




# W 160: Miniature series for optimum solutions




	<b>Photoelectric proximity switches, BGB</b>
	<b>Photoelectric proximity switches, energetic</b>
	<b>Photoelectric reflex switches</b>



optic cables with approx. 50 different configuration options are available as accessories.

W 160 switches have proven particularly successful in the following sectors:

- electronic component and printed circuit board production,
- the packaging and printing industries,
- assembly and handling systems,
- the construction of special-purpose machines, and
- conveyor systems.

	<b>Through-beam photoelectric switches</b>
	<b>P/e switches w. fibre-optic cable (proximity mode)</b>
	<b>P/e switches w. fibre-optic cable (through-beam mode)</b>

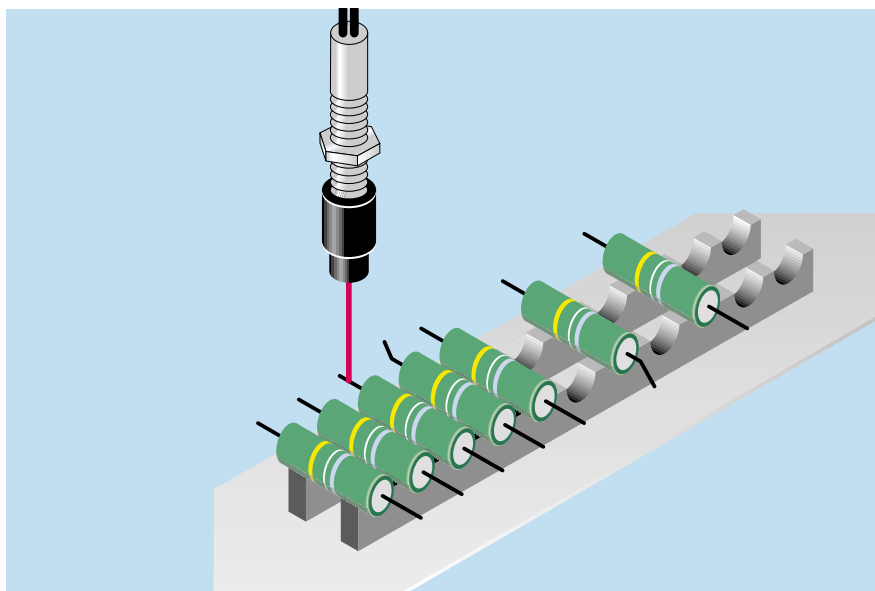
**P**Principal system characteristics are simple handling, large scanning ranges and a reduced number of sensor types thanks to integrated L.ON/D.ON switches. Integrated "intelligence" features such as pre-failure signalling output, test input (cable versions only) or external teach-in (WLL 160 T) increase system reliability under severe environmental conditions.

All W 160 optic variants are available in 2 housing versions with axial or 90° light emission.

WLL 160 fibre-optic cable photoelectric switches with switching point adjustment (manual using potentiometers or automatic at the push of a button using the teach-in method) complete the W 160 series. LL 3 plastic fibre-

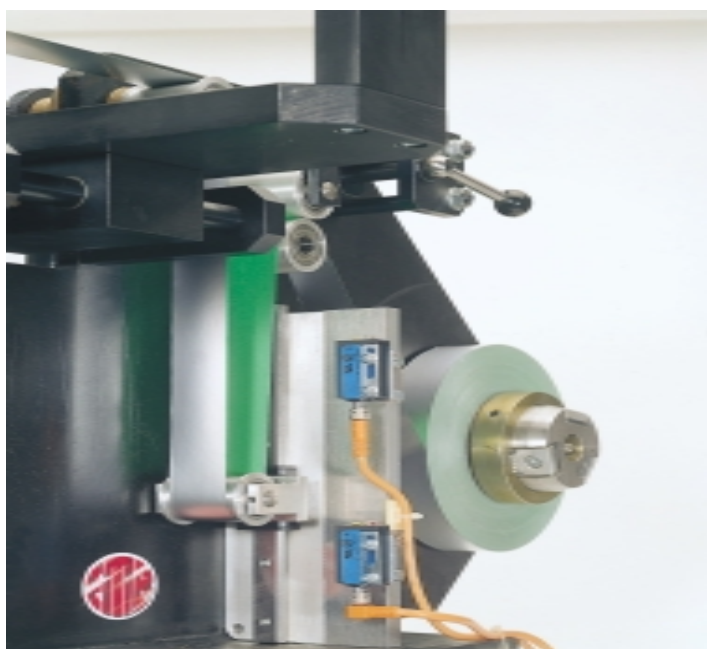
The scanning ranges:

- WS/WE 160 through-beam photoelectric switch: 7 m, slotted mask as accessory,
- WL 160 photoelectric reflex switch: 3 m (PL 80 A), with polarising filter,
- WT 160 photoelectric proximity switch: energetic: scanning distance up to 300 mm (90 % remission), for standard scanning tasks; with focused optics: scanning distance between 8 and 50 mm, background blanking, small light spot, high sensitivity; with divergent optics (angle of dispersion approx. 40°): scanning distance up to 80 mm; ideal for transparent objects.

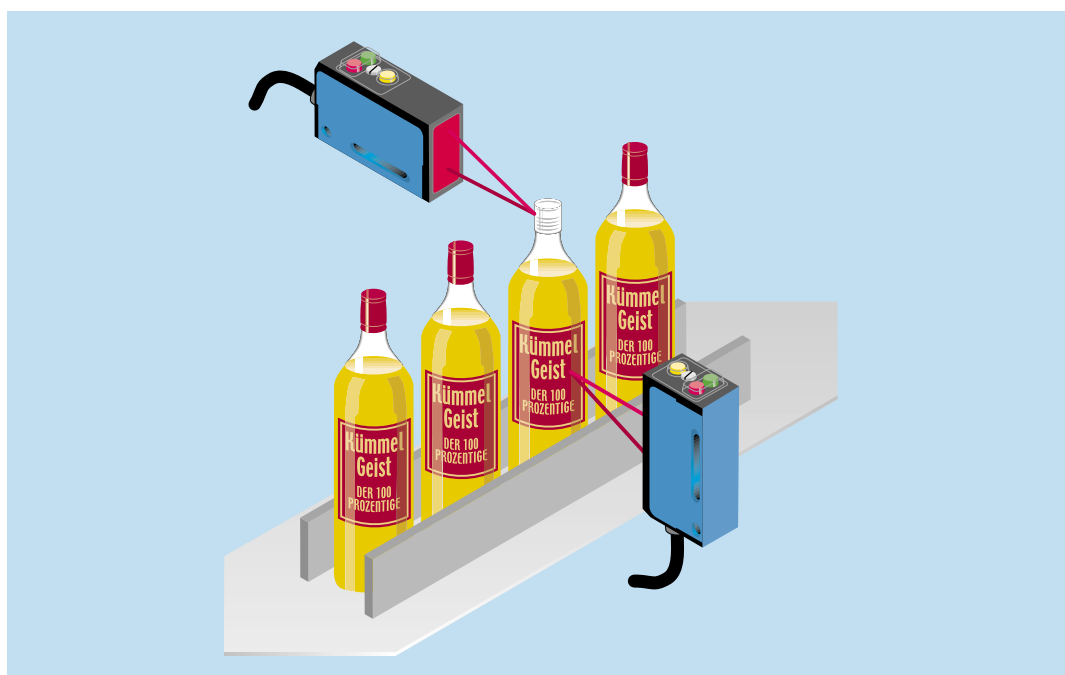
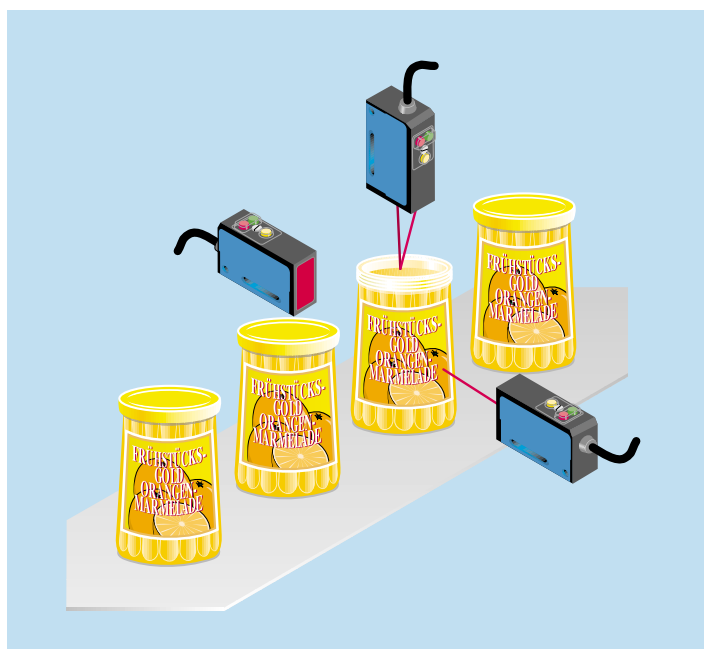


◀ Resistor production: fibre-optic WLL  
160 switches can detect even the thinnest of wires without any problem.

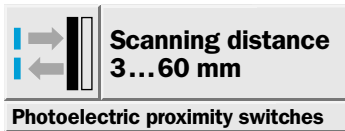
▼ Checking the presence of caps and covers: Using a WT 160 photoelectric proximity switch to detect lids and WS/WE 160 through-beam photoelectric switches to monitor system timing.



▲ The WT 160 miniature photoelectric proximity switch is used in film and foil processing to control feed tension.

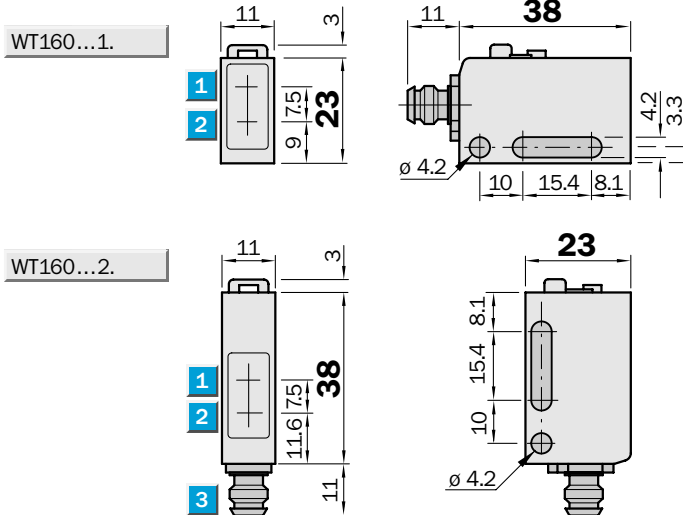


► Checking caps and labels using WT 160 photoelectric proximity switches.



