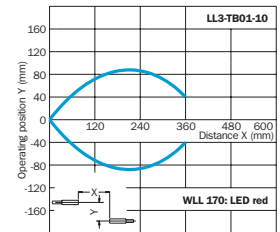
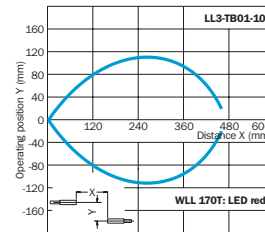
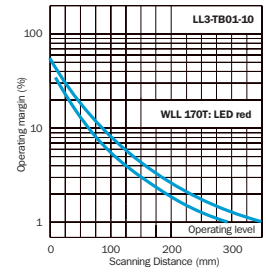


Order information

Type	Order no.
LL 3-TB01-10	5 308 051

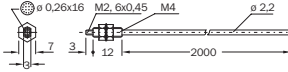


Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel

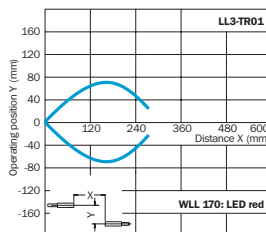
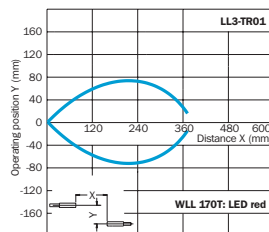
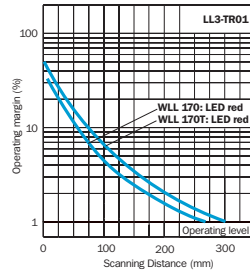


Order information

Type	Order no.
LL 3-TR01	5 308 052

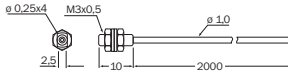


Material: core: PMMA; sheath: PE;  
sleeve: CuZn nickel-plated brass

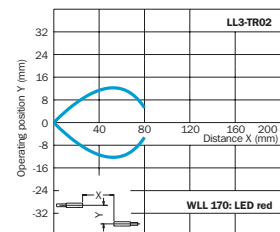
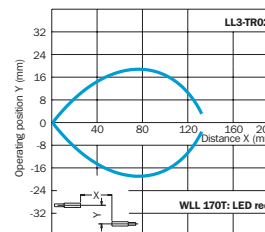
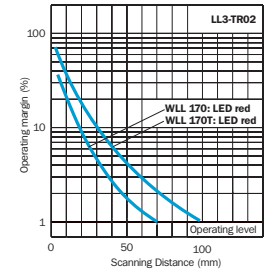


Order information

Type	Order no.
LL 3-TR02	5 308 053

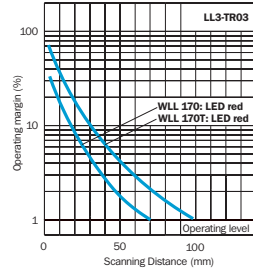
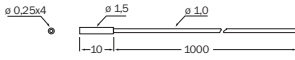


Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel

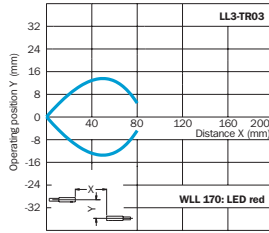
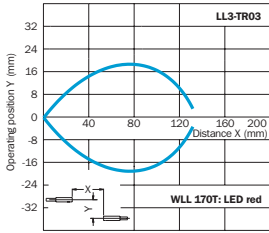


## Dimension illustrations and characteristic curves for LL 3 fiber-optic cable – through-beam systems

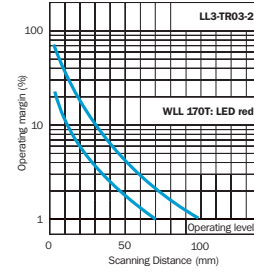
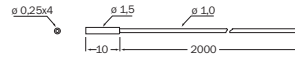
Order information	
Type	Order no.
LL 3-TR03	5 308 054



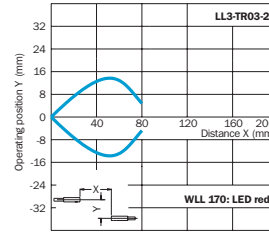
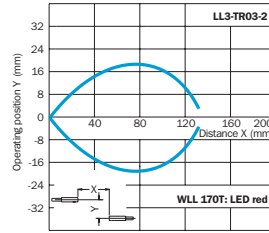
Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



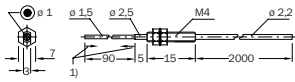
Order information	
Type	Order no.
LL 3-TR03-2	5 308 055



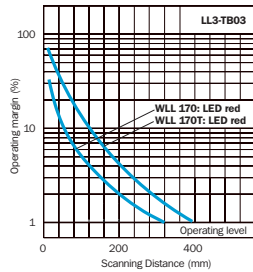
Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



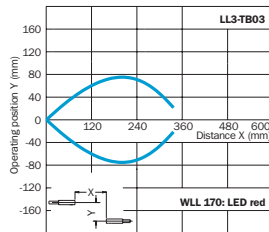
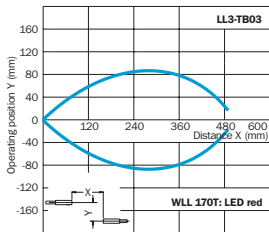
Order information	
Type	Order no.
LL 3-TB03	5 308 056



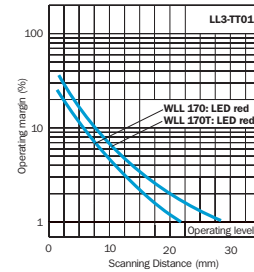
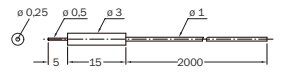
1) Flexible end sleeve, do not bend in this area (10 mm), bending radius R 10



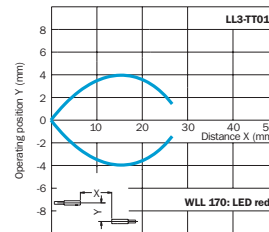
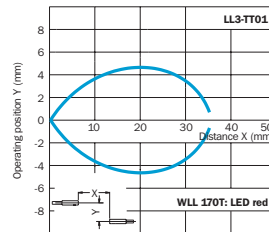
Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



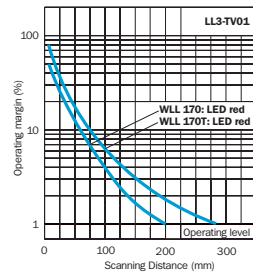
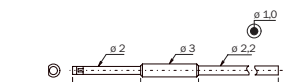
Order information	
Type	Order no.
LL 3-TT01	5 308 057



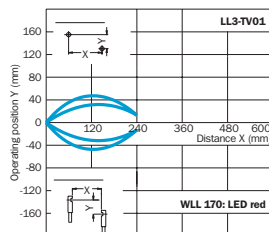
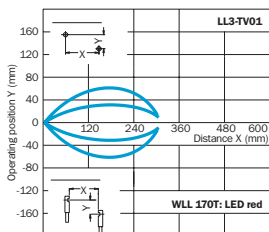
Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



