






# W 24 Exi: Safe and reliable switching in Ex-areas (gas)


	<b>Photoelectric proximity switches, BGS</b>
	<b>Photoelectric reflex switches</b>
	<b>Through-beam photoelectric switches</b>



	<b>Photoelectric switches with fibre-optic cable</b>
	<b>Photoelectric switches with fibre-optic cable</b>

The device variants used depend on the specific application:

- the WT 24 Exi photoelectric proximity switch with an adjustable scanning distance of 100 to 2,000 mm and background suppression,
- the WL 24 Exi photoelectric reflex switch which reliably detects objects located up to 8 metres away,
- the WS/WE 24 Exi through-beam photoelectric switch with a scanning range of 30 metres, and
- the WLL 24 Exi fibre-optic cable version which, depending on the type of optical head, can be used in both through-beam and proximity mode whereby the maximum distance to the object is 100 mm and 25 mm respectively.

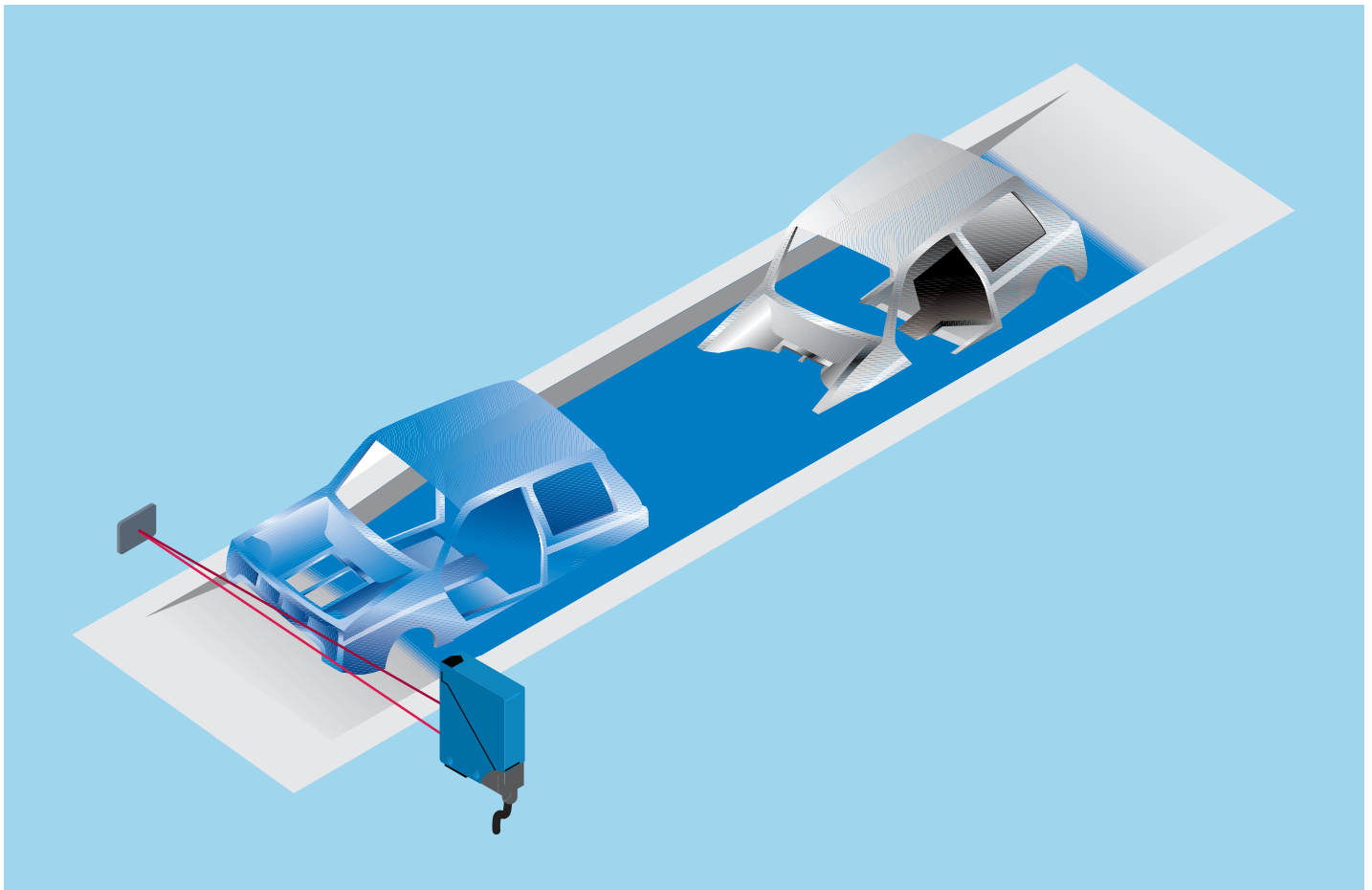
The W 24 X Series has been developed for applications in explosive areas, in order to provide intrinsic safety according to EN 50014 and EN 50020, and approved by the “Physikalisch-Technische Bundesanstalt (PTB)” in Braunschweig, Germany. The switching outputs of the devices are designed according to EN 60947-5-6 (NAMUR). Therefore, the W 24 X Series labelled  2G EEx ia IIC T4 complies with the requirements of Category 2G according to the new Directive 94/9/EC (ATEX). The W 24 X Series devices may be used in the explosive areas “Zone 1 (gas)” and “Zone 2 (gas)”.