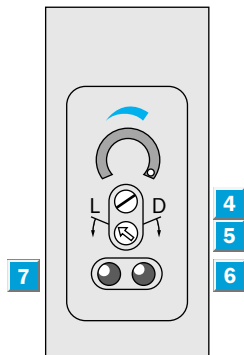
- Horizontal and vertical models
- Focused scanner with background blanking and great sensitivity
- Contamination control with green LED indicator and pre-failure signalling output
- Test input for equipment and system testing

#### Dimensional drawing



#### Adjustments possible

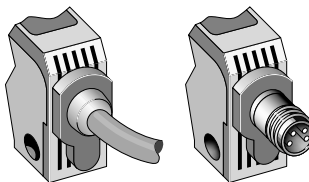
All types



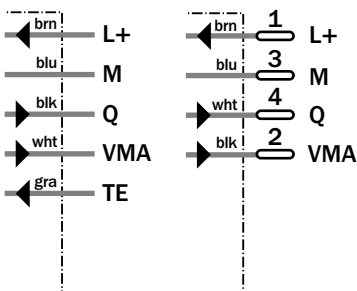
- Centre of optical axis, receiver
- Centre of optical axis, sender
- Plug 4-pin, M 8 or connection cable
- Sensitivity adjustment
- Light/dark rotary switch:  
L = light-switching  
D = dark-switching
- Red LED signal strength indicator
- Green LED signal strength indicator

#### Connection types

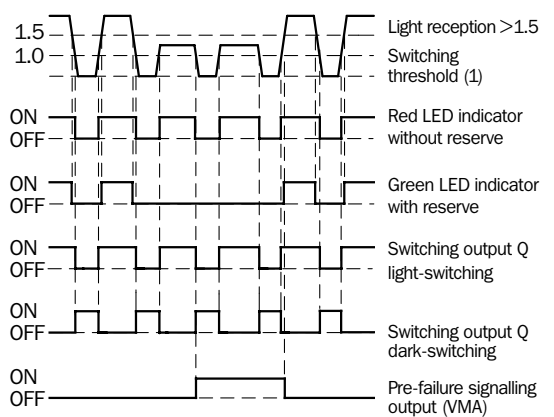
WT 160-P112	WT 160-P410
WT 160-N112	WT 160-N410
WT 160-P122	WT 160-P420
WT 160-N122	WT 160-N420


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

4-pin, M8



#### Operating diagram



Accessories	page
Cable receptacles	496
Mounting brackets*	510

\* included with delivery

Technical data		WT 160-	P 112	P 410	N 112	N 410	P 122	P 420	N 122	N 420		
Housing design	Horizontal											
	Vertical											
Scanning distance, max. typical	3... 60 mm <sup>4)</sup>											
Operating distance	8... 50 mm <sup>4)</sup>											
Background blanking	From approx. 100 mm (background 90 % remission) <sup>2)</sup>											
Adjustable sensitivity	Potentiometer, 2 turns with scaling 270°											
Light source <sup>3)</sup> , light type	LED, red light											
Light spot diameter	Approx. 3 mm at 25 mm											
Angle of dispersion, sender	Focused, focus 25 mm											
Supply voltage $V_S$	10...30 V DC <sup>4)</sup>											
Ripple <sup>5)</sup>	± 10 %											
Current consumption <sup>6)</sup>	≤ 30 mA											
Switching outputs	PNP, open collector: Q											
	NPN, open collector: Q											
Output current $I_A$ max.	100 mA											
Light receiver, switching type	Light /dark-switching via rotary switch											
Response time <sup>7)</sup> /max. switching freq. <sup>8)</sup>	≤ 0.9 ms / 550/s											
Pre-failure signalling output (VMA)	100 mA, static											
Test input "TE" <sup>9)</sup>	Sender off; PNP: TE to +V											
	Sender off; NPN: TE to 0 V											
Connection types cable	PVC, 2 m <sup>10)</sup> ; 5 x 0.2 mm <sup>2</sup> , Ø 4.2 mm											
plug	4-pin, M8											
VDE protection class <sup>11)</sup>	□											
Circuit protection <sup>12)</sup>	A, B, C, D											
Enclosure rating	IP 67											
Ambient temperature $T_A$	Operation - 25 °C...+ 55 °C											
	Storage - 40 °C...+ 70 °C											
Weight with cable	Approx. 60 g											
with plug	Approx. 20 g											
Housing material	Housing: ABS; optics: PC											

1) Scanned material with 90 % remission  
(based on standard white according to  
DIN 5033)

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

3) Background 90 % remission

4) Limit values

5) May not exceed or fall short of  
 $V_S$  tolerances

6) Without load

7) Signal transit time with resistive load

8) With light/dark ratio 1:1

9) TE not with plug model

10) Do not bend below 0 °C

11) Reference voltage 50 V DC

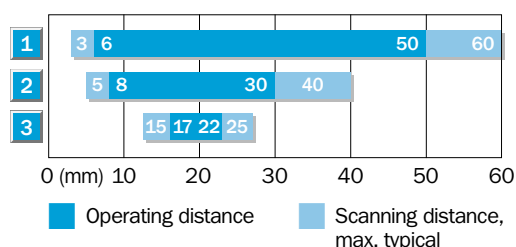
12) A =  $V_S$  connections reverse-polarity  
protected

B = Inputs and outputs reverse-  
polarity protected

C = Interference pulse suppression

D = Outputs overload and short-  
circuit protected

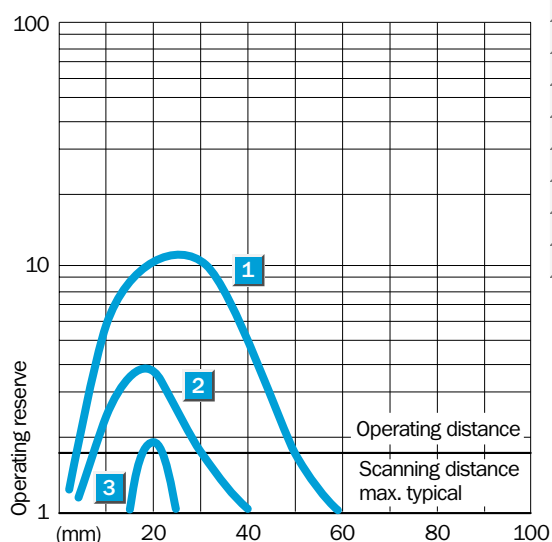
### Scanning distance



1) Scanning range on white, 90 % remission

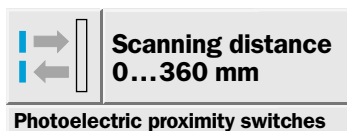
2) Scanning range on gray, 18 % remission

3) Scanning range on black, 6 % remission



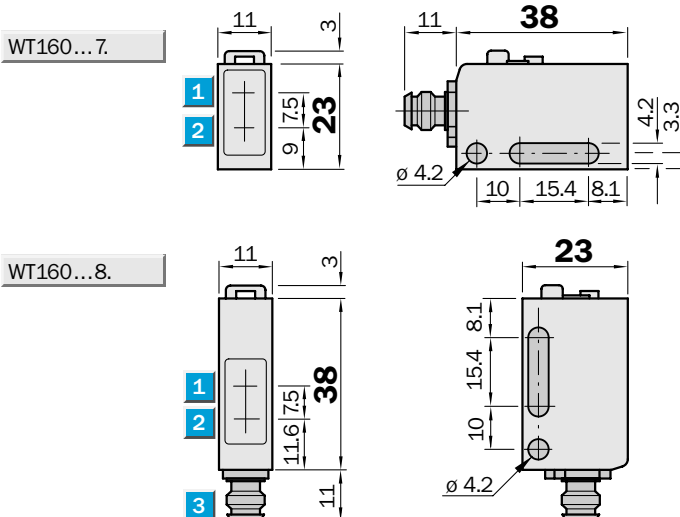
### Order information

Type	Part no.
WT 160-P112	6 009 511
WT 160-P410	6 009 519
WT 160-N112	6 008 819
WT 160-N410	6 008 827
WT 160-P122	6 009 512
WT 160-P420	6 009 520
WT 160-N122	6 008 820
WT 160-N420	6 008 828



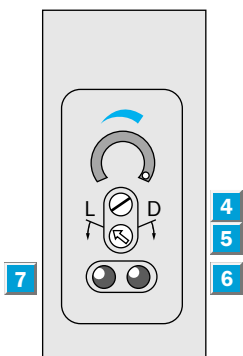
- Horizontal and vertical models
- Energetic scanner for standard applications
- Contamination control with green LED indicator and pre-failure signalling output
- Test input for device and system testing

#### Dimensional drawing



#### Adjustments possible

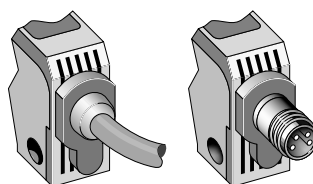
All types



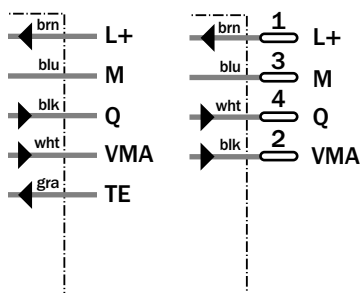
- Centre of optical axis, receiver
- Centre of optical axis, sender
- Plug 4-pin, M8 or connection cable
- Sensitivity adjustment
- Light/dark rotary switch:  
L = light-switching  
D = dark-switching
- Red LED signal strength indicator
- Green LED signal strength indicator

#### Connection types

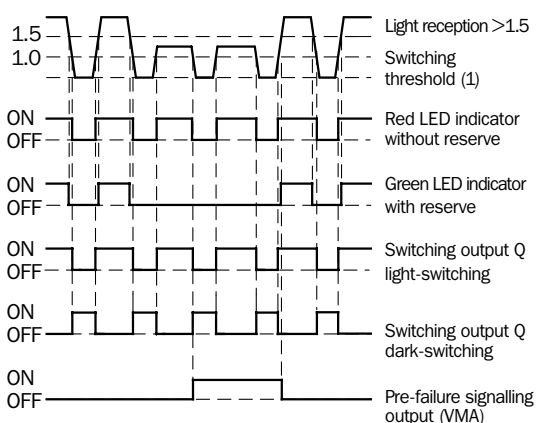
WT 160-P172	WT 160-P470
WT 160-N172	WT 160-N470
WT 160-P182	WT 160-P480
WT 160-N182	WT 160-N480