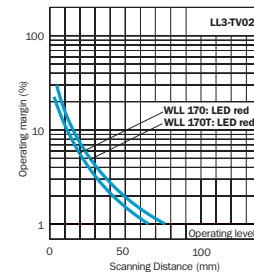
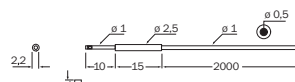
Order information	
Type	Order no.
LL 3-TV01	5 308 058



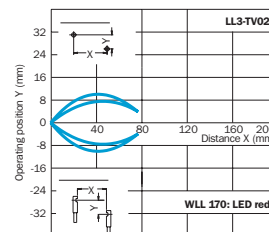
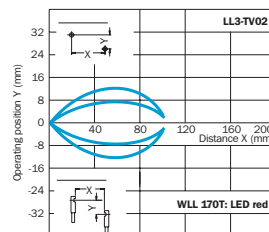
Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



Order information	
Type	Order no.
LL 3-TV02	5 308 059

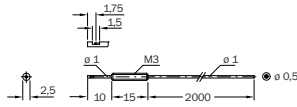


Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel

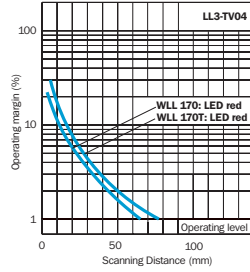
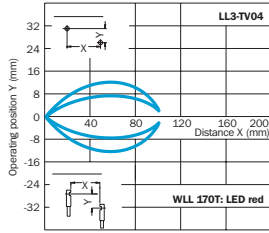


Dimension illustrations and characteristic curves for LL 3 fiber-optic cable – through-beam systems

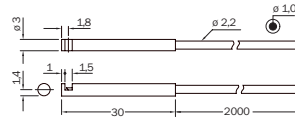
Order information	
Type	Order no.
LL 3-TV04	5 308 060



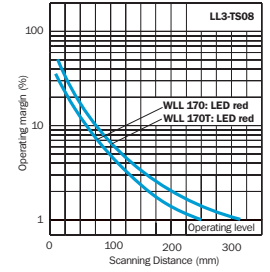
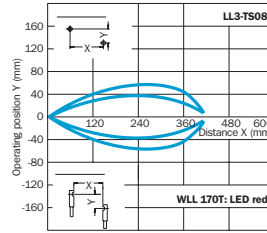
Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



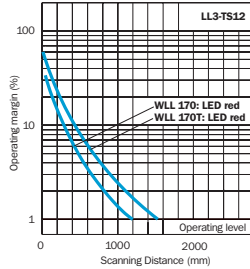
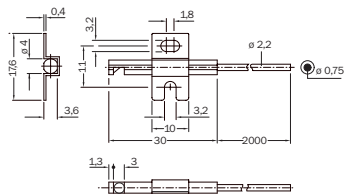
Order information	
Type	Order no.
LL 3-TS08	5 308 061



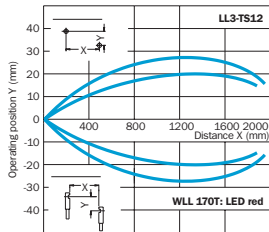
Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



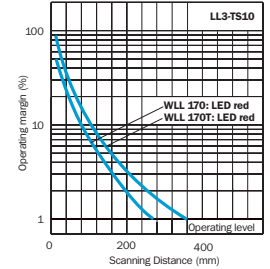
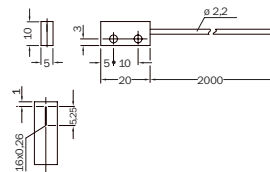
Order information	
Type	Order no.
LL 3-TS12	5 308 062



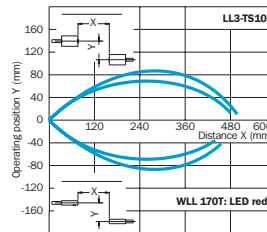
Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



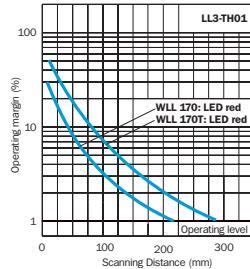
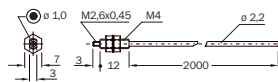
Order information	
Type	Order no.
LL 3-TS10	5 308 063



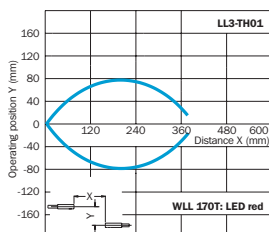
Material: core: PMMA; sheath: PE;  
sleeve: CuZn nickel-plated brass



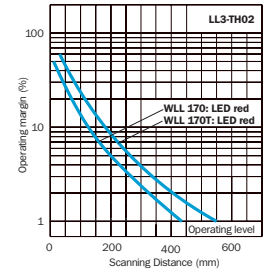
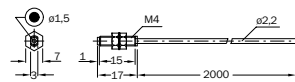
Order information	
Type	Order no.
LL 3-TH01	5 308 064



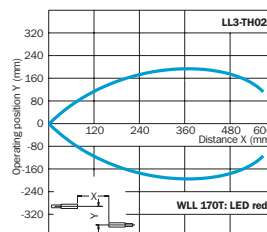
Material: core: PMMA; sheath: PE;  
sleeve: CuZn nickel-plated brass



Order information	
Type	Order no.
LL 3-TH02	5 308 065

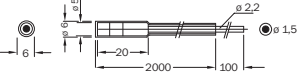


Material: core: HPOF; sheath: FEP;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel

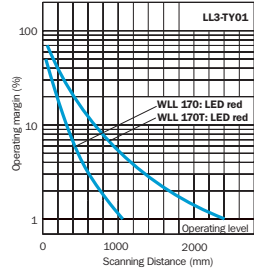
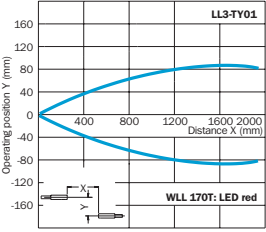


## Dimension illustrations and characteristic curves for LL 3 fiber-optic cable – through-beam systems

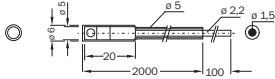
Order information	
Type	Order no.
LL 3-TY01	5 308 066



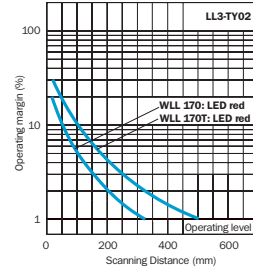
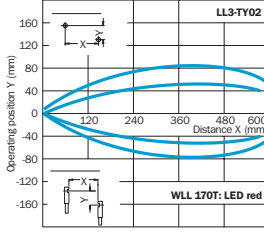
Material: core: PMMA; sheath: Teflon;  
sleeve: Teflon



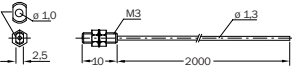
Order information	
Type	Order no.
LL 3-TY02	5 308 067



