

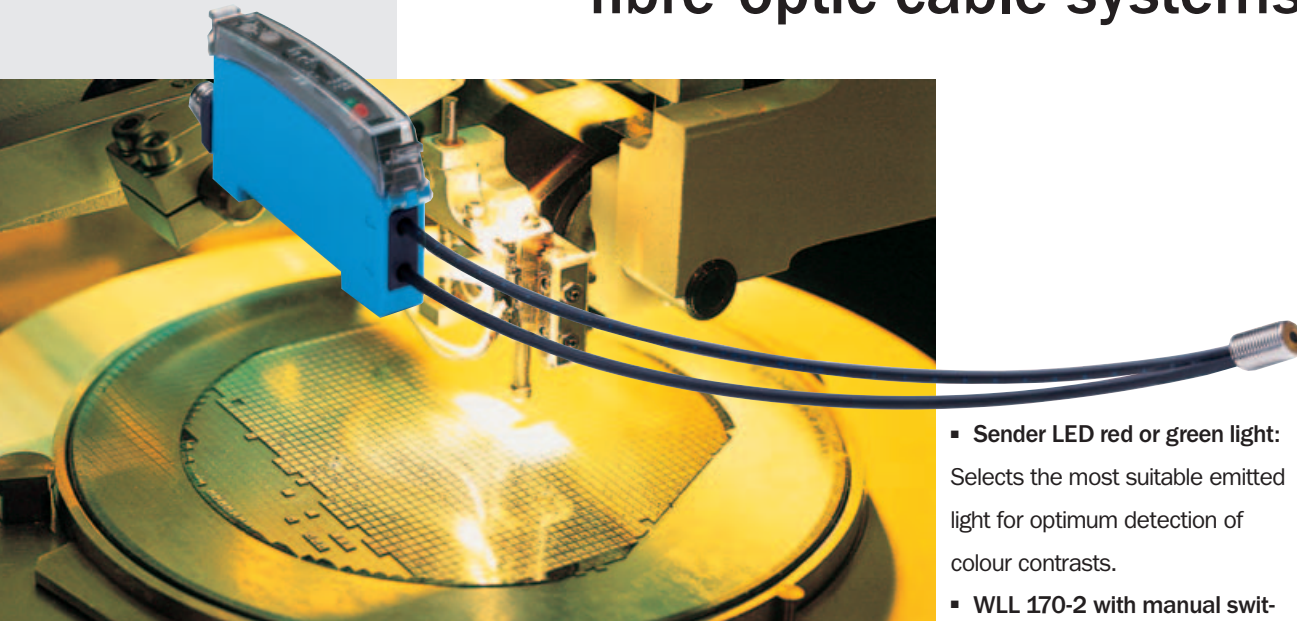


# Photoelectric switches WLL 170(T), fibre-optic cables LL 3: flexible solutions with fibre-optic cable systems

	Photoelectric switches with fibre-optic cable
Proximity mode	
	Photoelectric switches with fibre-optic cable
Through-beam mode	



- **Sender LED red or green light:** Selects the most suitable emitted light for optimum detection of colour contrasts.

- **WLL 170-2 with manual switching threshold adjustment:**

The cost-effective solution for all standard applications.

- **WLL 170 High Speed:** 10,000 switching operations per second - the optimum for high speed applications.

- **WLL 170A with analogue output:** For easy measurement and control.

Large selection of suitable fibre-optic cables: Fibre-optic cable range LL 3. For WLL 170, there are around 90 LL 3 versions, offering maximum flexibility and choice for your requirements.

Typical uses for these WLL 170 / LL 3 fibre-optic cable combinations: semiconductor industry, electronics assembly, packaging technology, handling and assembly systems, special-purpose machinery, construction and precision engineering.

**F**ibre-optic sensors without baggage. Safe and simple switching: The combination of photoelectric switches WLL 170(T) and fibre-optic cables LL 3 offers extremely simple handling and intelligent system options for a wide range of applications. For standard applications, but also for demanding applications such as detection of very small objects, recognition of colour marks or transparent materials.

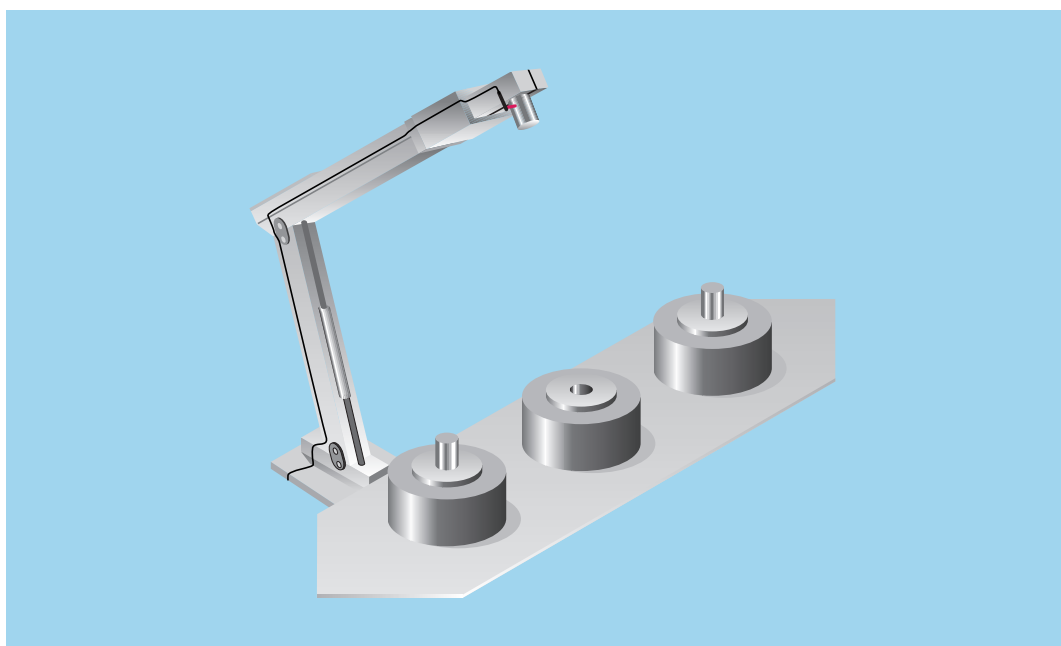
#### You choose:

Suitable WLL 170(T) versions, optimised for various typical uses, are available

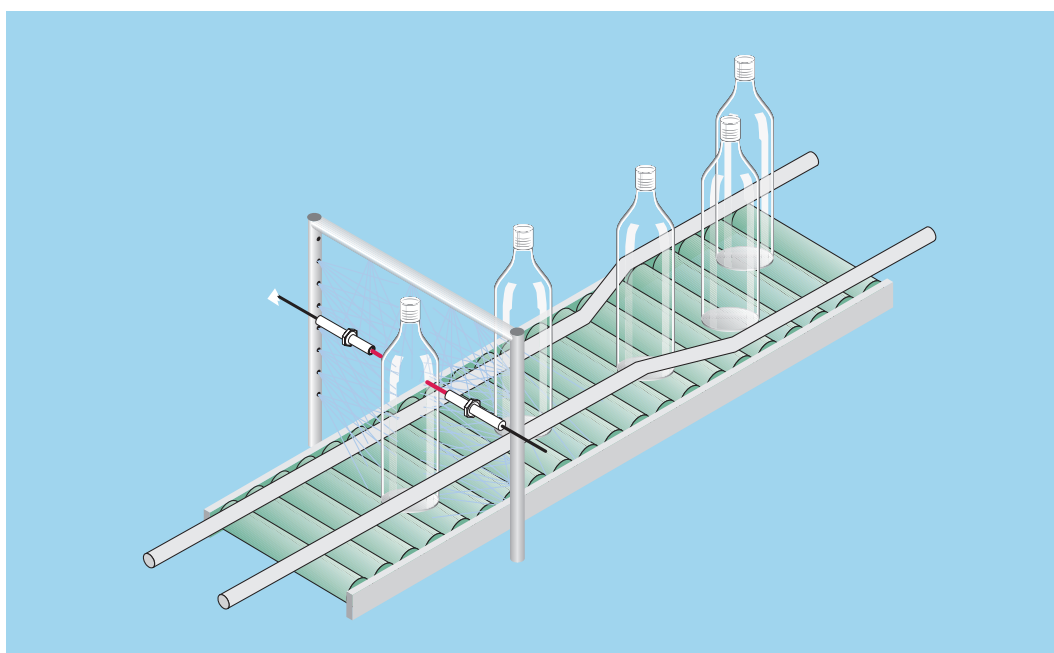
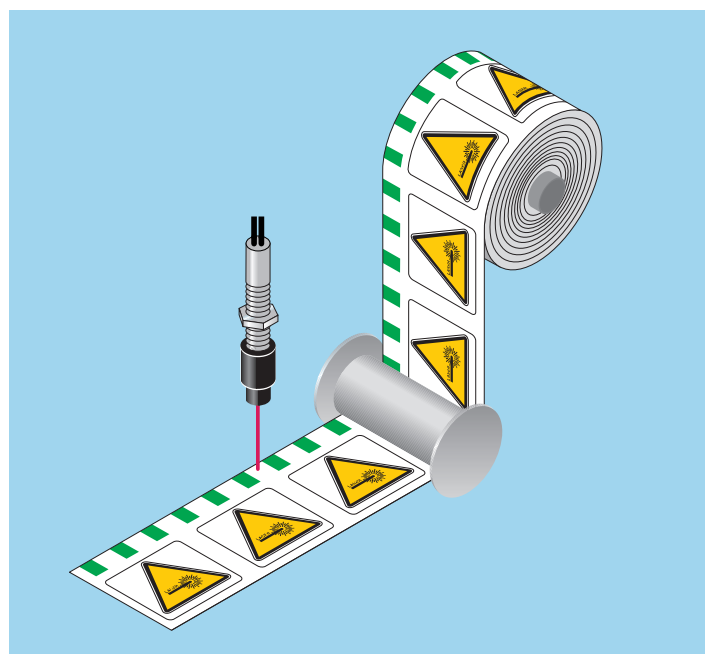
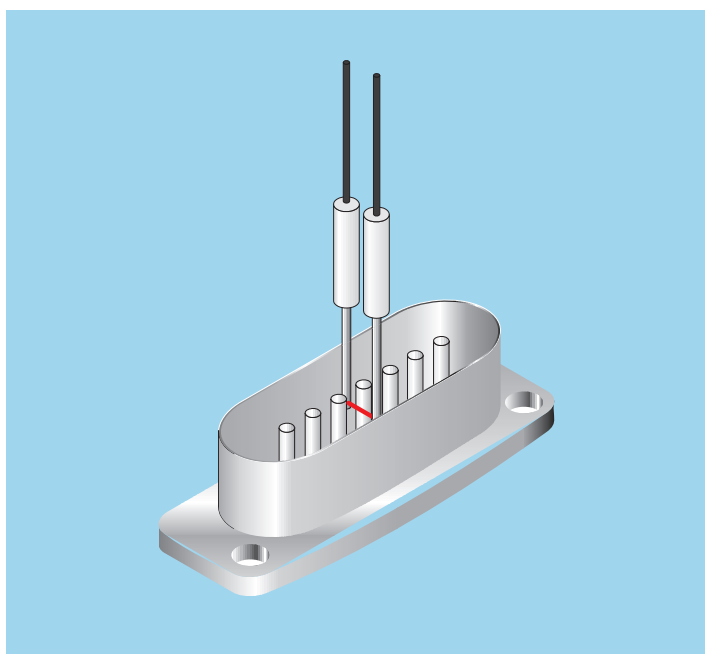
- **WLL 170T with teach-in:**