5x0.2 mm<sup>2</sup>

4-pin, M8



#### Operating diagram



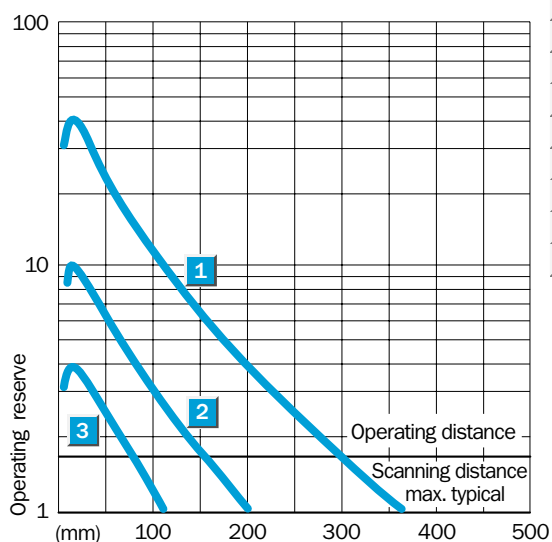
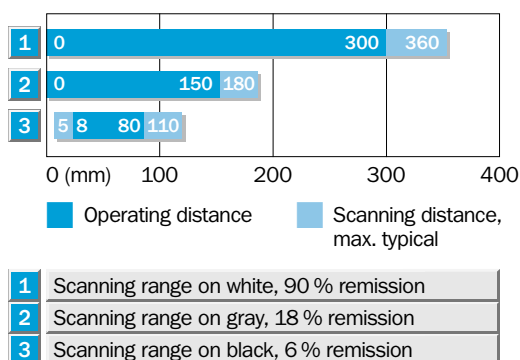
Accessories	page
Cable receptacles	496
Mounting brackets*	510

\* included with delivery

Technical data		WT 160 -	P172	P470	N172	N470	P182	P480	N182	N480		
Housing design	Horizontal											
	Vertical											
Scanning distance, max. typical	0 ... 360 mm <sup>1)</sup>											
Operating distance	0 ... 300 mm <sup>1)</sup>											
Adjustable sensitivity	Potentiometer, 2 turns with scaling 270°											
Light source <sup>2)</sup> , light type		LED, red light										
Light spot diameter	Approx. 25 mm at 300 mm											
Angle of dispersion, sender	Approx. 4.8°											
Supply voltage $V_S$		10 ... 30 V DC <sup>3)</sup>										
Ripple <sup>4)</sup>	± 10 %											
Current consumption <sup>5)</sup>	≤ 30 mA											
Switching outputs		PNP, open collector: Q										
		NPN, open collector: Q										
Output current $I_A$ max.	100 mA											
Light receiver, switching type	Light/dark-switching via rotary switch											
Response time <sup>6)</sup> /Max. switching freq. <sup>7)</sup>	≤ 0.9 ms / 550/s											
Pre-failure signalling output (VMA)	100 mA, static											
Test input "TE" <sup>8)</sup>		Sender off; PNP: TE to +V										
		Sender off; NPN: TE to 0 V										
Connection types	cable	PVC, 2 m <sup>9)</sup> ; 5 x 0.2 mm <sup>2</sup> , Ø 4.2 mm										
	plug	4-pin, M8										
VDE protection class <sup>10)</sup>		□										
Circuit protection <sup>11)</sup>		A, B, C, D										
Enclosure rating		IP 67										
Ambient temperature $T_A$		Operation - 25 °C...+ 55 °C										
		Storage - 40 °C...+ 70 °C										
Weight	with cable	Approx. 60 g										
	with plug	Approx. 20 g										
Housing material		Housing: ABS; optics: PC										

1) Scanned material with 90 % remission (based on standard white according to DIN 5033)  
 2) Average service life 100,000 h at  $T_A = + 25 °C$   
 3) Limit values  
 4) May not exceed or fall short of  $V_S$  tolerances  
 5) Without load  
 6) Signal transit time with resistive load  
 7) With light/dark ratio 1:1  
 8) TE not with plug model  
 9) Do not bend below 0 °C  
 10) Reference voltage 50 V DC  
 11) A =  $V_S$  connections reverse-polarity protected  
 B = Inputs and outputs reverse-polarity protected  
 C = Interference pulse suppression  
 D = Outputs overload and short-circuit protected

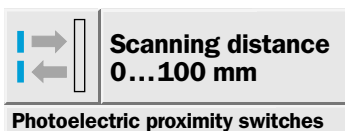
## Scanning distance



## Order information

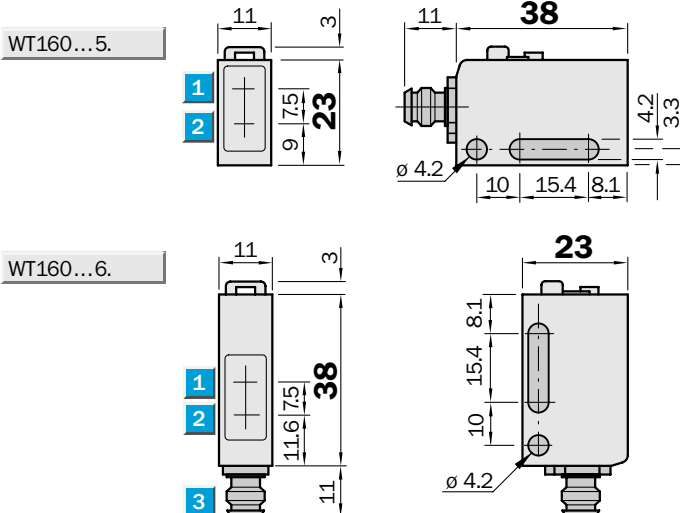
Type	Part no.
WT 160-P172	6 009 517
WT 160-P470	6 009 525
WT 160-N172	6 008 825
WT 160-N470	6 008 833
WT 160-P182	6 009 518
WT 160-P480	6 009 526
WT 160-N182	6 008 826
WT 160-N480	6 008 834





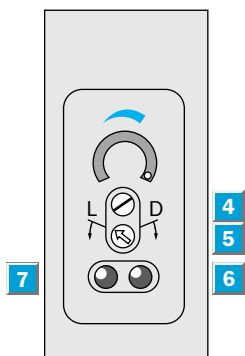
- Horizontal and vertical models
- Scanner with large aperture angle for greater tolerances of target position
- Contamination control with green LED indicator and pre-failure signalling output
- Test input for device and system testing

#### Dimensional drawing



#### Adjustments possible

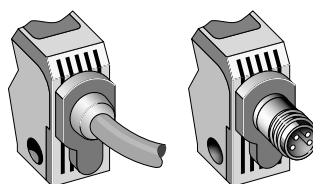
All types



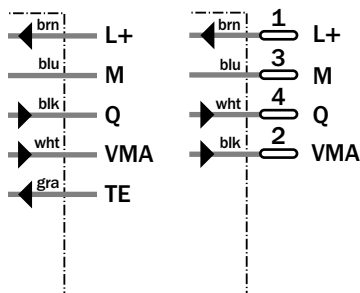
- Centre of optical axis, receiver
- Centre of optical axis, sender
- Plug 4-pin, M 8 or connection cable
- Sensitivity adjustment
- Light/dark rotary switch:  
L = light-switching  
D = dark-switching
- Red LED signal strength indicator
- Green LED signal strength indicator

#### Connection type

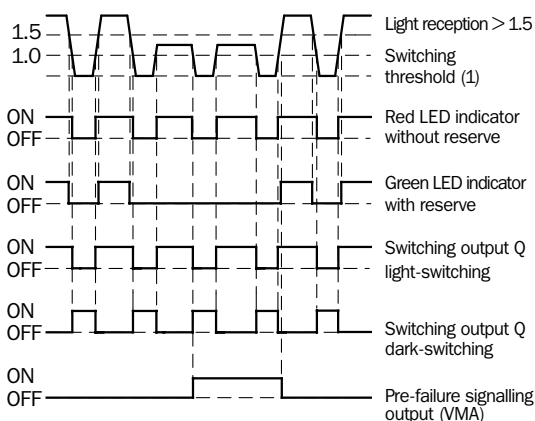
WT 160-P152	WT 160-P450
WT 160-N152	WT 160-N450
WT 160-P162	WT 160-P460
WT 160-N162	WT 160-N460


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

4-pin, M8



#### Operating diagram



Accessories	page
Cable receptacles	496
Mounting brackets*	510

\* included with delivery

Technical data		WT 160 -	P 152	P 450	N 152	N 450	P 162	P 460	N 162	N 460		
Housing design	Horizontal											
	Vertical											
Scanning distance, max. typical	0 ... 100 mm <sup>1)2)</sup>											
Operating distance	0 ... 80 mm <sup>1)2)</sup>											
Adjustable sensitivity	Potentiometer, 2 turns with scaling 270°											
Light source <sup>3)</sup> , light type		LED, infrared light										
Light spot diameter	Approx. 60 mm at 80 mm											
Angle of dispersion, sender	Approx. 40°											
Supply voltage $V_S$		10 ... 30 V DC <sup>4)</sup>										
Ripple <sup>5)</sup>	± 10 %											
Current consumption <sup>6)</sup>	≤ 30 mA											
Switching outputs		PNP, open collector: Q										
		NPN, open collector: Q										
Output current $I_A$ max.	100 mA											
Light receiver, switching type	Light/dark-switching via rotary switch											
Response time <sup>7)/</sup> max. switching freq. <sup>8)</sup>	≤ 0.9 ms/550/s											
Pre-failure signalling output (VMA)	100 mA, static											
Test input "TE" <sup>9)</sup>		Sender off; PNP: TE to +V										
		Sender off; NPN: TE to 0 V										
Connection type	cable	PVC, 2 m <sup>10)</sup> ; 5 x 0.2 mm <sup>2</sup> , Ø 4.2 mm										
	plug	4-pin, M8										
VDE protection class <sup>11)</sup>		□										
Circuit protection <sup>12)</sup>		A, B, C, D										
Enclosure rating		IP 67										
Ambient temperature $T_A$		Operation - 25 °C ... + 55 °C										
		Stockage - 40 °C ... + 70 °C										
Weight	with cable	Approx. 60 g										
	with plug	Approx. 20 g										
Housing material		Housing: ABS; optics: PCC										