The sturdy zinc die-cast housings with enclosure rating IP 67 (IP 65 with WLL 24 Exi), the cable glands and plugs that can be rotated towards the bottom and rear of the sensor, and very good insensitivity to ambient light make all of these devices ideally suited for use in industrial environments.


► Ex-Zone 1:  
Automatic palletisation/  
depalletisation of gas  
cylinders.



▼ Ex-Zone 1:  
Body panel detection with photoelectric  
reflex switches during fully automatic  
pretreatment of body shells.

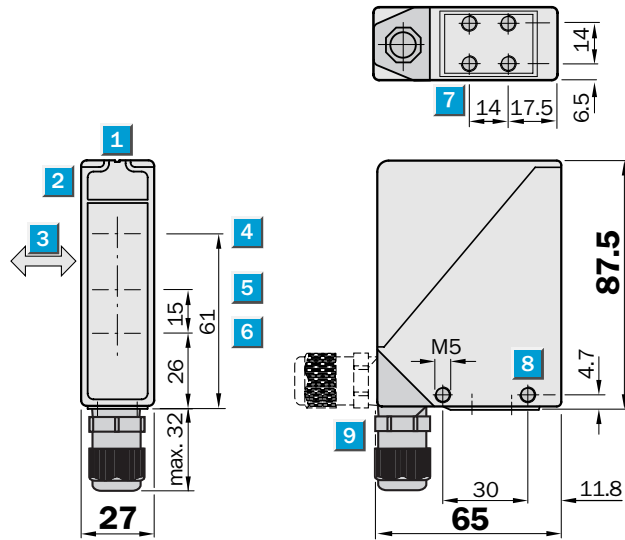



**Scanning distance**  
**100 ... 2000 mm**  
**Photoelectric proximity switches**

- **Marking:**  II 2G EEx ia IIC T4 according to Directive 94/9/EC (ATEX)
- **According to category** 2G
- **Switching output:** EN 60947-5-6 (NAMUR)
- **Background suppression** can be set very precisely
- **Infrared light**