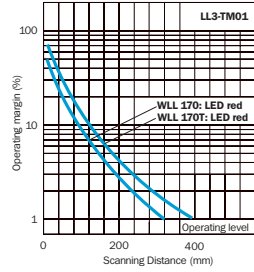
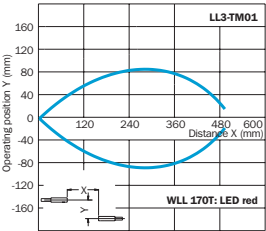
Material: core: PMMA; sheath: Teflon;  
sleeve: Teflon



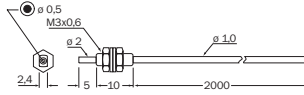
Order information	
Type	Order no.
LL 3-TM01	5 308 068



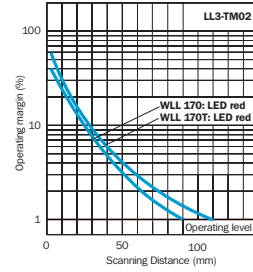
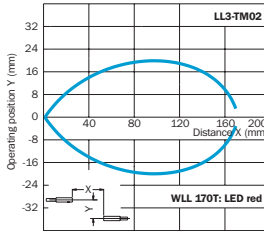
Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



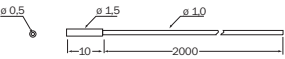
Order information	
Type	Order no.
LL 3-TM02	5 308 069



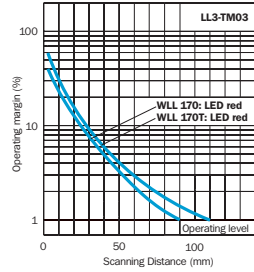
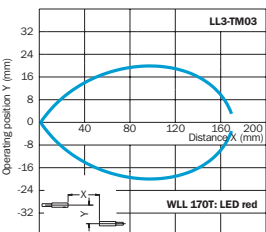
Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



Order information	
Type	Order no.
LL 3-TM03	5 308 070



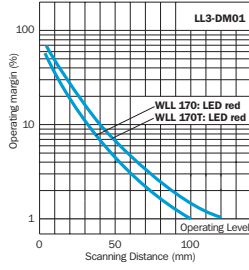
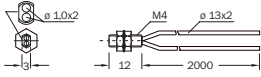
Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



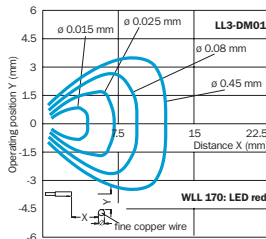
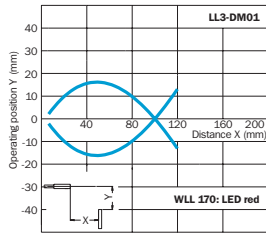
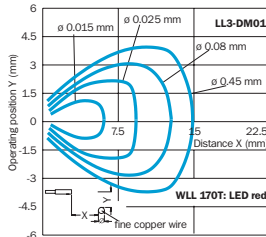
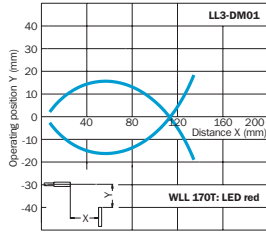
Dimension illustrations for LL 3 fiber-optic cable – proximity systems

Order information

Type	Order no.
LL 3-DM01	5 308 071

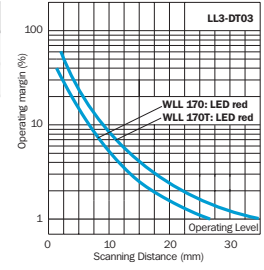
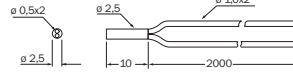


Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel

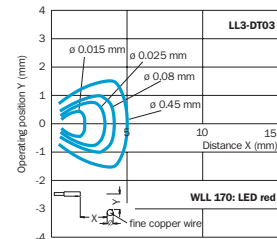
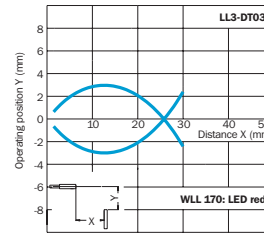
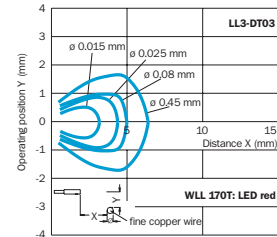
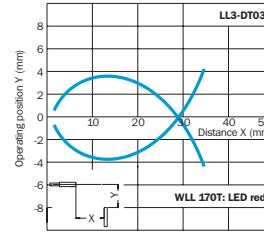


Order information

Type	Order no.
LL 3-DT03	5 308 072

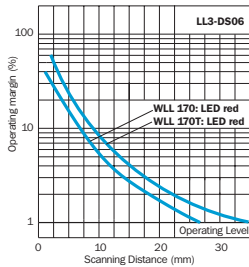
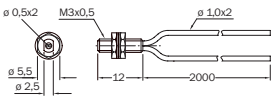


Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel

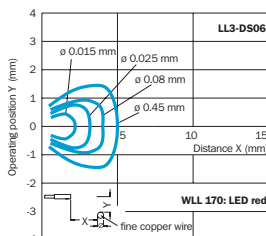
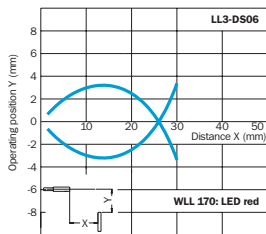
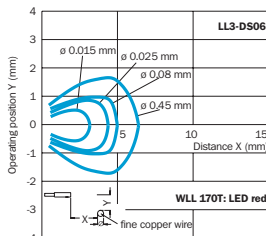
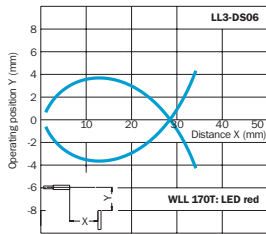


Order information

Type	Order no.
LL 3-DS06	5 308 073

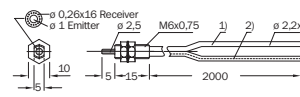


Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel

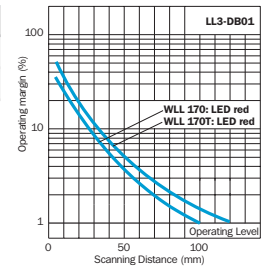


Order information

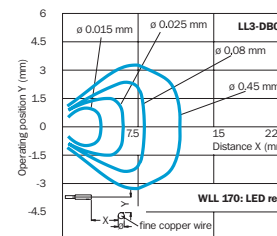
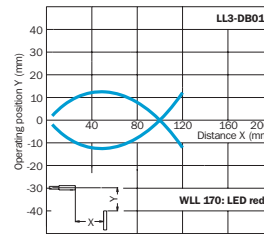
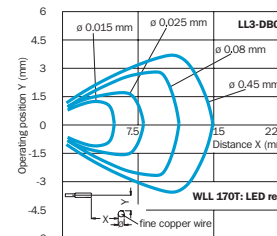
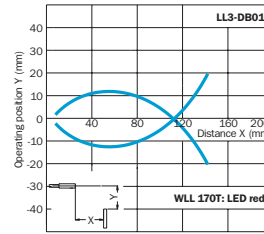
Type	Order no.
LL 3-DB01	5 308 074