This teach-in version simplifies handling: the switching threshold and switching hysteresis are automatically set, via a push button (Teach-in).

► In pick-and-place systems, WLL 170(T) photoelectric switches with LL 3 plastic fibre-optic cables are used in a wide variety of configurations to monitor the presence or position of minute objects.





▼ Fibre-optic cables are widely used in the electronics industry. For example, fibre-optic cables with integrated 90° angle used for detecting contact pins in locations where space is restricted.



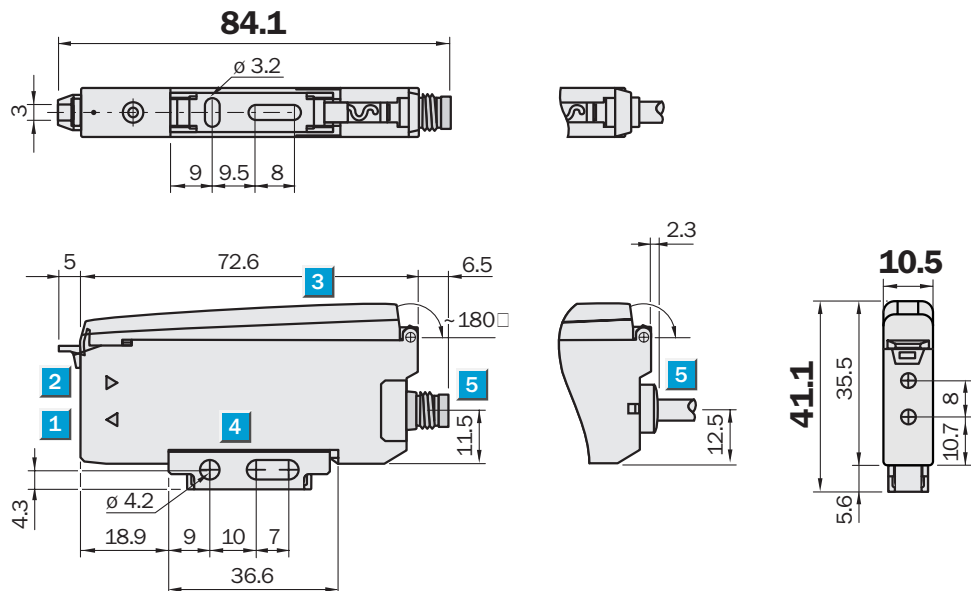
▲ WLL 170(T) units with red or green transmission light and LL 3 plastic fibre-optic cables for detecting print marks used to control labelling machines.

◀ LL 3 fibre-optic cables for special applications: here LL 3 cables with Teflon jacket are the right choice for harsh environments (i.e. contact with acids, alkaline solutions, detergents or oils).

	<b>Scanning range</b> 0 ... 4000 mm
<b>Through-beam mode</b>	
	<b>Scanning distance</b> 0 ... 160 mm
<b>Proximity mode</b>	

- Sender LED red for standard applications
- Manual sensitivity adjustment
- Simple installation and alignment

### Dimensional drawing



### Adjustments possible

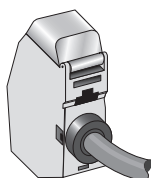


- 1 Sender LED, installation of LL 3 fibre-optic cable (sender fibre)
- 2 Receiver, installation of LL 3 fibre-optic cable (receiver fibre)
- 3 Protective hood, can be raised at both ends
- 4 Mounting bracket, included with delivery (see Accessories)
- 5 Connector
- 6 Indication of correct fibre-optic cable mounting
- 7 Indicator LED orange: lights up when switching output is active
- 8 LED signal strength indicator green, lights up when light received < 0.9 or > 1.1 (switching threshold = 1)
- 9 Sensitivity scale 270°
- 10 Sensitivity control (10 revolutions)
- 11 Selector switch for OFF delay: "OFF DLY" (=ON) / "OFF", 40 ms fixed
- 12 Selector switch: "L.ON" (light switching) / "D.ON" (dark switching)

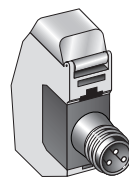
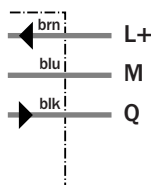


### Connection type

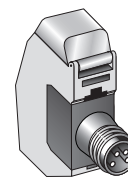
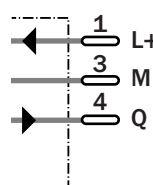
WLL170-2N132	WLL170-2N330	WLL170-2N430
WLL170-2P132	WLL170-2P330	WLL170-2P430



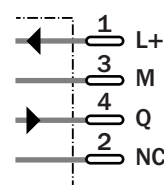
3 x 0.2 mm<sup>2</sup>



M8, 3-pin



M8, 4-pin



### See chapter Accessories

Connector, M8, 3-pin
Connector, M8, 4-pin
Fibre-optic cable
Tip adapters
Mounting systems

Technical data		WLL170-2	N132	N330	N430	P132	P330	P430				
<b>Operating distance</b>	0 ... 160 mm <sup>1)</sup>											
Fibre-optic cable (proximity system):	LL3-DK06											
Adjustment of operating distance	Poti, 10 revolutions <sup>2)</sup>											
<b>Scanning range max. typ.</b>	0 ... 4,000 mm											
Fibre-optic cable (through-beam system)	LL3-TB02 and tip adapter LL3-TA01											
<b>Operating range, recommended</b>	0 ... 700 mm											
Fibre-optic cable (through-beam system)	LL3-TB01											
Sensitivity adjustment	Poti, 10 revolutions <sup>2)</sup>											
<b>Light source, light type</b>	LED, red light, 660 nm <sup>3)</sup>											
Light spot diameter	Depends on scanning range											
Angle of dispersion	Approx. 65° see LL 3 fibre-optic data											
<b>Supply voltage V<sub>s</sub></b>	10 ... 30 V DC <sup>4)</sup>											
Residual ripple	10 % <sup>5)</sup>											
Power consumption	≤ 30 mA <sup>6)</sup>											
<b>Switching outputs</b>	NPN: open collector: Q											
	PNP: open collector: Q											
Switching mode	Light/dark switching, switchable											
Output current I <sub>a</sub> max	≤ 100 mA											
Response time	≤ 0,25 ms <sup>7)</sup>											
Switching frequency	2,000 Hz <sup>9)</sup>											
Time delay	40 ms fix, selectable by sliding switch											
Time type	Off delay t <sub>OFF</sub>											
<b>Connection type</b>	Cable, Ø 3.8 mm, PVC, 2 m <sup>9)</sup>											
	Connector, M8, 3-pin											
	Connector, M8, 4-pin											
<b>VDE protection class</b>	◆											
<b>Circuit protection</b>	V <sub>s</sub> connections reverse-polarity protected / In-/outputs short-circuit protected / Interference pulse suppression / Outputs overcurrent and short-circuit protected											
<b>Enclosure rating</b>	IP 66 <sup>10)</sup>											
<b>Ambient temperature operation</b>	-25 °C ... +55 °C											
<b>Ambient temperature storage</b>	-40 °C ... +70 °C											
<b>Weight</b>	Approx. 70 g											
<b>Housing material</b>	ABS/PC											