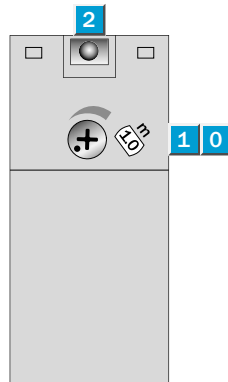


**Dimensional drawing**



**Adjustments possible**

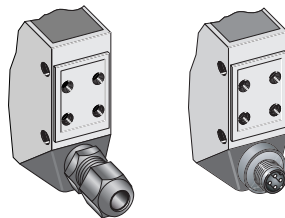
- WT 24-2X 260
- WT 24-2X 460



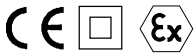
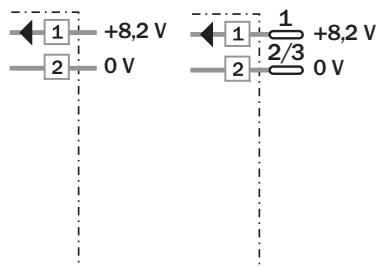
- 1** Alignment sight
- 2** LED signal strength indicator
- 3** Standard direction of the material being scanned
- 4** Middle of optic axis, sender
- 5** Middle of optic axis, receiver at close range
- 6** Middle of optic axis, receiver at long range
- 7** M5 threaded mounting hole, 6 mm deep
- 8** M5 threaded mounting hole
- 9** M16 screw fixing or M12 plug, rotatable by 90°
- 10** Scanning distance adjuster

**Connection types**

- WT 24-2X 260
- WT 24-2X 460



- M16, terminals
- 4-pin, M12



**See chapter Accessories**

- Cables and connectors
- Mounting systems
- Power supply units

Technical data		WT 24-2	X 260	X 460								
<b>Scanning distance</b>	100 ... 2000 mm, adjustable											
<b>Light source <sup>1)</sup>, light type</b>	LED, infrared light											
Light spot diameter	Approx. 50 mm at 2000 mm											
<b>Supply voltage <math>V_S</math> <sup>2)</sup></b>	8.2 V DC ( $R_i$ approx. 1 k $\Omega$ )											
	(5 V ... 15.5 V) <sup>3)</sup>											
Residual ripple <sup>4)</sup>	0.4 V <sub>PP</sub>											
<b>EC-type examination certificate</b>	PTB 03 ATEX 2105											
<b>Explosion protection</b>	Type of protection "Intrinsic safety"											
Input voltage $U_i$ , max.	15.5 V											
Input current $I_i$ , max.	53 mA											
Input power $P_i$ , max.	100 mW											
Internal capacity $C_i$ , max.	80 nF											
Internal inductivity $L_i$ , max.	Negligible small ( $\approx 0 \mu\text{H}$ )											
Ambient temperature $T_A$	Operation: $-20^\circ\text{C} < T_A < +60^\circ\text{C}$											
<b>Output/current consumption</b>	Control current dependent on switching state (to EN 60947-5-6 (NAMUR))											
Object is detected	$\geq 2.2 \text{ mA}$											
Object is not detected	$\leq 1 \text{ mA}$											
<b>Switching mode</b>	Light-switching											
Response time <sup>5)</sup>	$\leq 10 \text{ ms}$											
Max. switching frequency <sup>6)</sup>	50/s											
<b>Connection types</b>	Plug											
	Terminal connection											
<b>VDE protection class <sup>7)</sup></b>	<input type="checkbox"/>											
<b>Circuit protection <sup>8)</sup></b>	A, C											
<b>Enclosure rating</b>	IP 67											
<b>Ambient temperature <math>T_A</math></b>	Storage: $-25^\circ\text{C} \dots +70^\circ\text{C}$											
<b>Weight</b>	Approx. 330 g											
<b>Housing material</b>	Zinc die-cast housing											