- 1) Emitter
- 2) Receiver



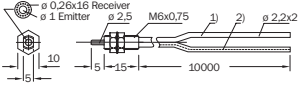
Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



## Dimension illustrations for LL 3 fiber-optic cable – proximity systems

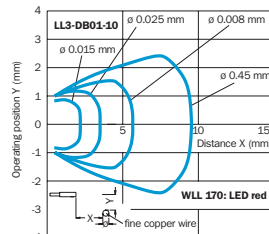
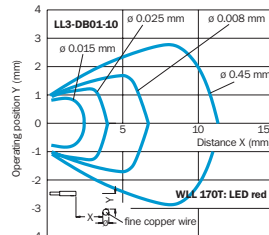
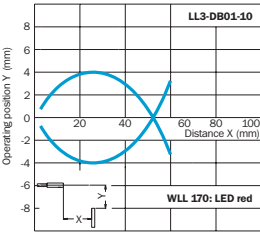
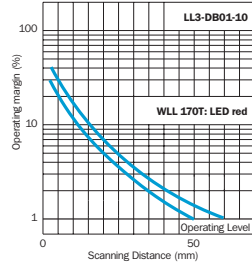
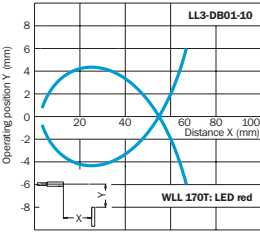
### Order information

Type	Order no.
LL 3-DB01-10	5 308 075



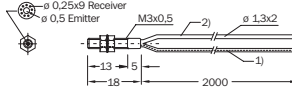
- 1) Emitter
- 2) Receiver

Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



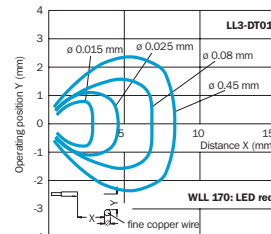
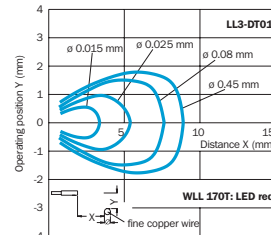
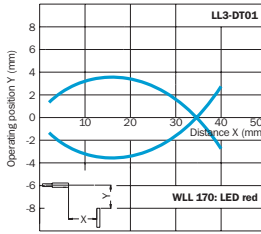
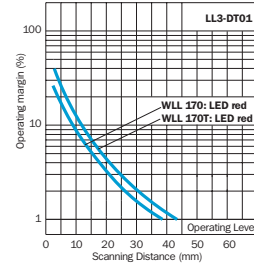
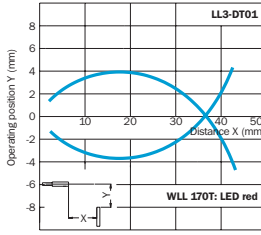
### Order information

Type	Order no.
LL 3-DT01	5 308 076



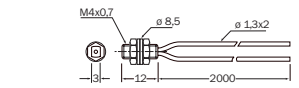
- 1) Emitter
- 2) Receiver

Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



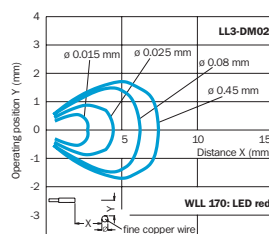
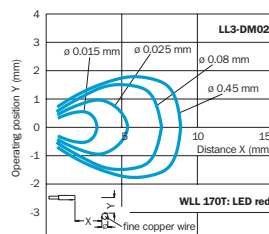
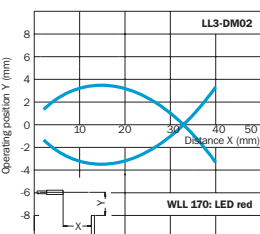
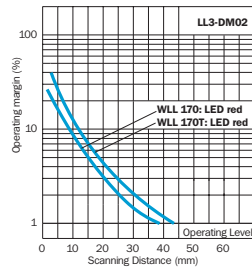
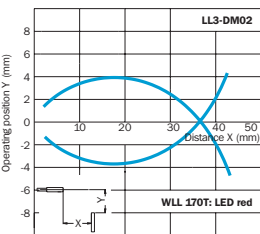
### Order information

Type	Order no.
LL 3-DM02	5 308 077



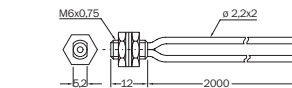
- 1) Emitter
- 2) Receiver

Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



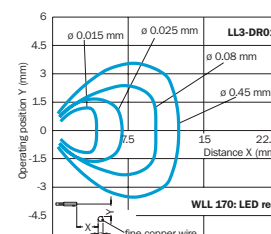
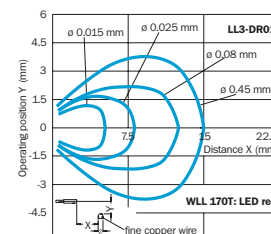
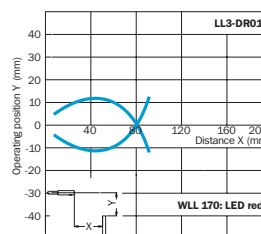
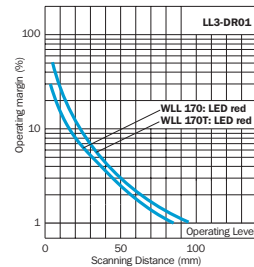
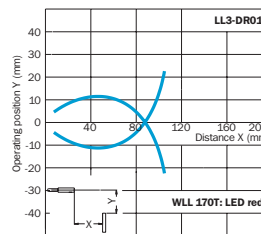
### Order information

Type	Order no.
LL 3-DR01	5 308 078



- 1) Emitter
- 2) Receiver

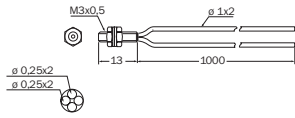
Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



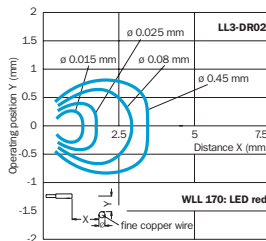
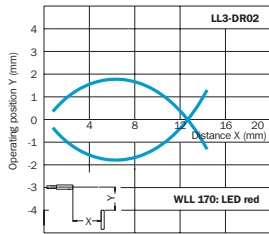
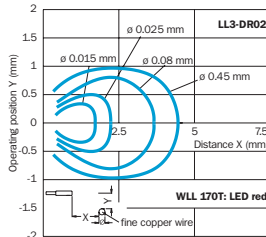
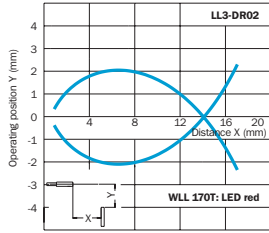
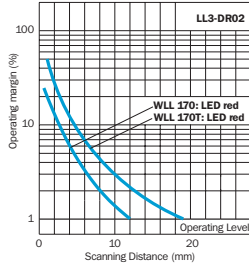
Dimension illustrations for LL 3 fiber-optic cable – proximity systems