<sup>1)</sup> Object with 90 % remission (based on standard white to DIN 5033)  
<sup>2)</sup> Sensitivity scale 270°  
<sup>3)</sup> Average service life 100,000 h at

T<sub>a</sub> = +25°C

<sup>4)</sup> Limit values

<sup>5)</sup> may not exceed or fall short of V<sub>s</sub>

tolerances

<sup>6)</sup> without load

<sup>7)</sup> Signal transit time with resistive load

<sup>8)</sup> with light/dark ratio 1:1

<sup>9)</sup> do not bend below 0 °C

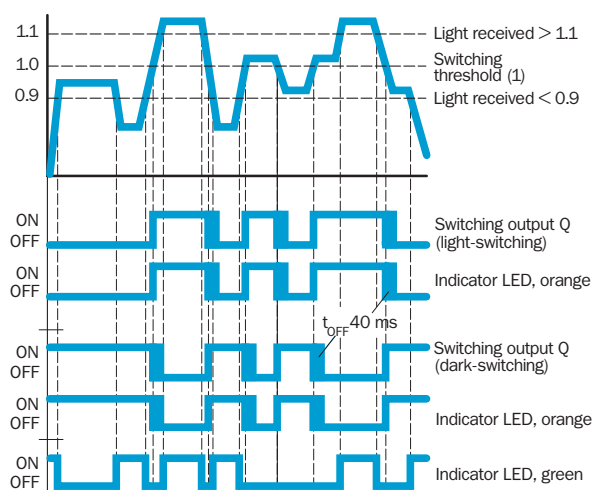
<sup>10)</sup> with correctly attached fibre-optic cable LL 3 and closed protection hood

## Function diagram for WLL 170-2

### ■ WLL 170-2



**Orange LED display:** lights up when switching output Q is active. Dependent on setting of light/dark selector switch.

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



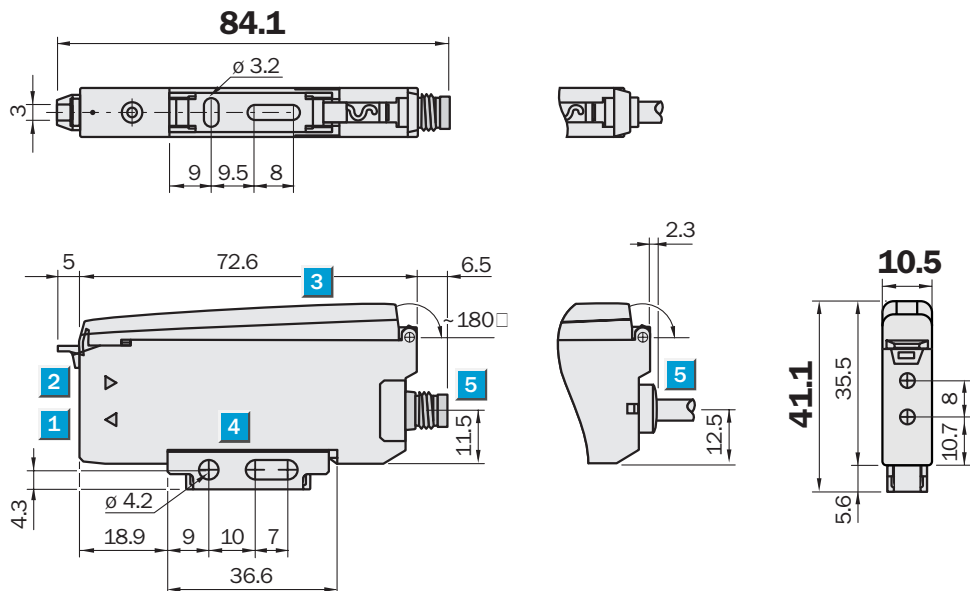
### Ordering information

Type	Order no.
WLL170-2N132	6 029 515
WLL170-2N330	6 029 517
WLL170-2N430	6 029 518
WLL170-2P132	6 029 511
WLL170-2P330	6 029 513
WLL170-2P430	6 029 514

	<b>Scanning range</b> 0 ... 1700 mm
<b>Through-beam mode</b>	
	<b>Scanning distance</b> 0 ... 45 mm
<b>Proximity mode</b>	

- Sender LED green for standard applications and print mark recognition
- Manual sensitivity adjustment
- Simple installation and alignment

### Dimensional drawing



### Adjustments possible

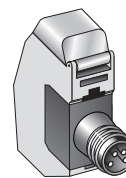
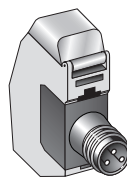
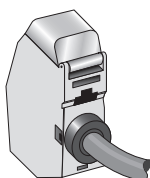


- 1 Sender LED, installation of LL 3 fibre-optic cable (sender fibre)
- 2 Receiver, installation of LL 3 fibre-optic cable (receiver fibre)
- 3 Protective hood, can be raised at both ends
- 4 Mounting bracket, included with delivery (see Accessories)
- 5 Connector
- 6 Indication of correct fibre-optic cable mounting
- 7 Indicator LED orange: lights up when switching output is active
- 8 LED signal strength indicator green, lights up when light received < 0.9 or > 1.1 (switching threshold = 1)
- 9 Sensitivity scale 270°
- 10 Sensitivity control (10 revolutions)
- 11 Selector switch for OFF delay: "OFF DLY" (=ON) / "OFF", 40 ms fixed
- 12 Selector switch: "L.ON" (light switching) / "D.ON" (dark switching)



### Connection type

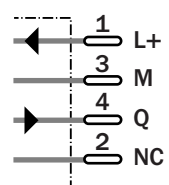
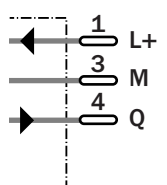
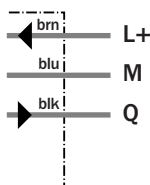
WLL170-2N192	WLL170-2N390	WLL170-2N490
WLL170-2P192	WLL170-2P390	WLL170-2P490



3 x 0.2 mm<sup>2</sup>

M8, 3-pin

M8, 4-pin



<b>See chapter Accessories</b>
Connector, M8, 3-pin
Connector, M8, 4-pin
Fibre-optic cable
Tip adapters
Mounting systems

Technical data		WLL170-2	N192	N390	N490	P192	P390	P490				
<b>Operating distance</b>	0 ... 45 mm <sup>1)</sup>											
Fibre-optic cable (proximity system):	LL3-DK06											
Adjustment of operating distance	Poti, 10 revolutions <sup>2)</sup>											
<b>Scanning range max. typ.</b>	0 ... 1,700 mm											
Fibre-optic cable (through-beam system)	LL3-TB02 and tip adapter LL3-TA01											
<b>Operating range, recommended</b>	0 ... 350 mm											
Fibre-optic cable (through-beam system)	LL3-TB01											
Sensitivity adjustment	Poti, 10 revolutions <sup>2)</sup>											
<b>Light source, light type</b>	LED, green light, 520 nm <sup>3)</sup>											
Light spot diameter	Depends on scanning range											
Angle of dispersion	Approx. 65° see LL 3 fibre-optic data											
<b>Supply voltage V<sub>s</sub></b>	10 ... 30 V DC <sup>4)</sup>											
Residual ripple	10 % <sup>5)</sup>											
Power consumption	≤ 30 mA <sup>6)</sup>											
<b>Switching outputs</b>	NPN: open collector: Q											
	PNP: open collector: Q											
Switching mode	Light/dark switching, switchable											
Output current I <sub>a</sub> max	≤ 100 mA											
Response time	≤ 0,25 ms <sup>7)</sup>											
Switching frequency	2,000 Hz <sup>9)</sup>											
Time delay	40 ms fix, selectable by sliding switch											
Time type	Off delay t <sub>OFF</sub>											
<b>Connection type</b>	Cable, Ø 3.8 mm, PVC, 2 m <sup>9)</sup>											
	Connector, M8, 3-pin											
	Connector, M8, 4-pin											
<b>VDE protection class</b>	◆											
<b>Circuit protection</b>	V <sub>s</sub> connections reverse-polarity protected / In-/outputs short-circuit protected / Interference pulse suppression / Outputs overcurrent and short-circuit protected											
<b>Enclosure rating</b>	IP 66 <sup>10)</sup>											
<b>Ambient temperature operation</b>	-25 °C ... +55 °C											
<b>Ambient temperature storage</b>	-40 °C ... +70 °C											
<b>Weight</b>	Approx. 70 g											
<b>Housing material</b>	ABS/PC											