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

2) Supply with switching amplifier EN 2 Ex

3) Limit values

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

5) Signal transit time with resistive load

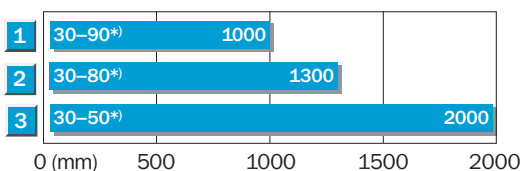
6) With light/dark ratio 1:1

7) Reference voltage 50 V DC

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

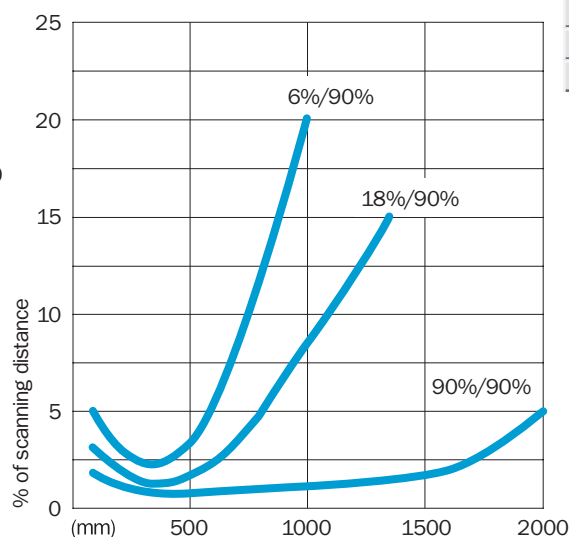
C = Interference pulse suppression

### Scanning distance




\*) Lower bound of detection area depending on the adjusted scanning distance

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



### Order information

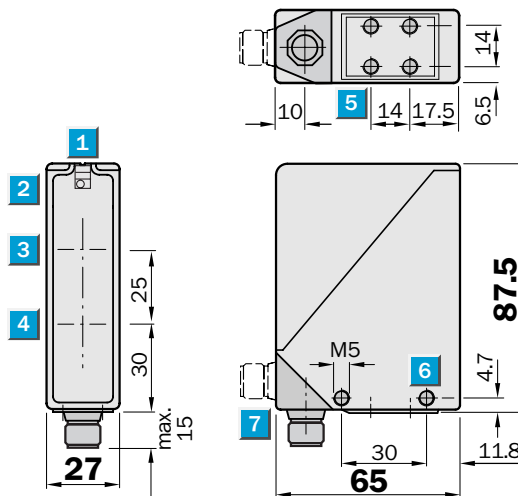
Type	Order no.
WT 24-2X 260	1 025 684
WT 24-2X 460	1 025 683

	<b>Scanning range</b> 15 m
<b>Photoelectric reflex switches</b>	

- Marking:  $\text{Ex}$  II 2G EEx ia IIC T4 according to Directive 94/9/EC (ATEX)
- According to category 2G
- Switching output: EN 60947-5-6 (NAMUR)
- Red light
- Device plug can be rotated through 90°

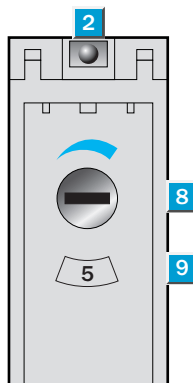


**Dimensional drawing**



**Adjustments possible**

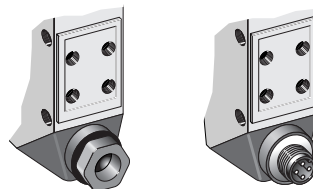
- WL 24-X 2301
- WL 24-X 4301



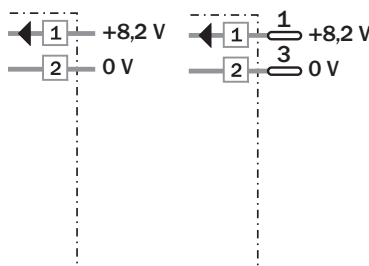
- 1 Alignment sight
- 2 LED signal strength indicator
- 3 Centre of receiver's optical axis
- 4 Centre of transmitter's optical axis
- 5 M5 threaded mounting hole – 8 mm deep
- 6 M5 threaded mounting hole
- 7 PG screw connection or plug M12, rotatable
- 8 Sensitivity adjustment
- 9 Sensitivity indicator

**Connection types**

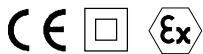
- WL 24-X 2301
- WL 24-X 4301



- PG 9, terminals
- 4-pin, M12



<b>See chapter Accessories</b>
Cables and connectors
Mounting systems
Reflectors
Power supply units