1) Scanned material with 90 % remission (based on standard white according to DIN 5033)

2) Object size 30 x 30 mm

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

4) Limit values

5) May not exceed or fall short of  $V_S$  tolerances

6) Without load

7) Signal transit time with resistive load

8) With light/dark ratio 1:1

9) TE not with plug model

10) Do not bend below 0 °C

11) Reference voltage 50 V DC

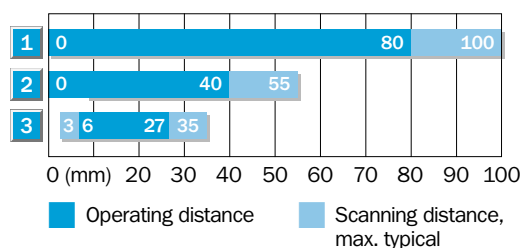
12) A =  $V_S$  connections reverse-polarity protected

B = Inputs and outputs reverse-polarity protected

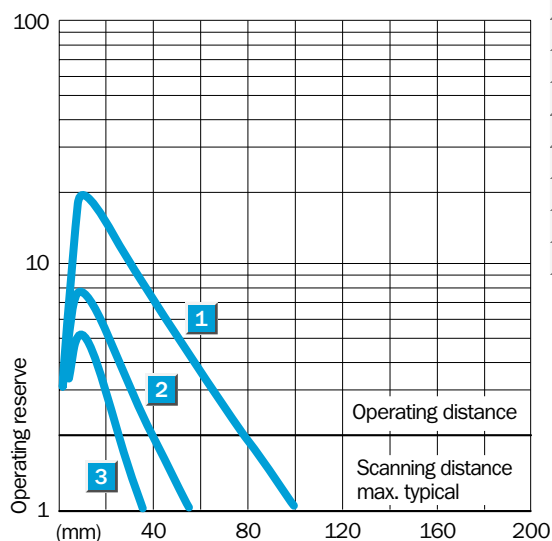
C = Interference pulse suppression

D = Outputs overload and short-circuit protected

### Scanning distance



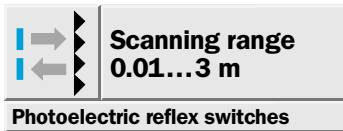
1	Scanning range on white, 90 % remission
2	Scanning range on gray, 18 % remission
3	Scanning range on black, 6 % remission



### Order information

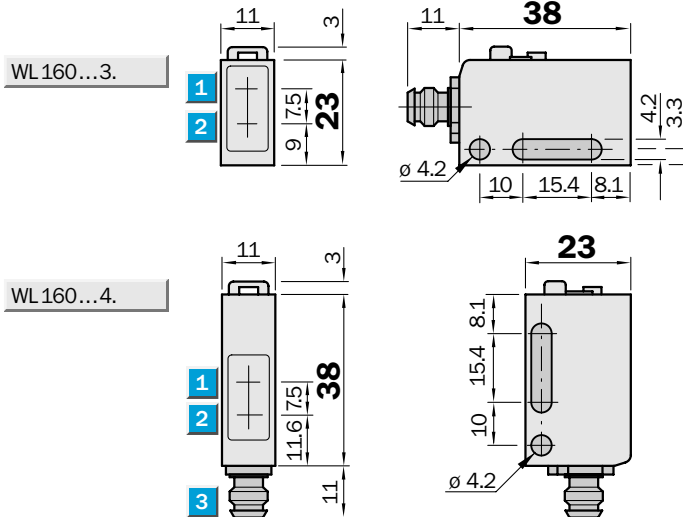
Type	Part no.
WT 160-P 152	6 009 515
WT 160-P 450	6 009 523
WT 160-N 152	6 008 823
WT 160-N 450	6 008 831
WT 160-P 162	6 009 516
WT 160-P 460	6 009 524
WT 160-N 162	6 008 824
WT 160-N 460	6 008 832





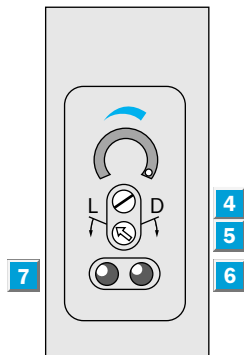
- Horizontal and vertical models
- Polarisation filter for detection of object with reflective surfaces
- Contamination control with green LED indicator and pre-failure signalling output
- Test input for device and system testing

## Dimensional drawing



## Adjustments possible

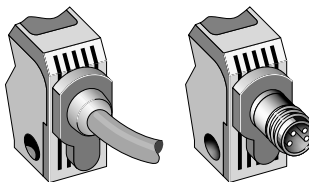
All types



- 1 Centre of optical axis, receiver
- 2 Centre of optical axis, sender
- 3 Plug 4-pin, M 8 or connection cable
- 4 Sensitivity adjustment
- 5 Light/dark rotary switch:  
L = light-switching  
D = dark-switching
- 6 Red LED signal strength indicator
- 7 Green LED signal strength indicator

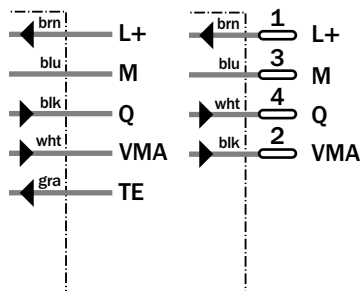
## Connection types

WL 160-P132	WL 160-P430
WL 160-N132	WL 160-N430
WL 160-P142	WL 160-P440
WL 160-N142	WL 160-N440

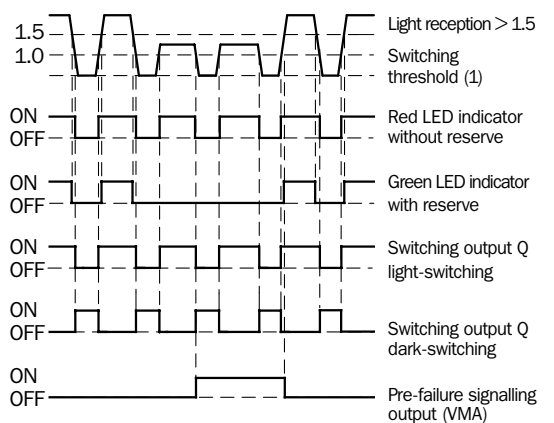


5 x 0.2 mm<sup>2</sup>

4-pin, M8



## Operating diagram



Accessories	page
Cable receptacles	496
Mounting brackets*	510
Reflectors**	520

\* included with delivery

\*\* Reflector P 250 included with delivery

Technical data		WL 160-	P 132	P 430	N 132	N 430	P 142	P 440	N 142	N 440		
Housing design	Horizontal											
	Vertical											
Scanning range, max. typical/on refl.	0.01...3 m/PL80 A											
	max. typical/on refl. 0.005...2.4 m/P250 (included)											
Operating range	0.01...2.0 m/P250											
Adjustable sensitivity	Potentiometer, 2 turns with scaling 270°											
Light source <sup>1)</sup> , light type	LED, red light with polarising filter											
Light spot diameter	Approx. 150 mm at 2.0 m											
Angle of dispersion, sender	Approx. 4.5°											
Supply voltage $V_S$	10...30 V DC <sup>2)</sup>											
Ripple <sup>3)</sup>	± 10 %											
Current consumption <sup>4)</sup>	≤ 30 mA											
Switching outputs	PNP, open collector: Q											
	NPN, open collector: Q											
Output current $I_A$ max.	100 mA											
Light receiver, switching type	Light/dark-switching via rotary switch											
Response time <sup>5)</sup> /max. switching freq. <sup>6)</sup>	≤ 0.9 ms / 550/s											
Pre-failure signalling output (VMA)	100 mA, static											
Test input "TE" <sup>7)</sup>	Sender off; PNP: TE to +V											
	Sender off; NPN: TE to 0 V											
Connection types cable	PVC, 2 m <sup>8)</sup> ; 5 x 0.2 mm <sup>2</sup> , Ø 4.2 mm											
	plug											
VDE protection class <sup>9)</sup>	□											
Circuit protection <sup>10)</sup>	A, B, C, D											
Enclosure rating	IP 67											
Ambient temperature $T_A$	Operation - 25 °C...+ 55 °C											
	Storage - 40 °C...+ 70 °C											
Weight	with cable											
	with plug											
Housing material	Housing: ABS; optics: PMMA											

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

2) Limit values

3) May not exceed or fall short of  $V_S$  tolerances

4) Without load

5) Signal transit time with resistive load

6) With light/dark ratio 1:1

7) TE not with plug model

8) Do not bend below 0 °C

9) Reference voltage 50 V DC

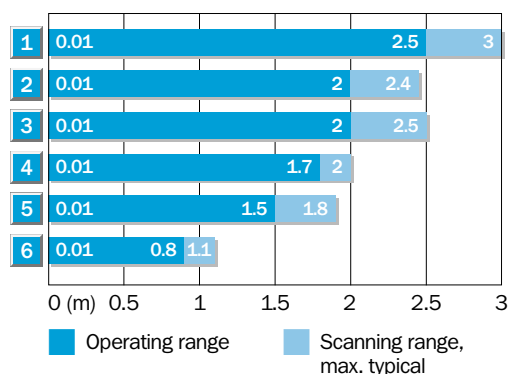
10) A =  $V_S$  connections reverse-polarity protected

B = Inputs and outputs reverse-polarity protected

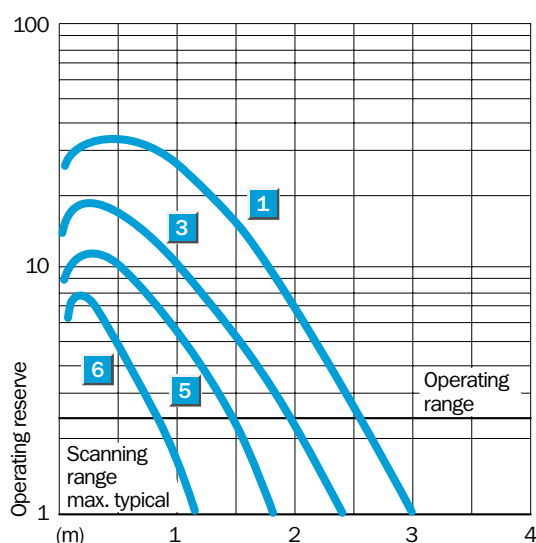
C = Interference pulse suppression

D = Outputs overload and short-circuit protected

### Scanning range and operating reserve



Reflector type	Operating range
1 PL 80 A	0.01...2.5 m
2 P 250	0.01...2.0 m
3 PL 50 A/PL 40 A	0.01...2.0 m
4 PL 30 A/PL 31 A	0.01...1.7 m
5 PL 20 A	0.01...1.5 m
6 Reflective tape	0.01...0.8 m
Diamond Grade	