<sup>1)</sup> Object with 90 % remission (based on standard white to DIN 5033)

<sup>2)</sup> Sensitivity scale 270°

<sup>3)</sup> Average service life 100,000 h at

T<sub>a</sub> = +25°C

<sup>4)</sup> Limit values

<sup>5)</sup> may not exceed or fall short of V<sub>s</sub>

tolerances

<sup>6)</sup> without load

<sup>7)</sup> Signal transit time with resistive load

<sup>8)</sup> with light/dark ratio 1:1

<sup>9)</sup> do not bend below 0 °C

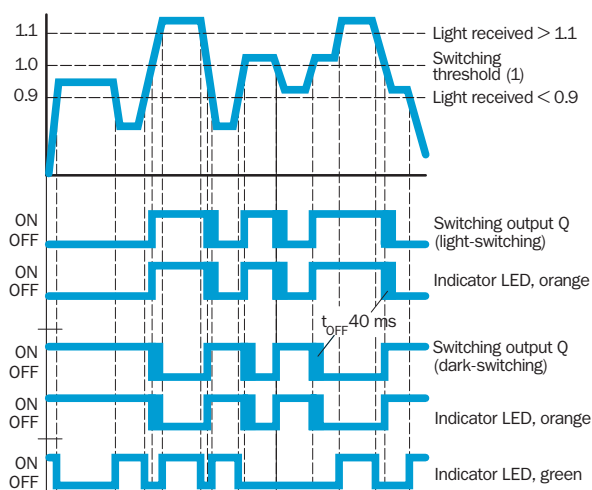
<sup>10)</sup> with correctly attached fibre-optic cable LL 3 and closed protection hood

## Function diagram for WLL 170-2

### ■ WLL 170-2

**Orange LED display:** lights up when switching output Q is active. Dependent on setting of light/dark selector switch.

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



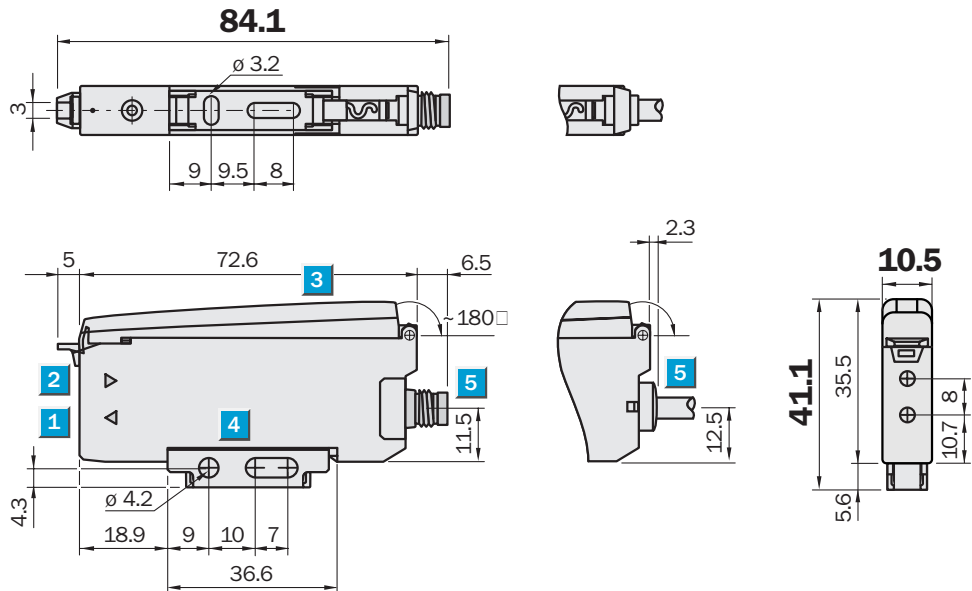
### Ordering information

Type	Order no.
WLL170-2N192	6 029 523
WLL170-2N390	6 029 525
WLL170-2N490	6 029 526
WLL170-2P192	6 029 519
WLL170-2P390	6 029 521
WLL170-2P490	6 029 522

	<b>Scanning range</b> 0 ... 1600 mm
<b>Through-beam mode</b>	
	<b>Scanning distance</b> 0 ... 65 mm
<b>Proximity mode</b>	

- High speed 10,000/sec., for extremely fast processes
- Sender LED red
- Manual sensitivity adjustment
- Time delay 40 ms for signal extension

### Dimensional drawing



### Adjustments possible

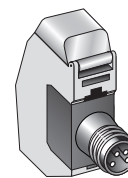
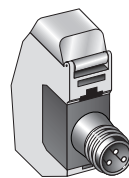
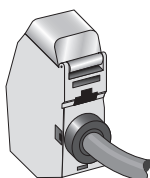


- 1 Sender LED, installation of LL 3 fibre-optic cable (sender fibre)
- 2 Receiver, installation of LL 3 fibre-optic cable (receiver fibre)
- 3 Protective hood, can be raised at both ends
- 4 Mounting bracket, included with delivery (see Accessories)
- 5 Connector
- 6 Indication of correct fibre-optic cable mounting
- 7 Indicator LED orange: lights up when switching output is active
- 8 LED signal strength indicator green, lights up when light received < 0.9 or > 1.1 (switching threshold = 1)
- 9 Sensitivity scale 270°
- 10 Sensitivity control (10 revolutions)
- 11 Selector switch for OFF delay: "OFF DLY" (=ON) / "OFF", 40 ms fixed
- 12 Selector switch: "LON" (light switching) / "D.ON" (dark switching)



### Connection type

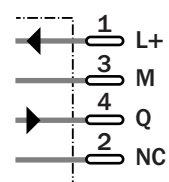
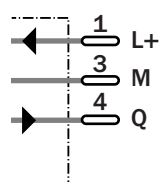
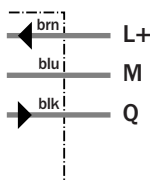
WLL170-2N162	WLL170-2N360	WLL170-2N460
WLL170-2P162	WLL170-2P360	WLL170-2P460



3 x 0.2 mm<sup>2</sup>

M8, 3-pin

M8, 4-pin



### See chapter Accessories

Connector, M8, 3-pin
Connector, M8, 4-pin
Fibre-optic cable
Tip adapters
Mounting systems

Technical data		WLL170-2	N162	N360	N460	P162	P360	P460				
<b>Operating distance</b>	0 ... 65 mm <sup>1)</sup>											
Fibre-optic cable (proximity system):	LL3-DB01											
Adjustment of operating distance	Poti, 10 revolutions <sup>2)</sup>											
<b>Scanning range max. typ.</b>	0 ... 1,600 mm											
Fibre-optic cable (through-beam system)	LL3-TB02 and tip adapter LL3-TA01											
<b>Operating range, recommended</b>	0 ... 350 mm											
Fibre-optic cable (through-beam system)	LL3-TB01											
Sensitivity adjustment	Poti, 10 revolutions <sup>2)</sup>											
<b>Light source, light type</b>	LED, Red light, 660 nm <sup>3)</sup>											
Light spot diameter	Depends on scanning range											
Angle of dispersion	Approx. 65° see LL 3 fibre-optic data											
<b>Supply voltage V<sub>s</sub></b>	10 ... 30 V DC <sup>4)</sup>											
Residual ripple	10 % <sup>5)</sup>											
Power consumption	≤ 30 mA <sup>6)</sup>											
<b>Switching outputs</b>	NPN: open collector: Q											
	PNP: open collector: Q											
Switching mode	Light/dark switching, switchable											
Output current I <sub>a</sub> max	≤ 100 mA											
Response time	≤ 50 µs <sup>7)</sup>											
Switching frequency	10,000 Hz <sup>8)</sup>											
Time delay	40 ms fix, selectable by sliding switch											
Time type	Off delay t <sub>OFF</sub>											
<b>Connection type</b>	Cable, Ø 3.8 mm, PVC, 2 m <sup>9)</sup>											
	Connector, M8, 3-pin											
	Connector, M8, 4-pin											
<b>VDE protection class</b>	◆											
<b>Circuit protection</b>	V <sub>s</sub> connections reverse-polarity protected / In-/outputs short-circuit protected / Interference pulse suppression / Outputs overcurrent and short-circuit protected											
<b>Enclosure rating</b>	IP 66 <sup>10)</sup>											
<b>Ambient temperature operation</b>	-25 °C ... +55 °C											
<b>Ambient temperature storage</b>	-40 °C ... +70 °C											
<b>Weight</b>	Approx. 70 g											
<b>Housing material</b>	ABS/PC											

<sup>1)</sup> Object with 90 % remission (based on standard white to DIN 5033)  
<sup>2)</sup> Sensitivity scale 270°  
<sup>3)</sup> Average service life 100,000 h at