Technical data		WL 24-	X 2301	X 4301									
<b>Scanning range, max. typ/on reflector</b>	15 m/PL 80 A												
Sensitivity	Adjustable												
<b>Light source <sup>1)</sup>, light type</b>	LED, red light												
Light spot diameter	Approx. 145 mm at 8 m												
<b>Supply voltage <math>V_S</math> <sup>2)</sup></b>	8.2 V DC ( $R_i$ approx. 1 k $\Omega$ ) (5 V ... 13.5 V) <sup>3)</sup>												
Residual ripple <sup>4)</sup>	0.4 V <sub>PP</sub>												
<b>EC-type examination certificate</b>	PTB 03 ATEX 2104												
<b>Explosion protection</b>	Type of protection "Intrinsic safety"												
Input voltage $U_i$ , max.	15.5 V												
Input current $I_i$ , max.	53 mA												
Input power $P_i$ , max.	100 mW												
Internal capacity $C_i$ , max.	80 nF												
Internal inductivity $L_i$ , max.	80 $\mu$ H												
Ambient temperature $T_A$	Operation: -20 °C < $T_A$ < +50 °C												
<b>Output/current consumption</b>	Control current dependent on switching state (to EN 60947-5-6 (NAMUR))												
Light beam not interrupted	$\geq 2.2$ mA												
Light beam interrupted	$\leq 1$ mA												
<b>Switching mode</b>	Light-switching												
Response time <sup>5)</sup>	$\leq 10$ ms												
Max. switching frequency <sup>6)</sup>	50/s												
<b>Connection types</b>	Plug												
Terminal connection													
<b>VDE protection class <sup>7)</sup></b>	<input type="checkbox"/>												
<b>Circuit protection <sup>8)</sup></b>	A, C												
<b>Enclosure rating</b>	IP 67												
<b>Ambient temperature <math>T_A</math></b>	Storage: -25 °C ... +70 °C												
<b>Weight</b>	Approx. 330 g												
<b>Housing material</b>	Zinc die-cast housing												

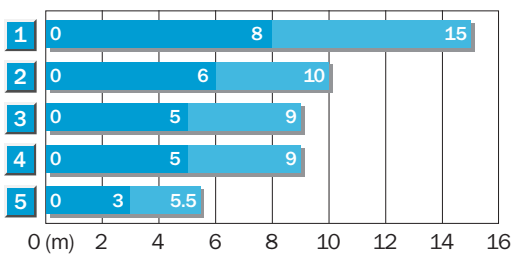
1) Average service life 100,000 h at  $T_A = +25$  °C  
 2) Supply with switching amplifier EN 2 Ex

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

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

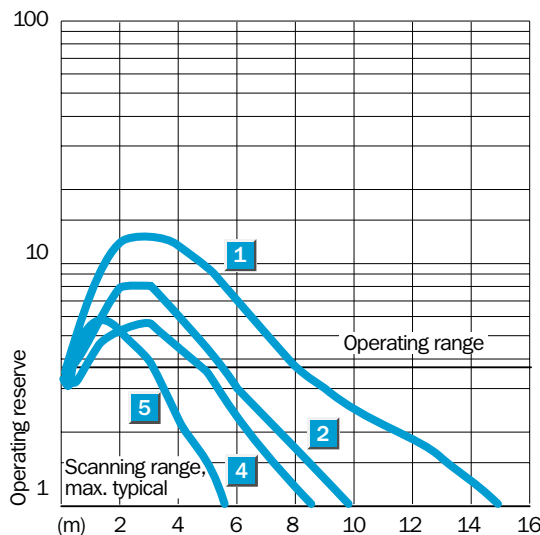
8) A =  $V_S$  connections reverse-polarity protected  
 C = Interference pulse suppression