Order information

Type	Order no.
LL 3-DR02	5 308 079

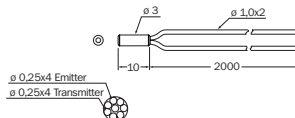


Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel

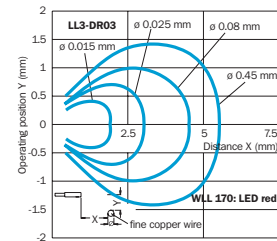
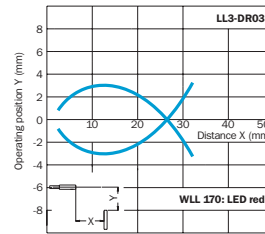
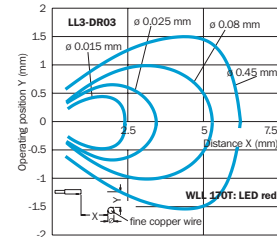
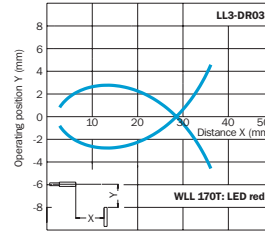
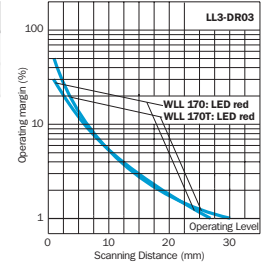


Order information

Type	Order no.
LL 3-DR03	5 308 080

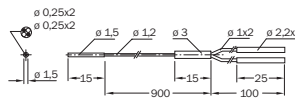


Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel

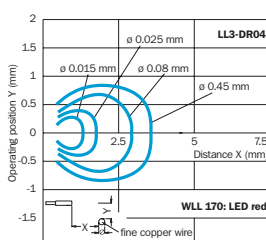
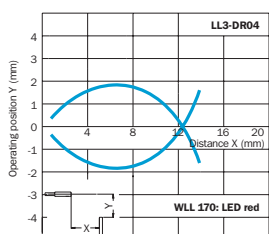
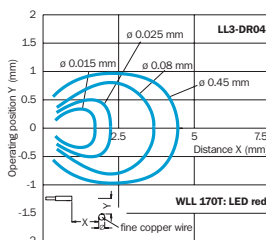
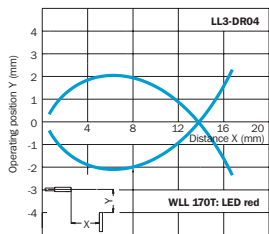
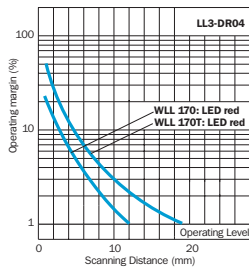


Order information

Type	Order no.
LL 3-DR04	5 308 081

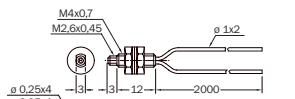


Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel

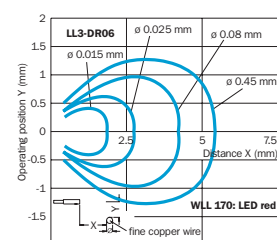
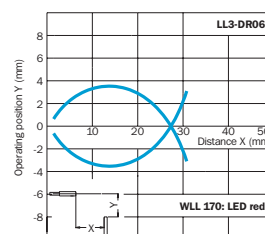
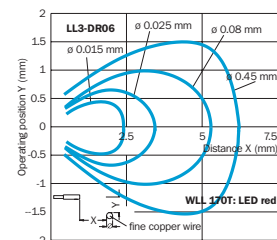
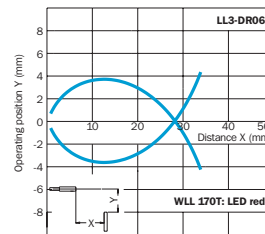
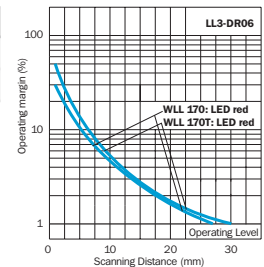


Order information

Type	Order no.
LL 3-DR06	5 308 082



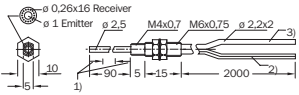
Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



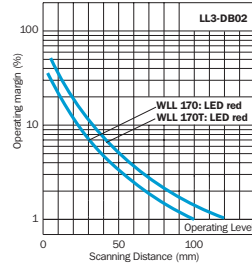
## Dimension illustrations for LL 3 fiber-optic cable – proximity systems

### Order information

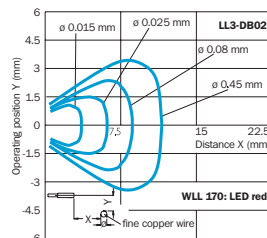
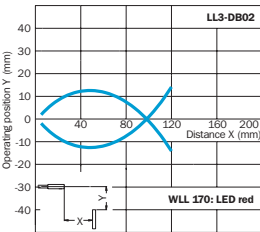
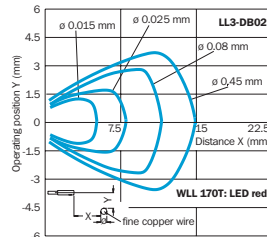
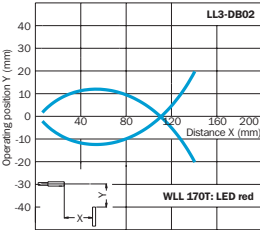
Type	Order no.
LL 3-DB02	5 308 083



- 1) Flexible end sleeve, do not bend in this area (10 mm), bending radius R 10
- 2) Emitter (blue dotted line)
- 3) Receiver

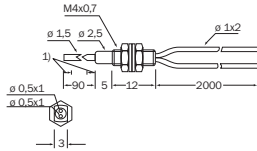


Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel

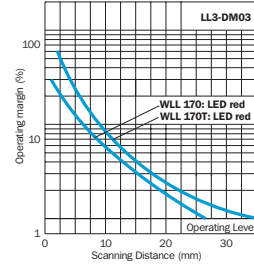


### Order information

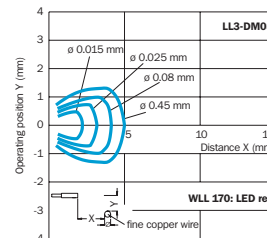
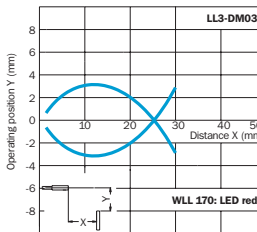
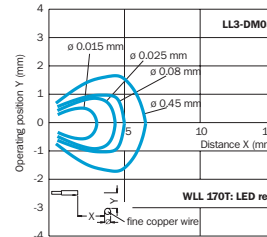
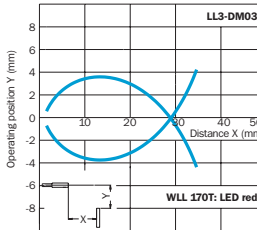
Type	Order no.
LL 3-DM03	5 308 084