T<sub>a</sub> = +25°C

<sup>4)</sup> Limit values

<sup>5)</sup> may not exceed or fall short of V<sub>s</sub>

tolerances

<sup>6)</sup> without load

<sup>7)</sup> Signal transit time with resistive load

<sup>8)</sup> with light/dark ratio 1:1

<sup>9)</sup> do not bend below 0 °C

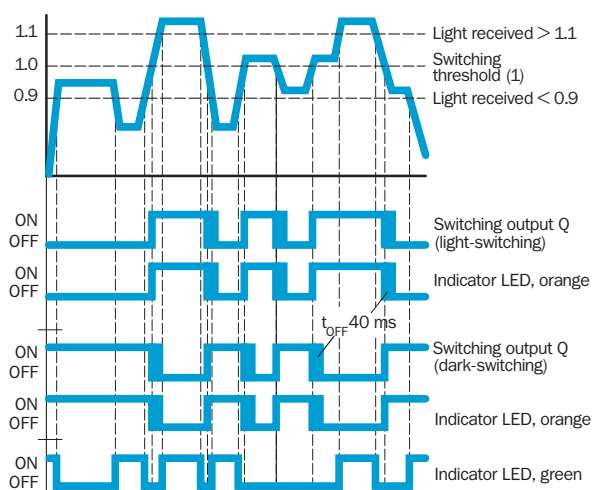
<sup>10)</sup> with correctly attached fibre-optic cable LL 3 and closed protection hood

## Function diagram for WLL 170-2

### ■ WLL 170-2

**Orange LED display:** lights up when switching output Q is active. Dependent on setting of light/dark selector switch.



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



### Ordering information

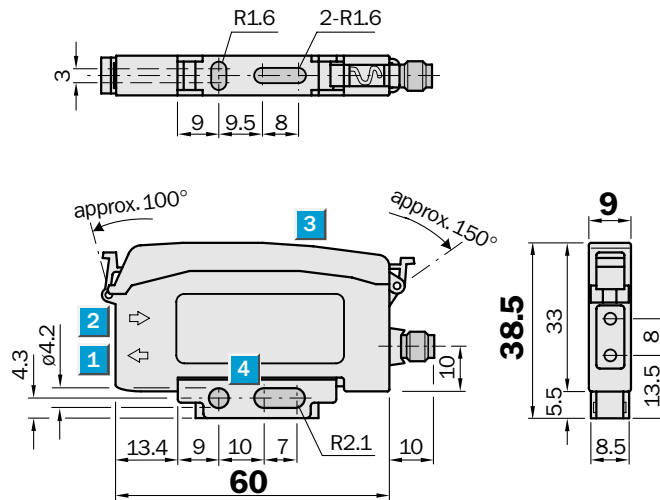
Type	Order no.
WLL170-2N162	6 029 531
WLL170-2N360	6 029 533
WLL170-2N460	6 029 534
WLL170-2P162	6 029 527
WLL170-2P360	6 029 529
WLL170-2P460	6 029 530



	<b>Scanning range</b> 0...600 mm
<b>Through-beam systems</b>	
	<b>Scanning distance</b> 0...100 mm
<b>Proximity systems</b>	

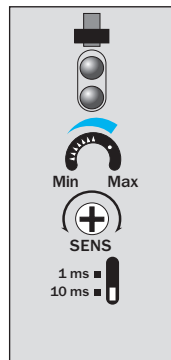
- Analogue output voltage 1...5 V
- Large range of suitable LL 3 fibre-optic cables
- Ideal for more complex requirements, e.g. positioning tasks, turbidity/transmission measurement, contrast resolution

## Dimensional drawing

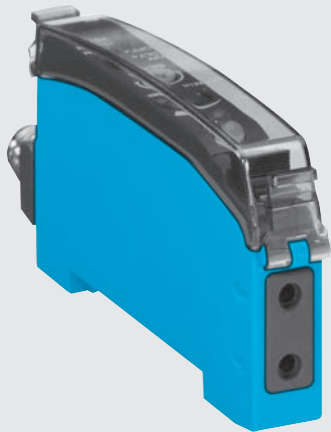


## Adjustments possible

WLL 170A-V 132  
WLL 170A-V 330  
WLL 170A-V 430



- 1 Sender LED, installation of LL 3 fibre-optic cable (sender fibre)
- 2 Receiver, installation of LL 3 fibre-optic cable (receiver fibre)
- 3 Protective hood: can be raised at both ends, removable
- 4 Mounting bracket, included (see Accessories)
- 5 Indicator LED, orange: analogue output with saturation ( $\geq 5$  V)
- 6 LED signal strength indicator, green: lights up when light received
- 7 Sensitivity scale, min./max. = 270°
- 8 Sensitivity control (min./max. = 7 revolutions)
- 9 Selector switch for analogue output response time

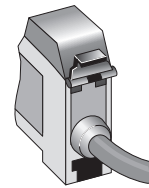
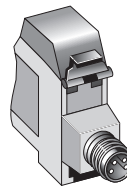
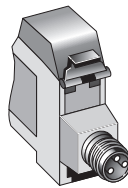


## Connection types

WLL 170A-V 330

WLL 170A-V 430

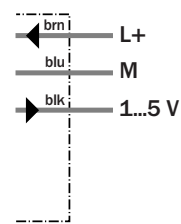
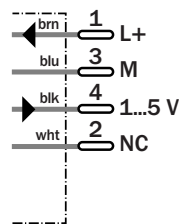
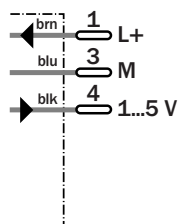
WLL 170A-V 132



3-pin, M8

4-pin, M8

ø 4 mm



## See chapter Accessories

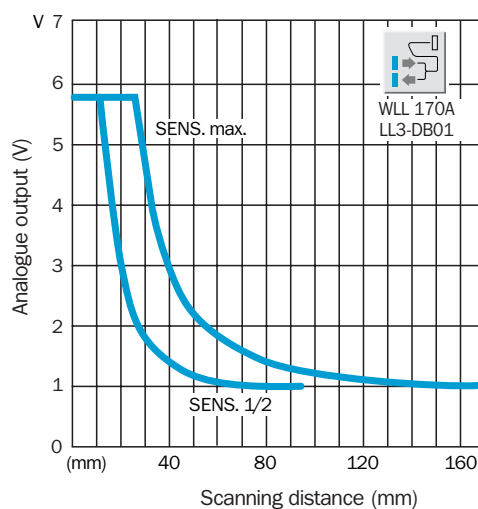
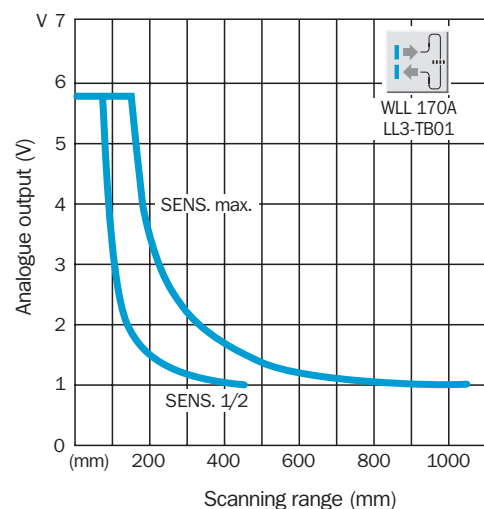
Cables and connectors  
Mounting systems  
Fibre-optic cables



Technical data		WLL 170T-	V 132	V 330	V 430						
<b>Suitable fibre-optic cable</b>	LL 3 plastic fibre-optic cables										
<b>Scanning range<sup>1)</sup></b>	Depends on fibre-optic cable used										
<b>Recommended operating ranges<sup>1)</sup></b>	max. 0...600 mm (through-beam syst.) (with tip adapters 0...3200 mm)										
<b>Recommended operating distance<sup>1)</sup></b>	max. 0...100 mm <sup>2)</sup> (proximity system)										
<b>Light source<sup>3)</sup>, light type</b>	LED, visible red light										
Light spot diameter of LL 3	Depends on scanning range										
Disp. angle of LL 3 fibre-optic cable	Approx. 65° <sup>4)</sup>										
<b>Supply voltage V<sub>S</sub><sup>5)</sup></b>	10...30 V DC										
Ripple <sup>6)</sup>	10 %										
Current consumption <sup>7)</sup>	≤ 40 mA										
<b>Analogue output</b>											
<b>Voltage output</b>	1...5 V 1 V = no light received 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 (recommended)										
<b>Response time, selectable<sup>8)</sup></b>	1 ms/10 ms										
<b>Sensitivity, adjustable</b>	Potentiometer, 7 turns <sup>9)</sup>										
<b>Connection types</b> cable <sup>10)</sup>	PVC, 2 m; 3 x 0.2 mm <sup>2</sup> , ∅ 4.0 mm										
plug	M8, 3-pin										
plug	M8, 4-pin										
<b>Cable extension</b>	max. 100 m; signal loss to be expected										
<b>Circuit protection<sup>11)</sup></b>	A, C, D										
<b>VDE protection class</b>	⊕										
<b>Enclosure rating</b>	IP 50										
<b>Ambient temperature T<sub>A</sub></b>	Operation - 25 °C...+ 55 °C Storage - 40 °C...+ 70 °C										
<b>Weight</b>											
with cable	Approx. 60 g										
with M8 plug	Approx. 20 g										
<b>Housing material</b>	ABS										