**Scanning range and operating reserve**



■ Operating range ■ Scanning range, max. typical

Reflector type	Operating range
1 PL 80 A	0 ... 8 m
2 PL 50 A	0 ... 6 m
3 PL 40 A	0 ... 5 m
4 PL 30 A	0 ... 5 m
5 PL 20 A	0 ... 3 m



**Order information**

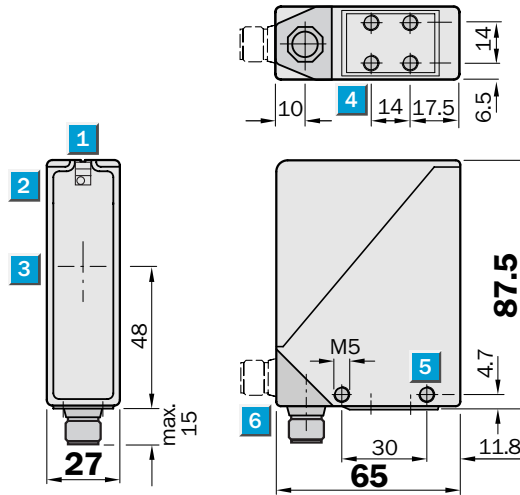
Type	Order no.
WL 24-X 2301	1 011 972
WL 24-X 4301	1 011 971

**Scanning range**  
40 m

Through-beam photoelectric switches

- Marking:  $\text{Ex}$  II 2G EEx ia IIC T4 according to Directive 94/9/EC (ATEX)
- According to category 2G
- Switching output: EN 60947-5-6 (NAMUR)
- Red light
- Device plug can be rotated through 90°

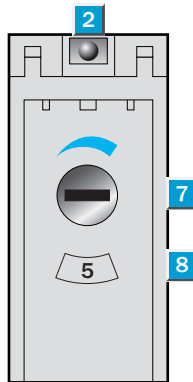
**Dimensional drawing**



**Adjustments possible**

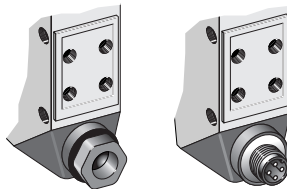
WS/WE 24-X 2301  
WS/WE 24-X 4301

- 1 Alignment sight
- 2 LED signal strength indicator on WE  
Power indicator on WS
- 3 Middle of optical axis
- 4 M5 threaded mounting hole – 8 mm deep
- 5 M5 threaded mounting hole
- 6 PG screw connection or plug M12, rotatable
- 7 Sensitivity adjustment
- 8 Sensitivity indicator