### Order information

Type	Part no.
WL 160-P132	6 008 813
WL 160-P430	6 008 815
WL 160-N132	6 008 807
WL 160-N430	6 008 809
WL 160-P142	6 008 814
WL 160-P440	6 008 816
WL 160-N142	6 008 808
WL 160-N440	6 008 810



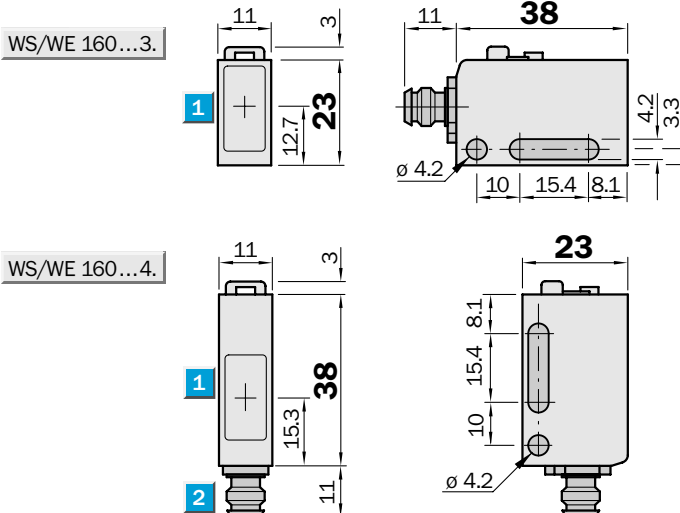
**Scanning range**  
8.5 m

Through-beam photoelectric switches

- Horizontal and vertical models
- Slotted masks for increasing switching frequency
- Contamination control with green LED indicator and pre-failure signalling output
- Test input for device and system testing

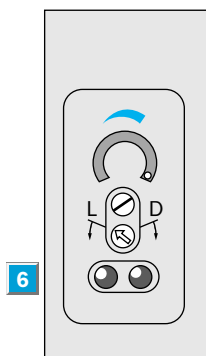


### Dimensional drawing



### Adjustments possible

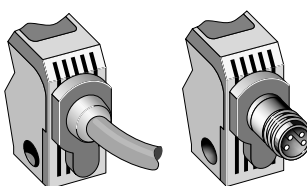
All types



- 1 Centre of optical axis sender/receiver
- 2 Plug 4-pin, M 8 or connection cable
- 3 Light/dark rotary switch:  
L = light-switching  
D = dark-switching
- 4 Sensitivity adjustment
- 5 Indicator, red (sender WS active)
- 6 Green LED signal strength indicator (receiver WE)

### Connection types

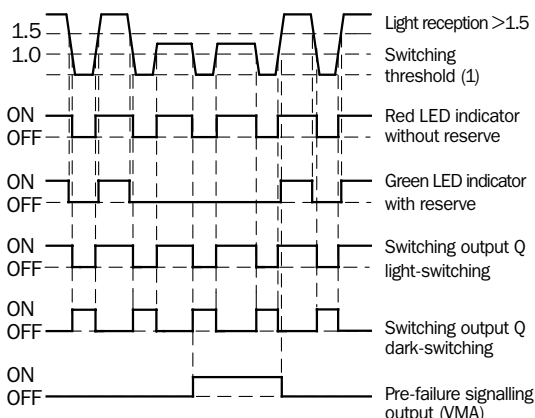
WS/WE160-P132	WS/WE160-P430
WS/WE160-N132	WS/WE160-N430
WS/WE160-P142	WS/WE160-P440
WS/WE160-N142	WS/WE160-N440



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

4-pin, M 8

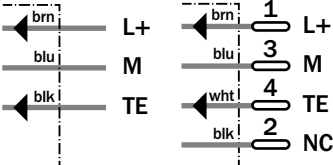
### Operating diagram



Accessories	page
Cable receptacles	496
Mounting brackets*	510
Slotted mask	556

\* included with delivery

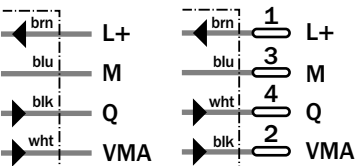
Sender



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

4-pin, M 8

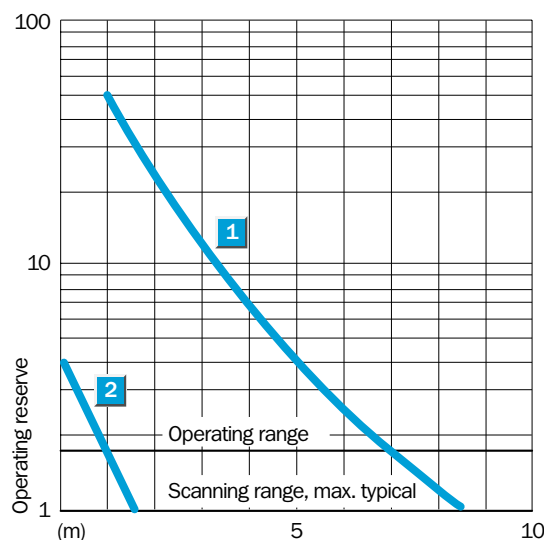
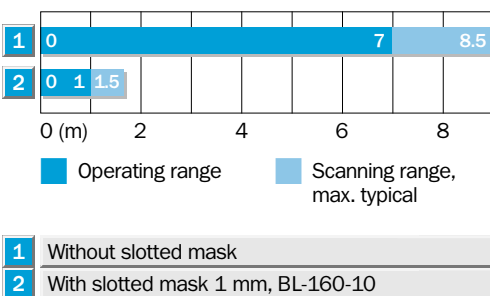
Receiver



Technical data		WS/WE160-	P132	P430	N132	N430	P142	P440	N142	N440		
Housing design	Horizontal											
	Vertical											
Scanning range, max. typical	0...8.5 m											
Operating range	0...7 m											
Operating range with filter, width 1.0 m	0...1 m											
Adjustable sensitivity	Potentiometer, 2 turns with scaling 270°											
Light source <sup>1)</sup> , light type	LED, infrared light											
Light spot diameter	Approx. 400 mm at 7 m											
Angle of dispersion, sender	Approx. 3.3°											
Angle of dispersion, receiver	Approx. 15°											
Supply voltage $V_S$	10...30 V DC <sup>2)</sup>											
Ripple <sup>3)</sup>	± 10 %											
Current consumption <sup>4)</sup>	sender	≤ 20 mA										
	receiver	≤ 30 mA										
Switching outputs	PNP, open collector: Q											
	NPN, open collector: Q											
Output current $I_A$ max.	100 mA											
Light receiver, switching type	Light-/dark-switching via rotary switch											
Response time <sup>5)</sup> /max. switching freq. <sup>6)</sup>	≤ 1.5 ms / 300/s											
Pre-failure signalling output (VMA)	100 mA, static											
Test input "TE" <sup>7)</sup>	Sender off: TE to 0 V											
Connection types	cable	PVC, 2 m <sup>8)</sup>										
	sender WS	3 x 0.2 mm <sup>2</sup> , Ø 4.2 mm										
	receiver WE	4 x 0.2 mm <sup>2</sup> , Ø 4.2 mm										
	plug	4-pin, M8										
VDE protection class <sup>9)</sup>	□											
Circuit protection <sup>10)</sup>												
	sender WS	A, B										
	receiver WS	A, B, C, D										
Enclosure rating	IP 67											
Ambient temperature $T_A$	Operation	-25 °C...+55 °C										
	Storage	-40 °C...+70 °C										
Weight	with cable	Sender/receiver each approx. 60 g										
	with plug	Sender/receiver each approx. 20 g										
Housing material	Housing: ABS; optics: PC											



1) Average service life 100,000 h at  $T_A = +25 °C$   
 2) Limit values  
 3) May not exceed or fall short of  $V_S$  tolerances  
 4) Without load  
 5) Signal transit time with resistive load  
 6) With light/dark ratio 1:1  
 7) TE not with plug model  
 8) Do not bend below 0 °C  
 9) Reference voltage 50 V DC  
 10) A =  $V_S$  connections reverse-polarity protected  
 B = Inputs and outputs reverse-polarity protected  
 C = Interference pulse suppression  
 D = Outputs overload and short-circuit protected  
 11) Part no. includes transmitter and receiver

## Scanning range and operating reserve



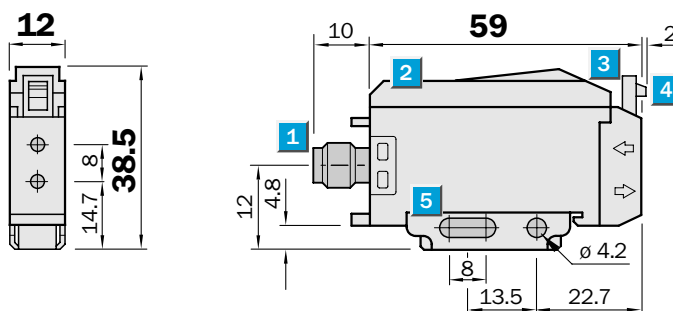
## Order information

Type	Part no. <sup>11)</sup>
WS/WE160-P132	6 009 555
WS/WE160-P430	6 009 557
WS/WE160-N132	6 009 549
WS/WE160-N430	6 009 551
WS/WE160-P142	6 009 556
WS/WE160-P440	6 009 558
WS/WE160-N142	6 009 550
WS/WE160-N440	6 009 552

	<b>Scanning range</b> max. 2 m
<b>Through-beam systems</b>	
	<b>Scanning distance</b> max. 70 mm
<b>Proximity systems</b>	

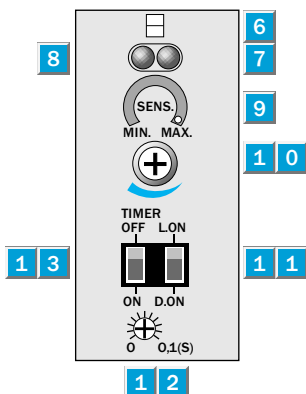
- Sensitivity adjustment with potentiometer, scaled
- Large selection of LL3 fibre-optic cables (accessories)
- Off-delay 0...100 ms
- Pre-failure signalling output and test input for device and system testing