- 1) See Accessories; selection table for LL 3 fibre-optic cables
- 2) Object with 90 % remission (based on standard white to DIN 5033)
- 3) Average service life 100,000 h at T<sub>A</sub> = + 25 °C
- 4) Deviations, see data for LL 3
- 5) Limit values
- 6) May not exceed or fall short of V<sub>S</sub> tolerances
- 7) Without load
- 8) Delay time: change in received light/change in analogue output, (90 % of upper range value)
- 9) Scale 270°
- 10) Do not bend below 0 °C
- 11) A = V<sub>S</sub> connections reverse-polarity protected  
C = Interference pulse suppression  
D = Outputs overcurrent and short-circuit protected

**WLL 170A, analogue, typical curves**



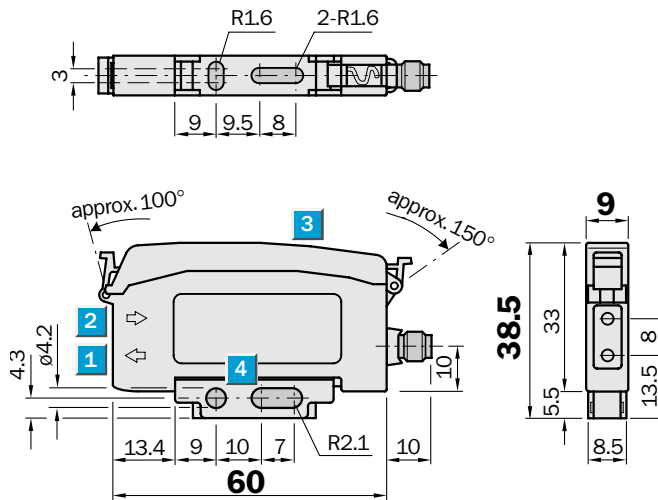
**Order information**

Type	Order no.
WLL 170A-V 132	6 021 078
WLL 170A-V 330	6 021 962
WLL 170A-V 430	6 021 080

	<b>Scanning range</b> 0...580 mm
<b>Through-beam systems</b>	
	<b>Scanning distance</b> 0...100 mm
<b>Proximity systems</b>	

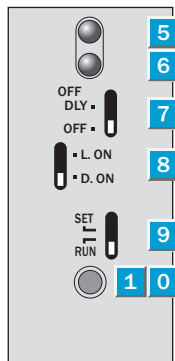
- Red sender LED
- For standard applications and mark recognition
- Easy alignment and commissioning by teach-in

Dimensional drawing

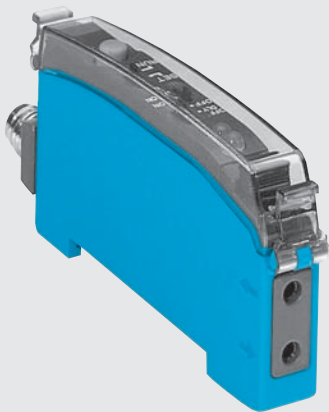


Adjustments possible

WLL 170T-P 132	WLL 170T-N 132
WLL 170T-P 330	WLL 170T-N 330
WLL 170T-P 430	WLL 170T-N 430

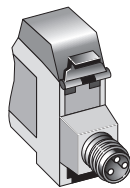


- LED sender, installation of LL 3 fibre-optic cable (sender fibre)
- Receiver, installation of LL 3 fibre-optic cable (receiver fibre)
- Protective hood, can be raised at both ends, removable
- Mounting bracket, included (see Accessories)
- Orange LED indicator, lights up when switching output is active
- Green LED reception indicator, lights up when light received is  $< 0.9$  or  $> 1.1$  (switching threshold = 1)
- OFF delay selector switch: "OFF DLY" (on)/"OFF", 40 ms fixed
- 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

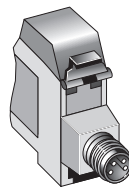
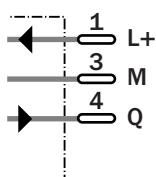


Connection types

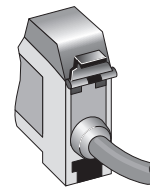
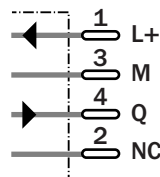
WLL 170T-P 330	WLL 170T-P 430	WLL 170T-P 132
WLL 170T-N 330	WLL 170T-N 430	WLL 170T-N 132



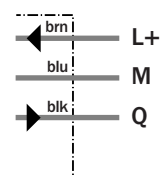
3-pin, M8



4-pin, M8



$\varnothing 4$  mm



See chapter Accessories

- Cables and connectors
- Mounting systems
- Fibre-optic cables

Technical data		WLL 170T-	P 132	P 330	P 430	N 132	N 330	N 430				
<b>Suitable fibre-optic cable</b>	LL 3 plastic fibre-optic cables											
<b>Scanning range</b>	Dependent on fibre-optic cable used											
<b>Recommended operating ranges</b>	0...580 mm (through-beam system) (with auxiliary lens 0...3200 mm)											
<b>Recommended operating distance</b>	0...100 mm <sup>1)</sup> (proximity system)											
<b>Sensitivity setting</b>	Automatically, by Teach-in button	Mode switch at pos. "SET" <sup>2)</sup>										
<b>Mode selector switch</b>	position "SET"	Teach-in button active										
	position "RUN"	Teach-in button inactive <sup>3)</sup>										
<b>Light source<sup>4)</sup>, light type</b>	LED, visible red light											
Light spot diameter LL 3	Dependent on scanning range											
Dispersion angle LL 3 fibre-optic cable	Approx. 65° <sup>5)</sup>											
<b>Supply voltage V<sub>S</sub><sup>6)</sup></b>	10...30 V DC											
Ripple <sup>7)</sup>	10%											
Current consumption <sup>8)</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>9)</sup>											
<b>Response time<sup>10)</sup></b>	≤ 0.5 ms											
<b>Switching frequency max.<sup>11)</sup></b>	1000/s											
<b>Time delay t<sub>OFF</sub> (OFF delay)</b>	40 ms fix, selectable by sliding switch											
<b>Connection types</b>	cable <sup>12)</sup>	PVC, 2 m; 3 x 0.2 mm <sup>2</sup> , ø 4.0 mm										
	plug	M8, 3-pin										
	plug	M8, 4-pin										
<b>Circuit protection<sup>13)</sup></b>	A, B, C, D											
<b>VDE protection class</b>	⚡											
<b>Enclosure rating</b>	IP 50											
<b>Ambient temperature T<sub>A</sub></b>	Operation	- 25 °C...+ 55 °C										
	Storage	- 40 °C...+ 70 °C										
<b>Weight</b>												
with cable 2 m	Approx. 60 g											
with M8 plug, 3-pin/4-pin	Approx. 20 g											
<b>Housing material</b>	ABS											

- 1) Object with 90 % remission (based on standard white to DIN 5033)
- 2) Teach-in active
- 3) Equipment in sensor mode
- 4) Average service life 100,000 h at T<sub>A</sub> = + 25 °C
- 5) See LL 3 data for deviations
- 6) Limit values
- 7) May not exceed or fall short of V<sub>S</sub> tolerances
- 8) Without load
- 9) By sliding switch
- 10) With light/dark ratio 1 : 1 without time delay
- 11) With resistive load
- 12) Do not bend below 0 °C
- 13) 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**

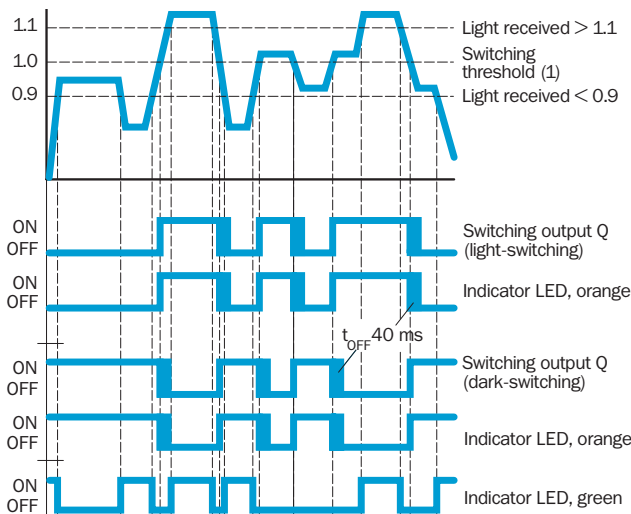
**WLL 170T in sensor mode**

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

**Orange LED display:** lights up if switching output 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 643.



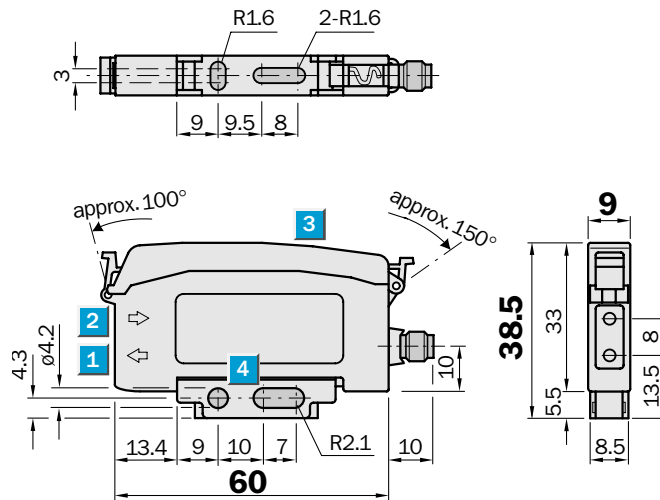
**Order information**

Type	Order no.
WLL 170T-P 132	6 011 722
WLL 170T-P 330	6 021 963
WLL 170T-P 430	6 011 724
WLL 170T-N 132	6 011 725
WLL 170T-N 330	6 021 964
WLL 170T-N 430	6 011 727