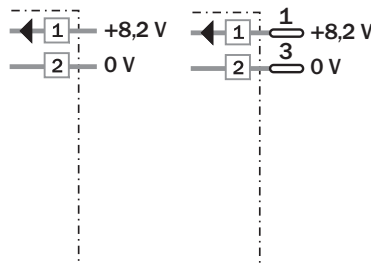
**Connection types**

WS/WE 24-X 2301    WS/WE 24-X 4301



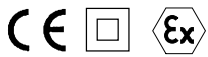
PG 9, terminals

4-pin, M12



**See chapter Accessories**

- Cables and connectors
- Mounting systems
- Power supply units



Technical data		WS/WE 24-	X 2301	X 4301								
Scanning range, max. typical	0 ... 40 m											
Sensitivity	Adjustable											
Light source <sup>1)</sup> , light type	LED, red light											
Light spot diameter	Approx. 450 mm at 25 m											
Supply voltage V <sub>S</sub> <sup>2)</sup>	8.2 V DC (R <sub>i</sub> approx. 1 kΩ) (5 V ... 13.5 V) <sup>3)</sup>											
Residual ripple <sup>4)</sup>	0.4 V <sub>PP</sub>											
EC-type examination certificate	PTB 03 ATEX 2103											
Explosion protection	Type of protection "Intrinsic safety"											
Input voltage U <sub>i</sub> , max.	15.5 V											
Input current I <sub>i</sub> , max.	53 mA											
Input power P <sub>i</sub> , max.	100 mW											
Internal capacity C <sub>i</sub> , max.	WS: 15 nF/WE: 80 nF											
Internal inductivity L <sub>i</sub> , max.	150 μH											
Ambient temperature T <sub>A</sub>	Operation: -20 °C < T <sub>A</sub> < +50 °C											
Output/current consumption	Control current dependent on switching state (to EN 60947-5-6 (NAMUR))											
Sender permanent	≥ 2.2 mA											
Light beam not interrupted	≥ 2.2 mA											
Light beam interrupted	≤ 1 mA											
Switching mode	Light-switching											
Response time <sup>5)</sup>	≤ 10 ms											
Max. switching frequency <sup>6)</sup>	50/s											
Connection types	Plug											
	Terminal connection											
VDE protection class <sup>7)</sup>	□											
Circuit protection <sup>8)</sup>	A, C											
Enclosure rating	IP 67											
Ambient temperature T <sub>A</sub>	Storage: -25 °C ... +70 °C											
Weight	Approx. 330 g											
Housing material	Zinc die-cast housing											

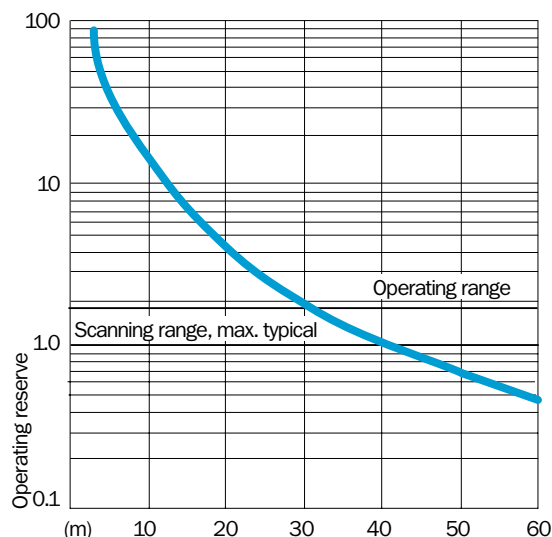
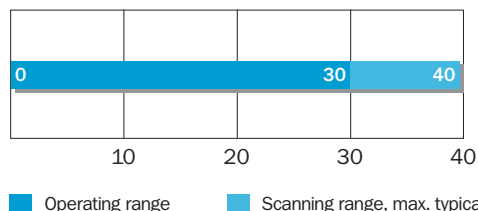
1) Average service life 100,000 h at T<sub>A</sub> = +25 °C  
 2) Supply with switching amplifier EN 2 Ex

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

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

8) A = V<sub>S</sub> connections reverse-polarity protected  
 C = Interference pulse suppression

Scanning range and operating reserve



Order information

Type	Order no.
WS/WE 24-X 2301	1 011 516
WS/WE 24-X 4301	1 011 517

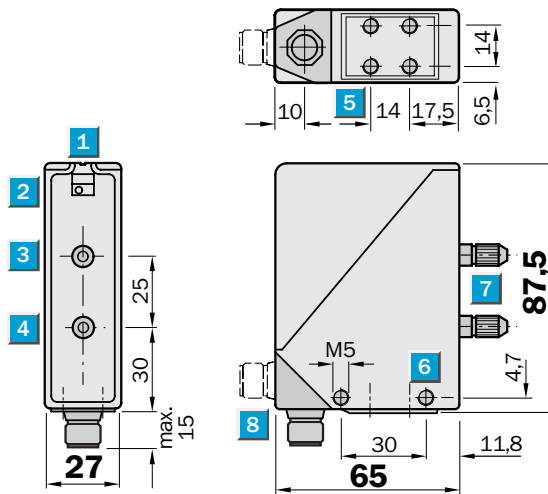


	<b>Scanning range</b> ... 100 mm (max. 1000 mm)
<b>Through-beam system</b>	
	<b>Scanning distance</b> ... 25 mm
<b>Proximity system</b>	