#### Dimensional drawing



#### Adjustments possible

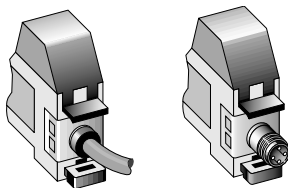
All types



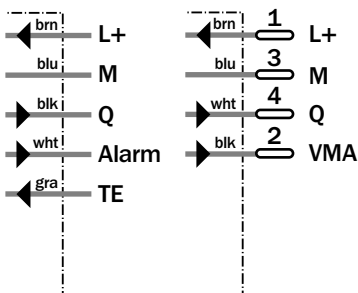
- 1 Plug 4-pin, M8 or connection cable
- 2 Protective hood
- 3 Fibre-optic cable lock (press down)
- 4 Fibre-optic cable release (press lug)
- 5 Mounting bracket, supplied with equipment
- 6 Indication of correct fibre-optic cable mounting
- 7 Red LED signal strength indicator (lights when switching threshold is exceeded)
- 8 Green LED signal strength indicator (lights when operating reserve is exceeded > 1.3)
- 9 Sensitivity scale
- 1 0 Sensitivity switch (4 turns)
- 1 1 Light-/dark-switching
- 1 2 OFF-delay 0...100 ms
- 1 3 Time delay on/off switch

#### Connection types

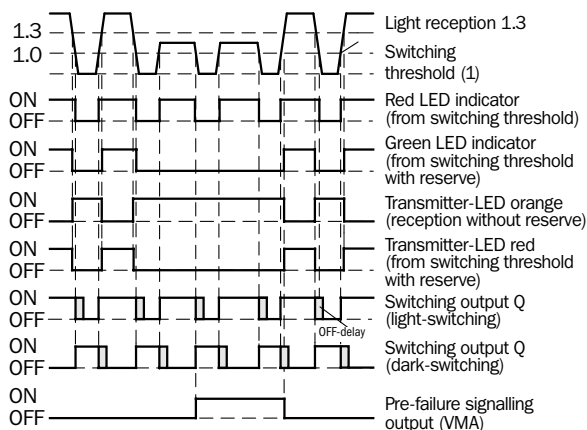
WLL 160-F 122	WLL 160-F 420
WLL 160-E 122	WLL 160-E 420


5x0.18 mm<sup>2</sup>

4-pin, M8



#### Operating diagram



Accessories	page
Cable receptacles	496
Mounting brackets*	510
LL 3 fibre-optic cables	528

\* included with delivery

Technical data		WLL 160-	F122	F420	E122	E420						
<b>Suitable fibre-optic cables</b>	LL 3 plastic fibre-optic cable series											
	(p. 528)											
<b>Scanning ranges</b>	Depend. on fibre-optic cable type used											
Scanning range, through-beam system	0...500 mm (with tip adapter 0...2 m)											
Scanning distance, scanner system	0...70 mm <sup>1)</sup>											
Adjustable sensitivity	Potentiometer, 4 turns with scaling 270°											
<b>Light source<sup>2)</sup>, light type</b>												
Light reception with operating reserve	LED, visible red light ("spot control")											
Light reception without operating reserve	LED, visible red-orange light ("spot control")											
Light spot diameter	Dependent on scanning range											
Opening angle of fibre-optic cables	Approx. 65°											
<b>Supply voltage V<sub>S</sub></b>												
10...30 V DC <sup>3)</sup>												
Ripple <sup>4)</sup>	± 10 %											
Current consumption <sup>5)</sup>	≤ 30 mA											
<b>Switching outputs</b>												
PNP, open collector: Q												
	NPN, open collector: Q											
Output current I <sub>A</sub> max.	100 mA											
Light receiver, switching type	Light-/dark-switching via slide switch											
Response time <sup>6)</sup> /max. switching freq. <sup>7)</sup>	≤ 0.35 ms / 1500/s											
Pre-failure signalling output (VMA)	100 mA, static											
<b>Test input "TE"<sup>8)</sup></b>												
Sender off; PNP: TE to +V												
	Sender off; NPN: TE to 0 V											
<b>Time delay T<sub>OFF</sub></b> (OFF-delay)	Selectable, per slide switch											
<b>Time range</b>	Adjust., 0...100 ms; potentiometer 270°											
<b>Connection types</b>	cable											
	PVC, 2m <sup>9)</sup> ; 5 x 0.2 mm <sup>2</sup> , Ø 4.2 mm											
plug	4-pin, M8											
<b>VDE protection class<sup>10)</sup></b>	□											
Circuit protection <sup>11)</sup>	A, B, C, D											
<b>Enclosure rating</b>	IP 66											
<b>Ambient temperature T<sub>A</sub></b>												
Operation	– 25 °C...+ 55 °C											
	Storage – 40 °C...+ 70 °C											
<b>Weight</b>	with cable											
	Approx. 80 g											
with plug	Approx. 30 g											
<b>Housing material</b>	ABS											

1) Scanned material with 90 % remission (based on standard white according to DIN 5033)

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

3) Limit values

4) May not exceed or fall short of V<sub>S</sub> tolerances

5) Without load

6) Signal transit time with resistive load

7) With light/dark ratio 1:1

8) TE not with plug model

9) Do not bend below 0 °C

10) Reference voltage 50 V DC

11) A = V<sub>S</sub> connections reverse-polarity protected

B = Inputs and outputs reverse-polarity protected



C = Interference pulse suppression

D = Outputs overload and short-circuit protected

#### Order information

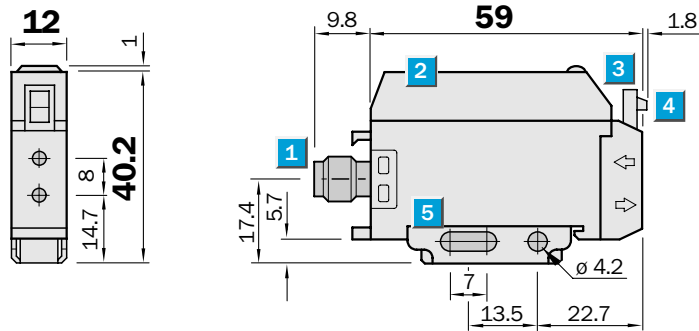
Type	Part no.
WLL 160-F122	6 009 989
WLL 160-E122	6 009 981
WLL 160-F420	6 009 990
WLL 160-E420	6 009 982



	<b>Scanning range</b> max. 2 m
<b>Through-beam systems</b>	
	<b>Scanning distance</b> max. 70 mm
<b>Proximity systems</b>	

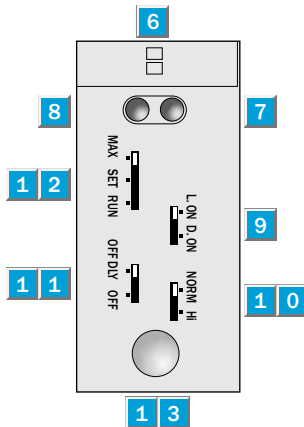
- Automatic setting of the switching threshold and hysteresis with teach-in via button or external control cable ET
- Large selection of LL 3 plastic fibre-optic cables (accessories)
- Switching frequency 830/s or 1660/s, switchable

Dimensional drawing



Adjustments possible

All types

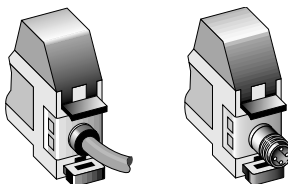


- 1 Plug 4-pin, M8 or connection cable
- 2 Protective hood
- 3 Fibre-optic cable lock (press down)
- 4 Fibre-optic cable release (press lug)
- 5 Mounting bracket, supplied with equipment
- 6 Indication of correct fibre-optic cable mounting
- 7 LED signal strength indicator, red (lights when switching threshold is exceeded)
- 8 LED signal strength indicator, green
- 9 Selector switch light- ("L.ON")/dark-switching ("D.ON")
- 10 Selector switch response time, NORM (600  $\mu$ s)/HI (300  $\mu$ s)
- 11 Selector switch OFF-delay On ("OFF DLY")/off ("OFF"); 40 ms fix
- 12 Operating mode selector switch "MAX/SET/RUN"
- 13 Teach-in button

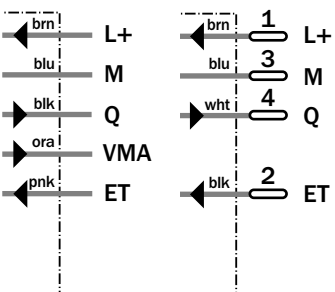


Connection types

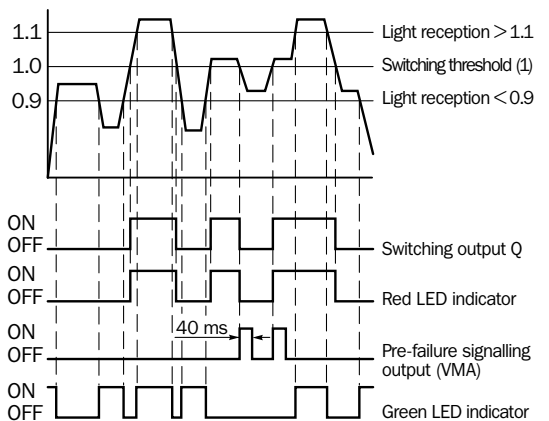
WLL 160T-F132	WLL 160T-F430
WLL 160T-E132	WLL 160T-E430


5x0.18 mm<sup>2</sup>

4-pin, M8



Operating diagram



Accessories	page
Cable receptacles	496
Mounting brackets*	510
LL 3 fibre-optic cables	528