- 1) Flexible end sleeve, do not bend in this area (10 mm), bending radius R 10

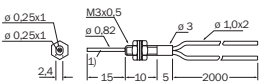


Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



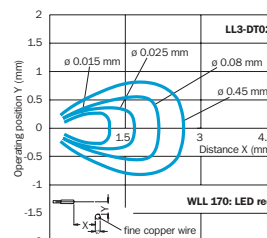
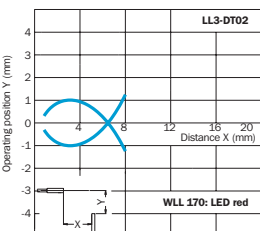
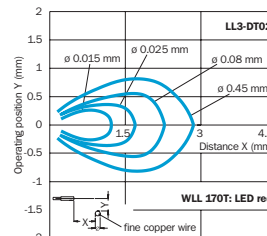
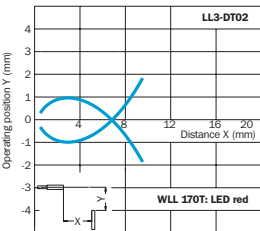
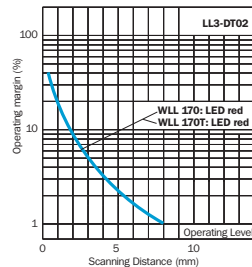
### Order information

Type	Order no.
LL 3-DT02	5 308 085



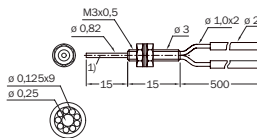
- 1) End sleeve cannot be bent

Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



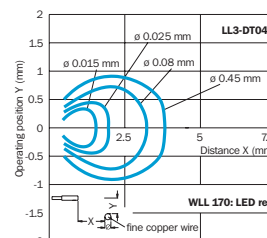
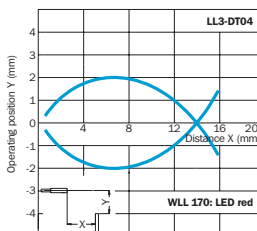
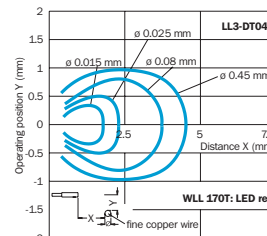
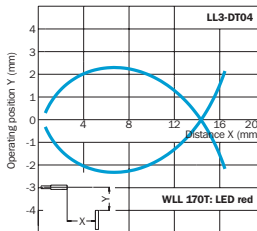
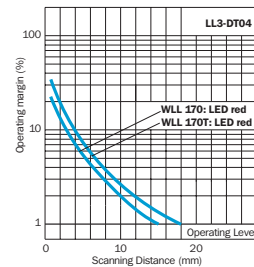
### Order information

Type	Order no.
LL 3-DT04	5 308 086



- 1) End sleeve cannot be bent

Material: core: PMMA; sheath: PE;  
sleeve: CuZn nickel-plated brass

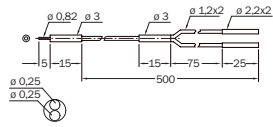




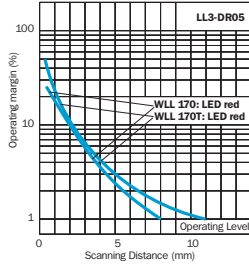
Dimension illustrations for LL 3 fiber-optic cable – proximity systems

Order information

Type	Order no.
LL 3-DR05	5 308 087

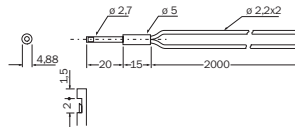


Material: core: PMMA; sheath: PE;  
sleeve: CuZn nickel-plated brass

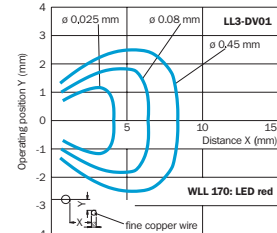
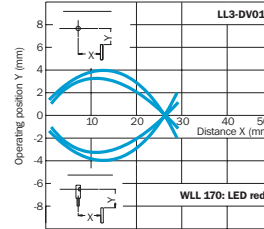
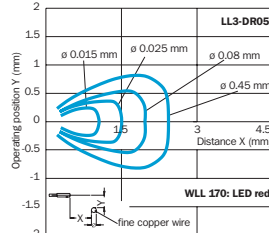
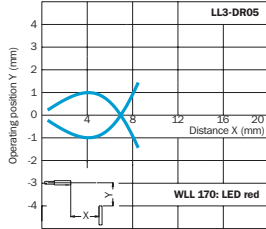
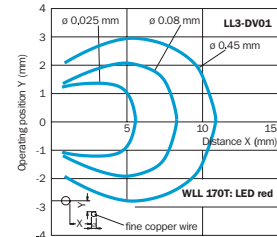
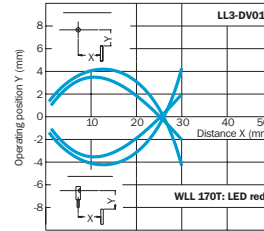
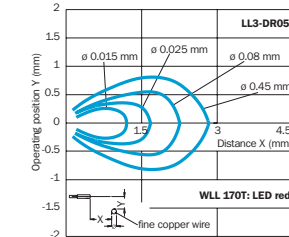
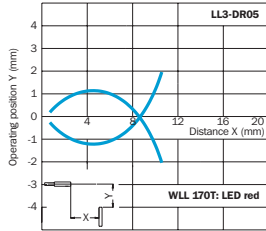
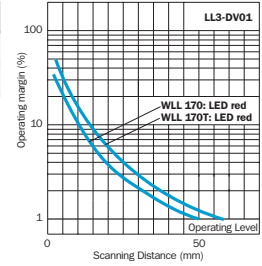