	<b>Scanning range</b> 0...140 mm
<b>Through-beam systems</b>	
	<b>Scanning distance</b> 0...25 mm
<b>Proximity systems</b>	

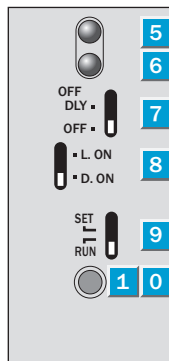
- Green sender LED
- Ideal for recognition of red marks, contrasts or parts
- Commissioning by teach-in

## Dimensional drawing

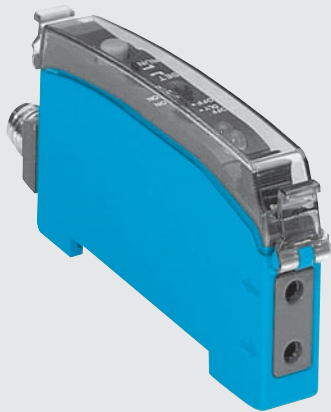


## Adjustments possible

WLL 170T-P 192	WLL 170T-N 192
WLL 170T-P 390	WLL 170T-N 390
WLL 170T-P 490	WLL 170T-N 490

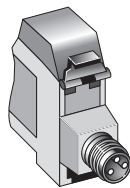


- LED sender, installation of LL 3 fibre-optic cable (sender fibre)
- Receiver, installation of LL 3 fibre-optic cable (receiver fibre)
- Protective hood, can be raised at both ends, removable
- Mounting bracket, included in delivery (see Accessories)
- Orange LED indicator, lights up when switching output is active
- Green LED reception indicator, lights up when light received is < 0.9 or > 1.1 (switching threshold = 1)
- OFF delay selector switch: "OFF DLY" (on)/"OFF", 40 ms fixed
- 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

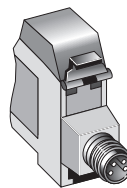
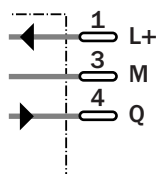


## Connection types

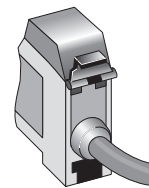
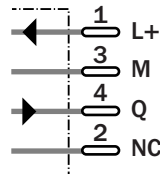
WLL 170T-P 390	WLL 170T-P 490	WLL 170T-P 192
WLL 170T-N 390	WLL 170T-N 490	WLL 170T-N 192



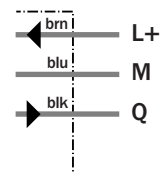
3-pin, M8



4-pin, M8



ø 4 mm



## See chapter Accessories

- Cables and connectors
- Mounting systems
- Fibre-optic cables

Technical data		WLL 170T-	P 192	P 390	P 490	N 192	N 390	N 490				
<b>Suitable fibre-optic cable</b>	LL 3 plastic fibre-optic cables											
<b>Scanning range</b>	Dependent on fibre-optic cable used											
<b>Recommended operating ranges</b>	0...140 mm (through-beam system) (with auxiliary lens 0...650 mm)											
<b>Recommended operating distance</b>	0...25 mm <sup>1)</sup> (proximity system)											
<b>Sensitivity setting</b>												
Automatically, by Teach-in button	Mode switch at pos. "SET" <sup>2)</sup>											
Additional fine alignment, manual	Optional <sup>5)</sup>											
<b>Black &amp; white resolution<sup>3)</sup></b>	8 grey levels											
<b>Mode selector switch</b> position "SET"	Teach-in button active											
position "RUN"	Teach-in button inactive <sup>4)</sup>											
<b>Light source<sup>5)</sup>, light type</b>	LED, visible green light											
Light spot diameter LL 3	Dependent on scanning range											
Dispersion angle LL 3 fibre-optic cable	Approx. 65° <sup>6)</sup>											
<b>Supply voltage V<sub>S</sub><sup>7)</sup></b>	10...30 V DC											
Ripple <sup>8)</sup>	10%											
Current consumption <sup>9)</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>10)</sup>											
<b>Response time<sup>11)</sup></b>	≤ 0.5 ms											
<b>Switching frequency max.<sup>12)</sup></b>	1000/s											
<b>Time delay t<sub>OFF</sub></b> (OFF delay)	40 ms fix, selectable by sliding switch											
<b>Connection types</b> cable <sup>13)</sup>	PVC, 2 m; 3 x 0.2 mm <sup>2</sup> , ø 4.0 mm											
plug	M8, 3-pin											
plug	M8, 4-pin											
<b>Circuit protection<sup>14)</sup></b>	A, B, C, D											
<b>VDE protection class</b>	⚡											
<b>Enclosure rating</b>	IP 50											
<b>Ambient temperature T<sub>A</sub></b>	Operation - 25 °C...+ 55 °C Storage - 40 °C...+ 70 °C											
<b>Weight</b> with cable 2 m	Approx. 60 g											
with M8 plug, 4-pin	Approx. 20 g											
<b>Housing material</b>	ABS											

- 1) Object with 90 % remission (based on standard white to DIN 5033)
- 2) Teach-in active
- 3) With LL 3-DT01 proximity fibre-optic cable, scanning distance 3 mm
- 4) Equipment in sensor mode
- 5) Average service life 100,000 h at T<sub>A</sub> = + 25 °C
- 6) See LL 3 data for deviations

- 7) Limit values
- 8) May not exceed or fall short of V<sub>S</sub> tolerances
- 9) Without load
- 10) By sliding switch
- 11) With light/dark ratio 1: 1 without time delay
- 12) With resistive load
- 13) Do not bend below 0 °C

- 14) 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**

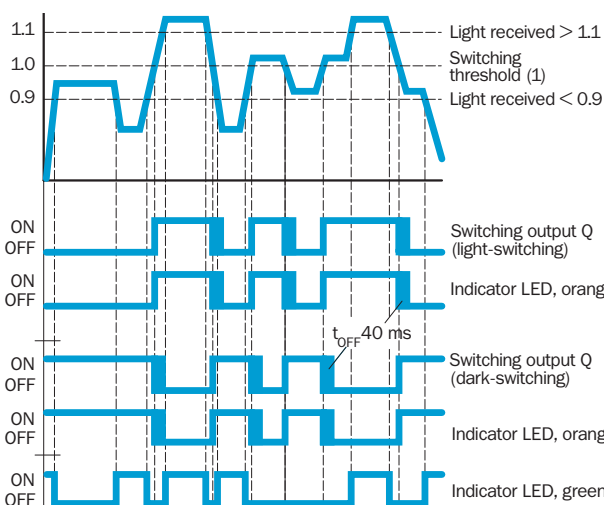
**■ WLL 170T in sensor mode**

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

**Orange LED display:** lights up if switching output 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 643.



**Order information**

Type	Order no.
WLL 170T-P 192	6 011 728
WLL 170T-P 390	6 021 967
WLL 170T-P 490	6 011 730
WLL 170T-N 192	6 011 731
WLL 170T-N 390	6 021 968
WLL 170T-N 490	6 011 733

Functions

■ Teach-in button

Sensitivity adjustment by pressing a button. No special photoelectric switch knowledge necessary.

Only active when MODE selector switch is in the SET position (manipulation protection).

■ Switching selector switch Q

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

■ Connection type

Either M8, 3-pin/4-pin equipment plug or 2 m connection cable.

■ OFF delay  $t_{off}$

For switching output Q.  
Also switchable, 40 ms fixed.  
Enables the control unit to detect very short events.

■ Mounting system WLL 170T

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

■ LED indicators orange, green

■ Teach-in mode:  
Signalling Teach-in sequence  
Constantly flashing: Teach-in error  
Constantly lit: Teach-in OK.

■ Sensor mode:  
Orange LED: switching output active  
Green LED: receiver signal  $> 1.1$  or  $< 0.9$ ; (switching threshold = 1).

■ Sender LED:

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

■  $\mu$ -processor controlled, with EEPROM:

Permanent retention of taught-in switching threshold and hysteresis even if voltage is interrupted for a longer period of time.

■ Teach-in mode selector switch

Separate from 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 button (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 retained for an unlimited period of time even if the voltage is interrupted for a longer time.