\* included with delivery

Technical data		WLL 160T-	F132	F430	E132	E430						
<b>Suitable fibre-optic cables</b>	LL 3 plastic fibre-optic cable series (p. 528)											
<b>Scanning ranges</b>	Depend. on fibre-optic cable type used											
Scanning range, through-beam system	0...500 mm (with tip adapter 0...2 m)											
Scanning distance, scanner system	0...70 mm <sup>1)</sup>											
Adjustable sensitivity	Automatic, via TEACH-IN key or "MAX" mode											
Mode selector switch "MAX" position	Max. range, set permanently											
"SET" position	TEACH-IN key activated											
"RUN" position	TEACH-IN key inactive, equipment in sensor mode											
TEACH-IN manual	Via button (only active if mode switch is in "SET" position)											
external TEACH-IN	Only active, if mode switch is in "RUN" position											
	PNP: control wire + V											
	NPN: control wire 0 V											
<b>Light source<sup>2)</sup>, light type</b>	LED, visible red light											
Light spot diameter	Dependent on range											
Opening angle of fibre-optic cables	Approx. 65°											
<b>Supply voltage V<sub>S</sub></b>	10...24 V DC											
Ripple <sup>3)</sup>	≤ 5 V <sub>SS</sub>											
Current consumption <sup>4)</sup>	≤ 50 mA											
<b>Switching outputs</b>	PNP, open collector: Q											
	NPN, open collector: Q											
Output current I <sub>A</sub> max.	100 mA											
Light receiver, switching type	Light-/dark-switching via slide switch											
Response time <sup>5)</sup> /max. switching freq. <sup>6)</sup>	≤ 0.6 ms/830/s, selectable											
Dependent on selected operating mode:												
"Mode"-selector switch in pos. "MAX"												
or selector switch "Response time"												
in "NORM" position												
Selector "response time" in pos. "HI"	≤ 0.3 ms/1660/s <sup>7)</sup>											
Pre-failure signalling output (VMA)	30 mA, one shot, pulse length 40 ms											
<b>Time delay T<sub>OFF</sub></b> (switch-off delay)	40 ms fixed, selectable, per slide switch											
<b>Connection types</b> cable	PVC, 2 m <sup>8)</sup> ; 5 x 0.18 mm <sup>2</sup> , Ø 4.0 mm											
plug	4-pin, M8											
<b>VDE protection class<sup>9)</sup></b>	□											
Circuit protection <sup>10)</sup>	A, B, C, D											
<b>Enclosure rating</b>	IP 66											
<b>Ambient temperature T<sub>A</sub></b>	Operation - 25 °C...+ 55 °C											
	Storage - 40 °C...+ 70 °C											
<b>Weight</b> with cable	Approx. 80 g											
with plug	Approx. 30 g											
<b>Housing material</b>	Housing: ABS											

1) Scanned material with 90 % remission  
(based on standard white according to  
DIN 5033)

2) Average service life 100.000 h  
at T<sub>A</sub> = + 25 °C

3) May not exceed or fall short  
of V<sub>S</sub> tolerances

4) Without load

5) Signal transit period with resistive load

6) With light/dark ratio 1:1

7) Scanning distance reduction  
approx. 30 %

8) Do not bend below 0 °C

9) Reference voltage 50 V DC

10) A = V<sub>S</sub> connections reverse-polarity  
protected

B = Inputs and outputs reverse-  
polarity protected

C = Interference pulse suppression

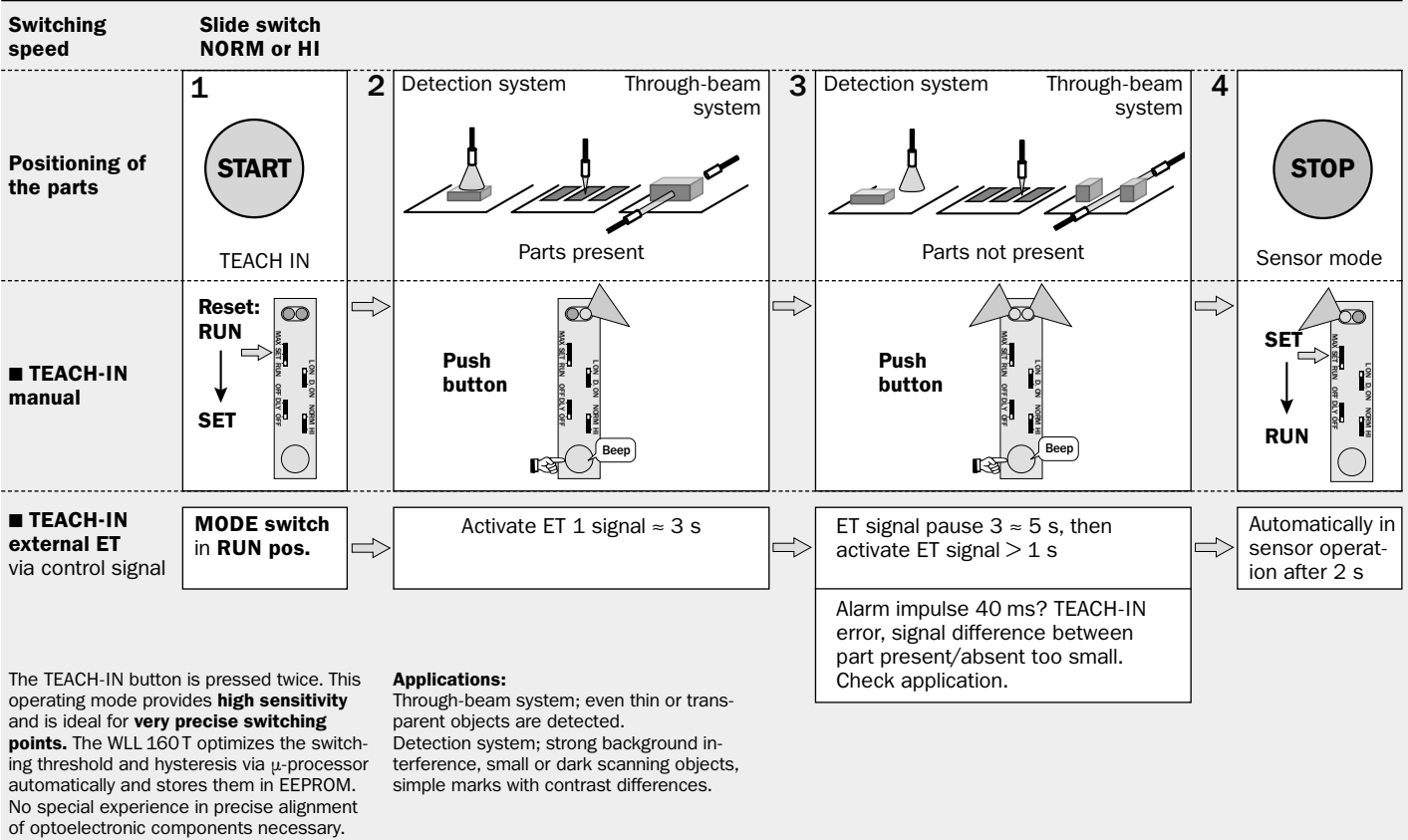
D = Outputs overload and short-circuit  
protected

#### Order information

Type	Part no.
WLL 160T-F132	6 010 650
WLL 160T-F430	6 010 651
WLL 160T-E132	6 010 648
WLL 160T-E430	6 010 649

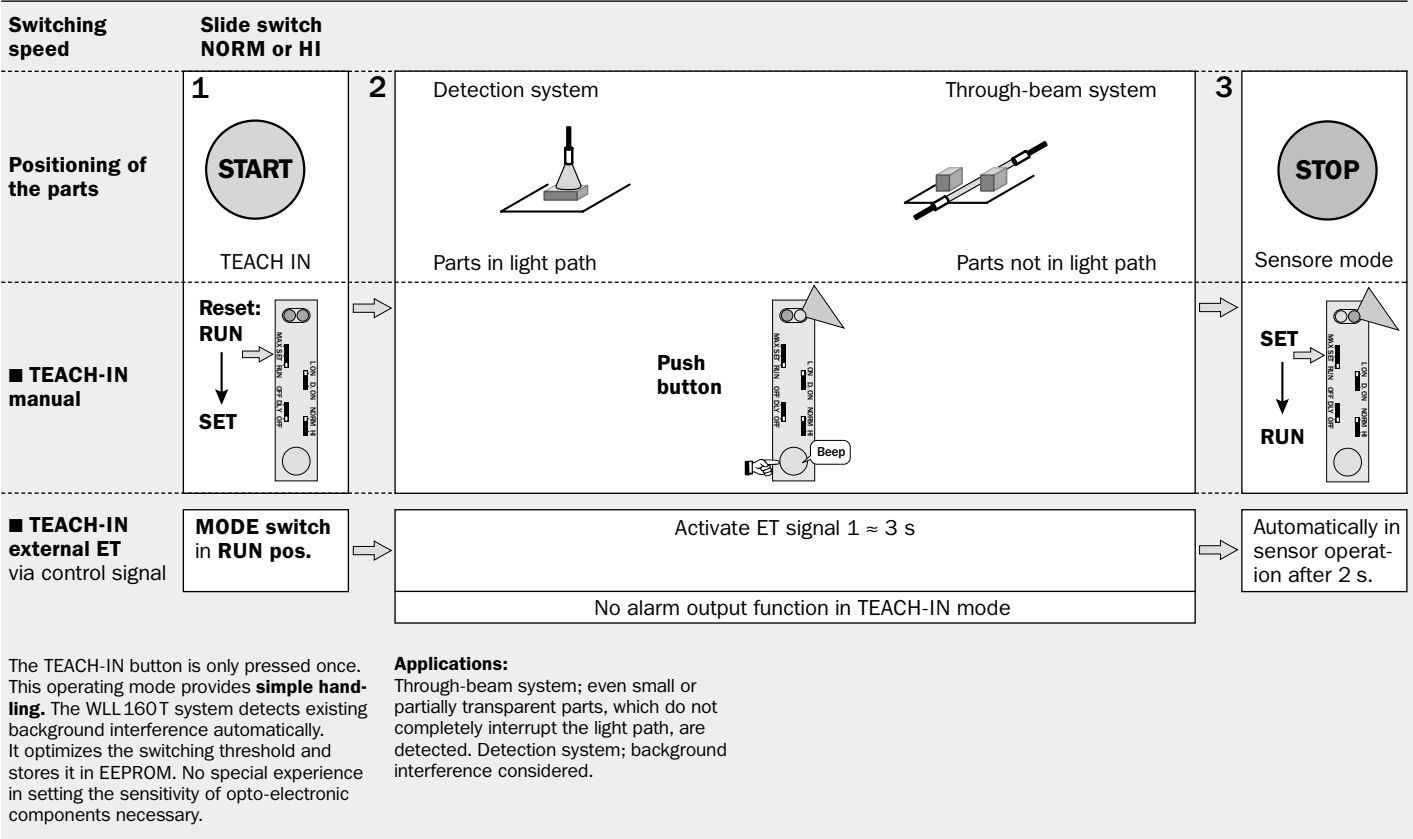
# 1. Precise sensitivity setting (via 2x push of button); WLL 160T