Order information

Type	Order no.
LL 3-DV01	5 308 088

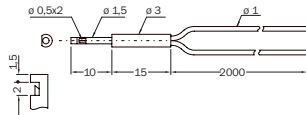


Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel

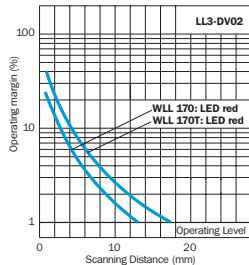


Order information

Type	Order no.
LL 3-DV02	5 308 089

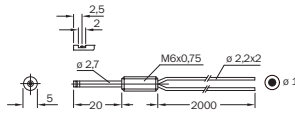


Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel

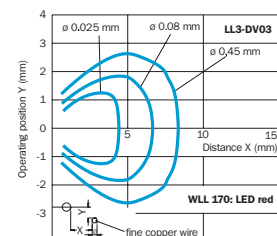
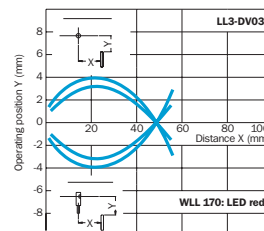
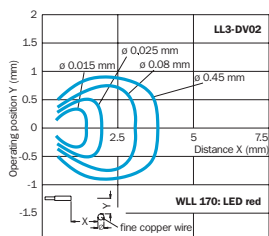
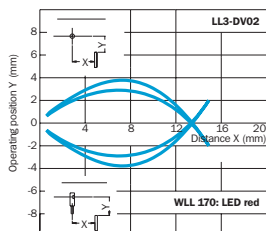
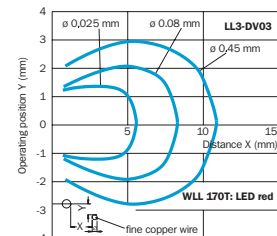
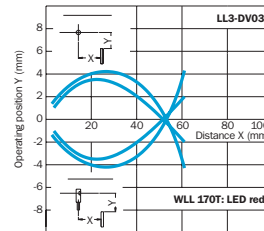
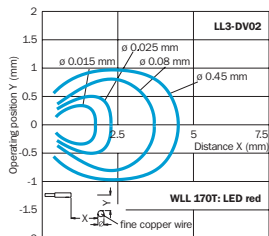
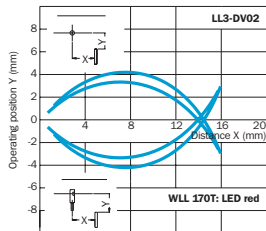
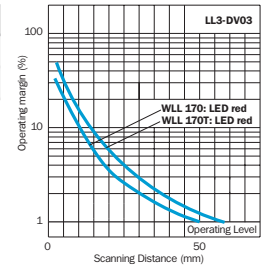


Order information

Type	Order no.
LL 3-DV03	5 308 090



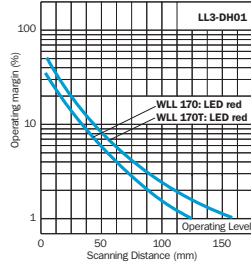
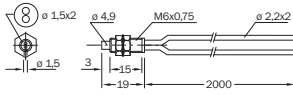
Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel



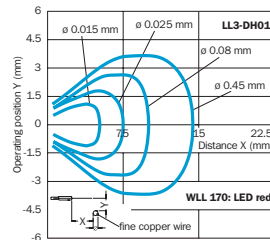
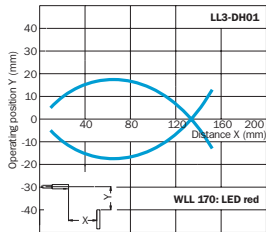
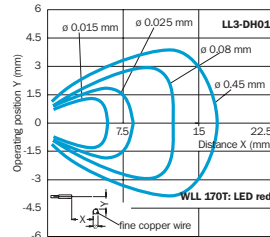
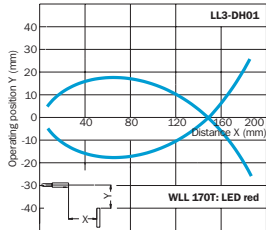
## Dimension illustrations for LL 3 fiber-optic cable – proximity systems

### Order information

Type	Order no.
LL 3-DH01	5 308 091

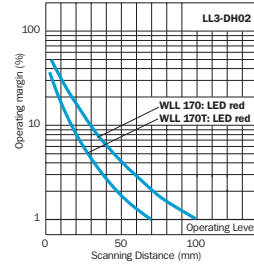
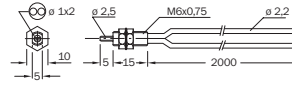


Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel

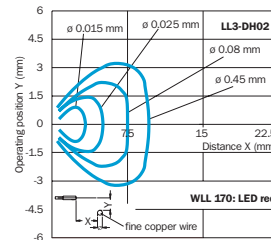
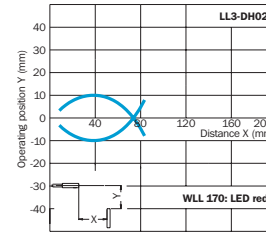
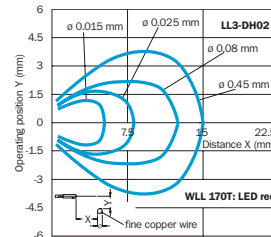
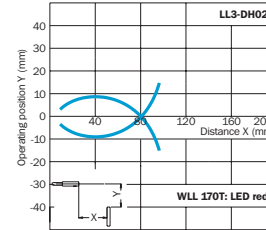


### Order information

Type	Order no.
LL 3-DH02	5 308 092

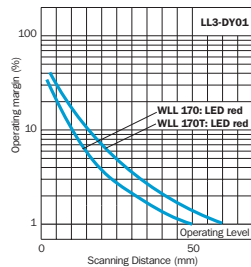
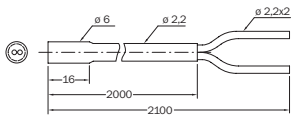


Material: core: PMMA; sheath: PE;  
sleeve: 1.4305 (German material no.)  
rust- and acid-resistant stainless steel

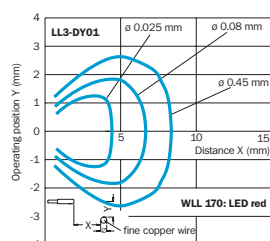
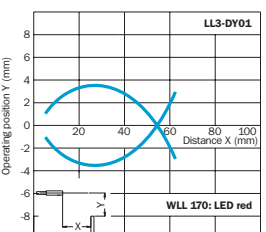
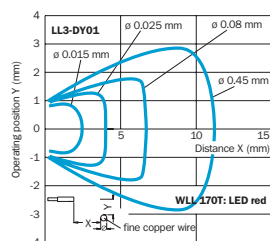
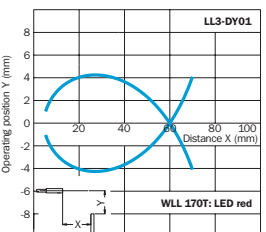


### Order information

Type	Order no.
LL 3-DY01	5 308 093

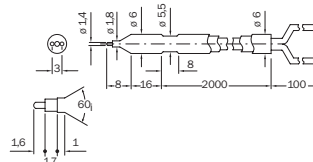


Material: core: PMMA; sheath: Teflon;  
sleeve: Teflon



### Order information

Type	Order no.
LL 3-DF01	5 308 094 <sup>1)</sup>
LL 3-DF02	5 308 095 <sup>2)</sup>



<sup>1)</sup> for transparent liquid  
<sup>2)</sup> for cloudy liquid

Material: core: PMMA; sheath: Teflon;  
sleeve: Teflon

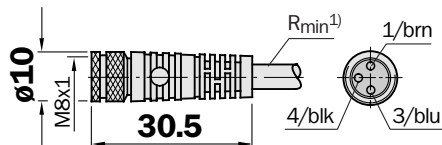
Dimension illustrations and ordering information