■ Protective hood

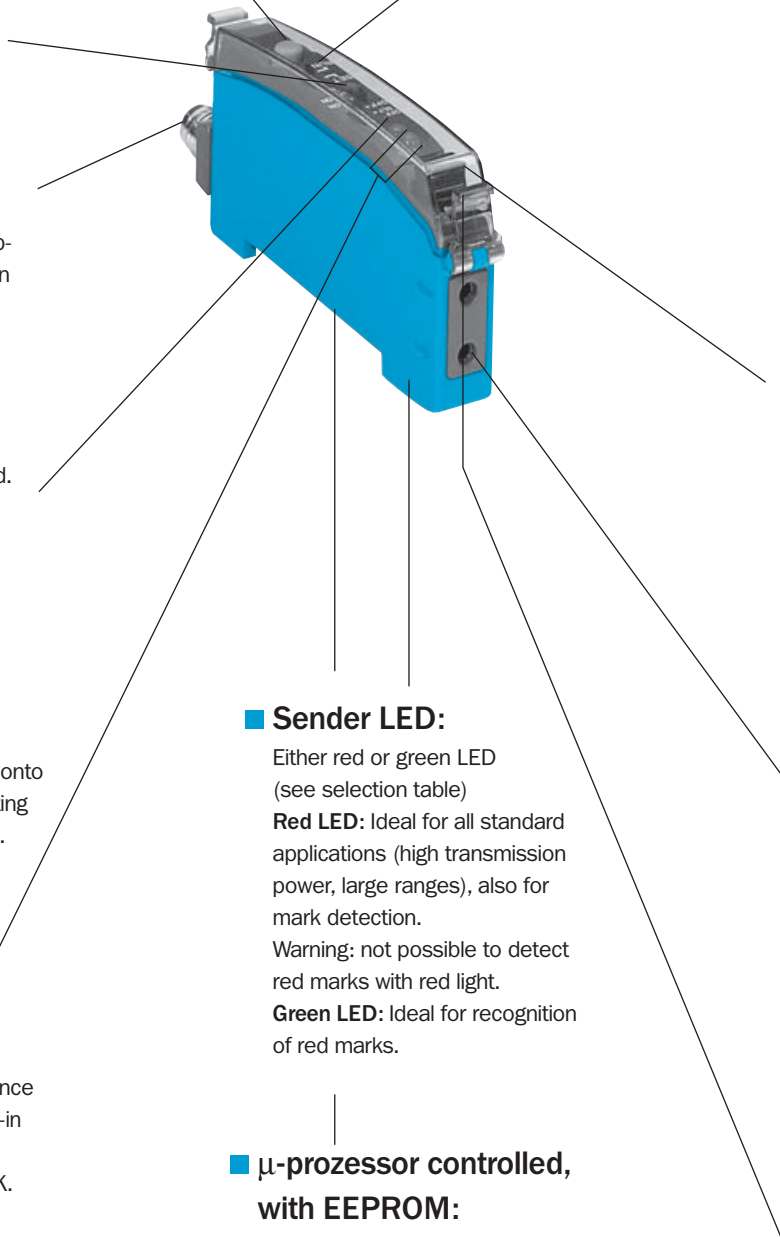
Both sides can be opened up, easy to remove. Easy locking. Also used to check correct fibre-optic cable locking (protective hood cannot be shut otherwise).

■ Snap-in connector for fibre-optic cable

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

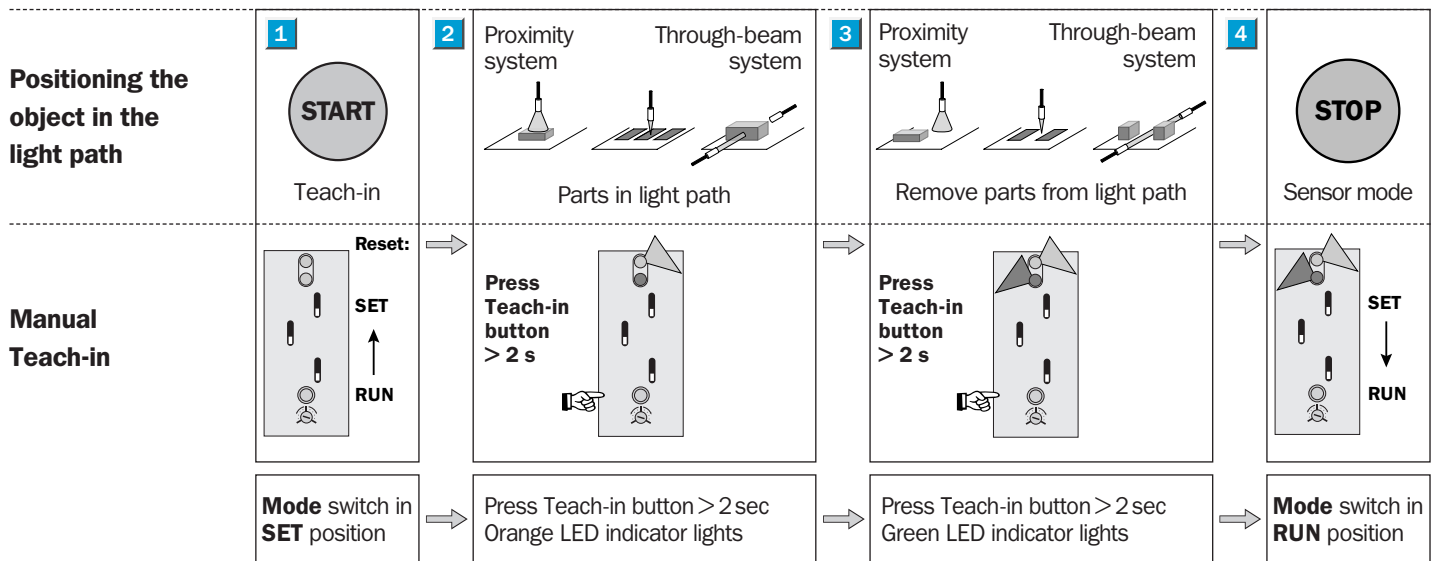
■ Fibre-optic cable receptacle

← fibre-optic cable (sender).  
→ fibre-optic cable (receiver).  
Suitable fibre-optic cable: LL 3 series plastic fibre-optic cable (see description of the many LL 3 variants).



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

Teach-in steps

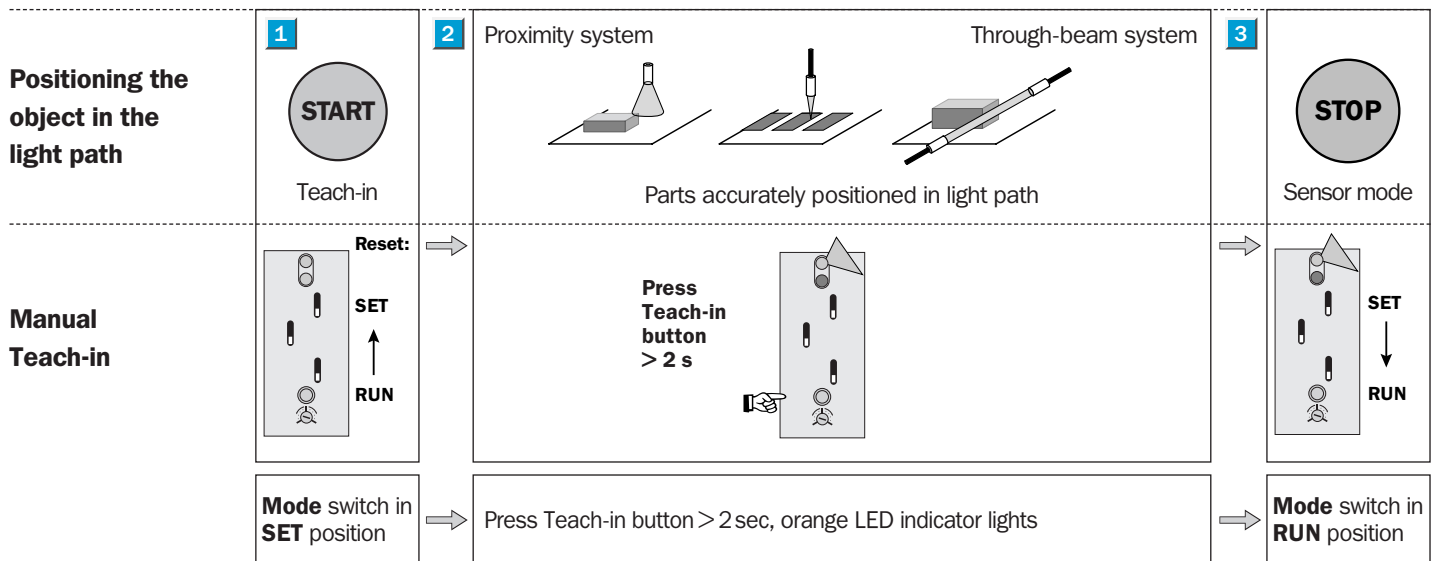


This operating mode is suitable for all applications: large ranges, precise switching points, low hysteresis, transparent objects and contrast marks. The WLL 170T automatically optimizes the switching threshold and hysteresis by means of a  $\mu$ -processor and saves these values permanently in the EEPROM.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

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

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

Teach-in steps



This operating mode is particularly suitable for accurate 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 permanently in the EEPROM. No special experience with opto-electronic components is necessary. The Teach-in button is pressed once.

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