## TEACH-IN steps

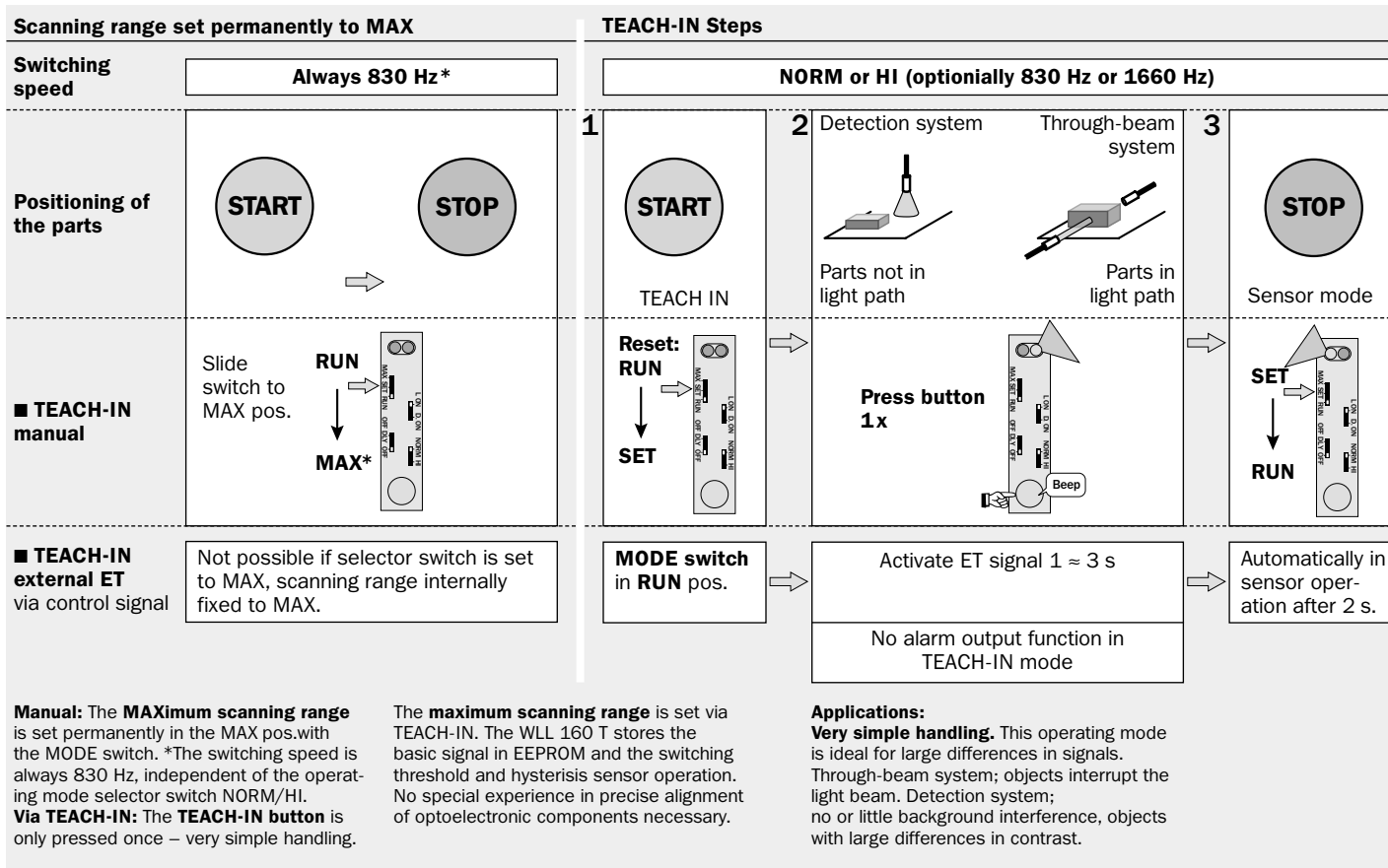


# 2. Simple sensitivity setting (via 1x push of button); WLL 160T

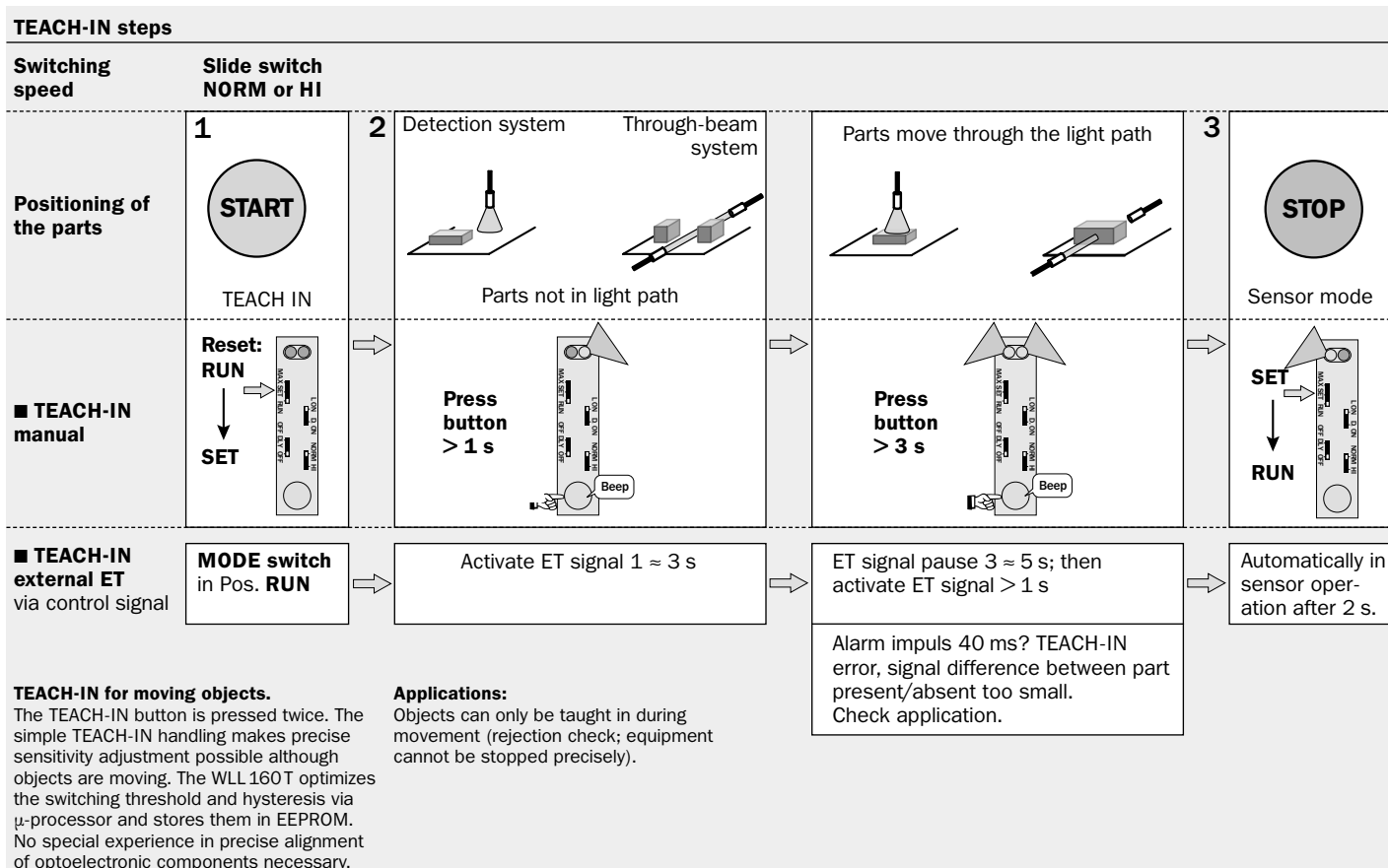
## TEACH-IN steps



## 3. Max. scanning range, fixed setting; WLL 160 T



## 4. Moving objects; precise sensitivity adjustment (via 2x push of button); WLL 160T



## WLL 160 T TEACH-IN functions

### Response time/switching speed

**NORM:** 830 Hz; max. system scanning distance.

**HI:** 1660 Hz, system scanning distance 70 %. Select before TEACH-IN!

### Off-delay $T_{OFF}$

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

### Selector switch switching output Q

L.ON: light-switching

D.ON: dark-switching optionally in PNP or NPN.

### Connection technique

Optionally M 8 plug, 4-pin (no alarm output) or 5-wire connecting cable.

### Alarm output

■ **TEACH-IN mode:** signals TEACH-IN error.

■ **Sensor mode (RUN):** signals insufficient signal reserve, e.g., due to contamination or misalignment (not with plug version M 8 – 4-pin).

### WLL 160 T Assembly technology

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

### Mounting technique

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

### µ-processor technique with EEPROM

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

### TEACH-IN button

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

### TEACH-IN mode selector switch

Separate from operating mode functions, and consequently simple and comprehensible handling; no dual functions.

■ **MAX:** Maximum scanning range set permanently. Caution: switching speed independent of operating mode selection; switching speed always 830 Hz.

■ **SET:** WLL 160 T in manual TEACH-IN mode. Optimum switching point setting at the simple push of a button (1 or 2 times).

■ **RUN:** optionally

– **TEACH-IN manual:** The taught-in switching threshold and hysteresis are stored in EEPROM.

The WLL 160 T operates in sensor mode after 2 s.

– **External TEACH-IN (ET):**

Optimum system adjustment using external control signal. Ideal if the WLL 160 T is not accessible or part changes are often aligned automatically.

### Fibre-optic cable lock

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

### Fibre-optic cable attachment

➔ Transmitter fibre-optic cable

➔ Receiver fibre-optic cable

Suitable fibre-optic cable: **plastic fibre-optic cables of the LL 3 series** (see the description of the LL 3 variants).

### BUZZER

For acoustic support. Short tone after TEACH-IN = O.K.

Long tone after TEACH-IN = error or application not suitable.

### LED display red, green

■ **TEACH-IN mode:**

**Signalization** TEACH-IN process.

Permanently blinking: TEACH-IN error.

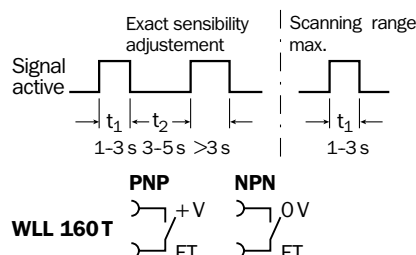
Permanently lit: TEACH-IN o.K.

■ **Sensor operation:**

LED red: switching threshold exceeded

LED green: received signal  $> 1.1$  or  $< 0.9$

External TEACH-IN signal ET



SICK