SENSICK circular screwing system, M 8 plug, 3 pin/4 pin, enclosure rating IP 67

M 8 Cable receptacles, 3 pin, straight

Cable diameter 5 mm, 3 x 0.34 mm<sup>2</sup>, PVC coating

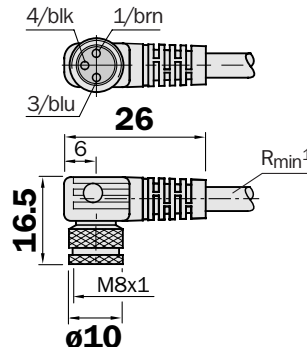
Type	Order no.	Cable length
DOL-0803-G02M	6 010 785	2 m
DOL-0803-G05M	6 022 009	5 m
DOL-0803-G10M	6 022 011	10 m



M 8 Cable receptacles, 3 pin, angled

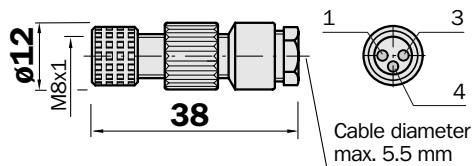
Cable diameter 5 mm, 3 x 0.34 mm<sup>2</sup>, PVC coating

Type	Order no.	Cable length
DOL-0803-W02M	6 008 489	2 m
DOL-0803-W05M	6 022 010	5 m
DOL-0803-W10M	6 022 012	10 m



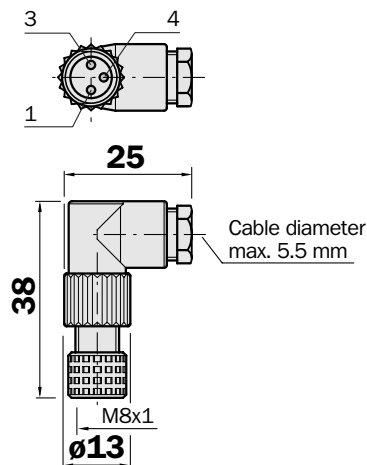
M 8 Cable receptacles, 3 pin, straight

Type	Order no.	Notes
DOS-0803-G	7 902 077	Can be fabricated for $\phi$ 3.5 - 5 mm cable with screw locking.



M 8 Cable receptacles, 3 pin, angled

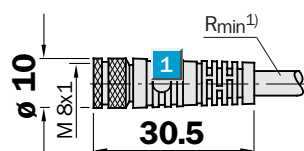
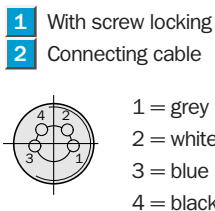
Type	Order no.	Notes
DOS-0803-W	7 902 078	Can be fabricated for $\phi$ 3.5 - 5 mm cable with screw locking.



M 8 Cable receptacles, 4 pin, straight. Contact assign. acc. to EN 50044

Cable diameter 5 mm, 4 x 0.25 mm<sup>2</sup>, PVC coating

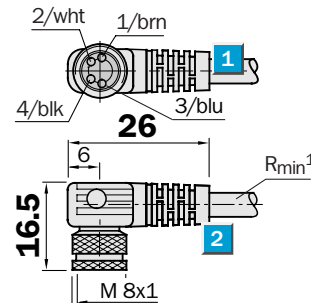
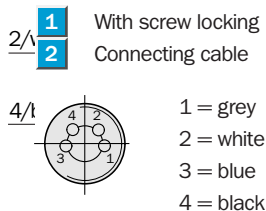
Type	Order no.	Cable length
DOL-0804-G02M	6 009 870	2 m
DOL-0804-G05M	6 009 872	5 m
DOL-0804-G10M	6 010 754	10 m



M 8 Cable receptacles, 4 pin, angled. Contact assign. acc. to EN 50044

Cable diameter 5 mm, 4 x 0.25 mm<sup>2</sup>, PVC coating

Type	Order no.	Cable length
DOL-0804-W02M	6 009 871	2 m
DOL-0804-W05M	6 009 873	5 m
DOL-0804-W10M	6 010 755	10 m



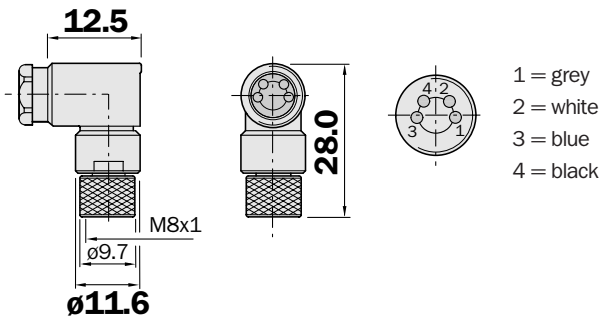
<sup>1)</sup> Minimum bending radius with dynamic use  $R_{min} = 20 \times$  cable diameter

Dimension illustrations and ordering information

SENSICK circular screwing system, M 8 plug, 4 pin, enclosure rating IP 67

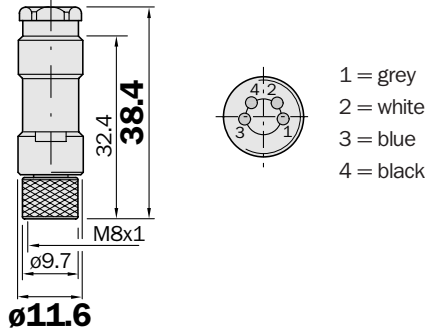
M 8 Cable receptacles, 4 pin, angled

Type	Order no.	
DOS-0804-W	6 009 975	Can be fabricated for $\varnothing$ 3.5 - 5 mm cable with screw locking.



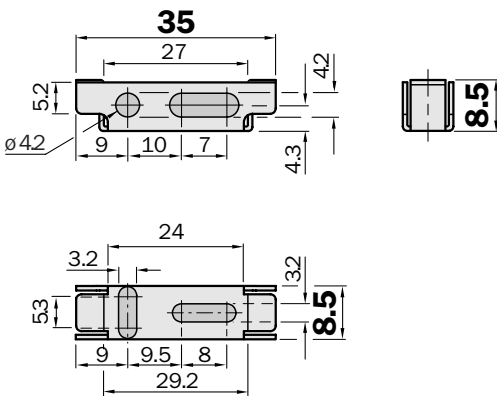
M 8 Cable receptacles, 4 pin, straight

Type	Order no.	
DOS-0804-G	6 009 974	Can be fabricated for $\varnothing$ 3.5 - 5 mm cable with screw locking.



Fixing bracket for WLL 170T

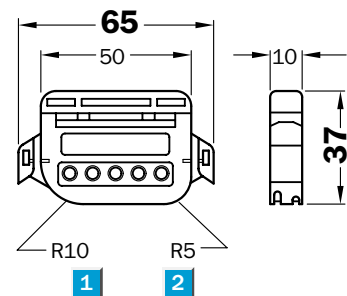
Order information		Included in delivery of WLL 170T.
Type	Order no.	
BEF-WLL 170	5 306 574	



Fiber-optic cable cutter

Order information		Cutter included in delivery of fiber-optic cable LL 3. Follow the operating instructions in the packaging.
Type	Order no.	
FC	5 304 141	

- 1 Pattern for bending radius R 10 mm, for end sleeve  $\varnothing$  1.5 mm and  $\varnothing$  2.5 mm
- 2 Bending radius R 5 mm



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 sick@werple.net.au