- Marking:  $\text{Ex}$  II 2G EEx ia IIC T4 according to Directive 94/9/EC (ATEX)
- Switching output: EN 60947-5-6 (NAMUR)
- Red light
- Fibre-optic cable, exchangeable



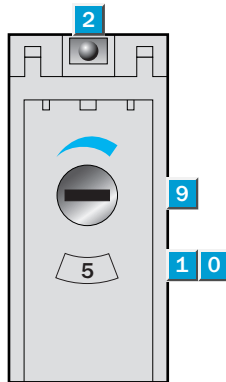
**Dimensional drawing**



**Adjustments possible**

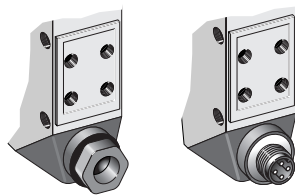
- WLL 24-X 2301
- WLL 24-X 4301

- 1 Alignment sight
- 2 LED signal strength indicator
- 3 Centre of receiver's optical axis
- 4 Centre of transmitter's optical axis
- 5 M5 threaded mounting hole – 8 mm deep
- 6 M5 threaded mounting hole
- 7 Connector for fibre-optic cable
- 8 PG screw connection or plug M12, rotatable
- 9 Sensitivity adjustment
- 10 Sensitivity indicator

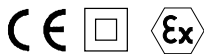
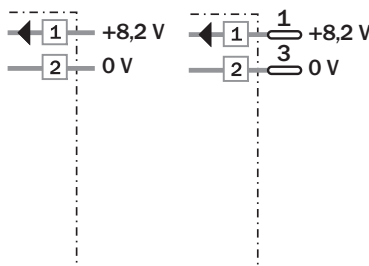


**Connection types**

- WLL 24-X 2301
- WLL 24-X 4301



- PG 9, terminals
- 4-pin, M12



<b>See chapter Accessories</b>
Cables and connectors
Mounting systems
Fibre-optic cables
Power supply units

Technical data		WLL 24-	X 2301	X 4301								
<b>Scanning range</b> , through-beam system	100 mm with LL3-TB02											
	1000 mm with tip adapter LL3-TA01											
<b>Scanning distance</b> , proximity system	25 mm with LL3-DB01											
Fibre-optic cable	See chapter Accessories "Fibre-optic cables"											
Sensitivity	Adjustable											
<b>Light source</b> <sup>1)</sup> , <b>light type</b>	LED, red light											
<b>Supply voltage</b> $V_S$ <sup>2)</sup>	8.2 V DC ( $R_i$ approx. 1 k $\Omega$ ) (5 V ... 13.5 V) <sup>3)</sup>											
Residual ripple <sup>4)</sup>	0.4 V <sub>PP</sub>											
<b>EC-type examination certificate</b>	PTB 03 ATEX 2104											
<b>Explosion protection</b>	Type of protection "Intrinsic safety"											
Input voltage $U_i$ , max.	15.5 V											
Input current $I_i$ , max.	53 mA											
Input power $P_i$ , max.	100 mW											
Internal capacity $C_i$ , max.	80 nF											
Internal inductivity $L_i$ , max.	80 $\mu$ H											
Ambient temperature $T_A$	Operation: $-20\text{ }^\circ\text{C} < T_A < +50\text{ }^\circ\text{C}$											
<b>Output/current consumption</b>	Control current dependent on switching state (to EN 60947-5-6 (NAMUR))											
Light beam not interrupted	$\geq 2.2$ mA											
Light beam interrupted	$\leq 1$ mA											
<b>Switching mode</b>	Light-switching											
Response time <sup>5)</sup>	$\leq 10$ ms											
Max. switching frequency <sup>6)</sup>	50/s											
<b>Connection types</b>	Plug											
	Terminal connection											
<b>VDE protection class</b> <sup>7)</sup>	<input type="checkbox"/>											
<b>Circuit protection</b> <sup>8)</sup>	A, C											
<b>Enclosure rating</b>	IP 65											
<b>Ambient temperature</b> $T_A$	Storage: $-25\text{ }^\circ\text{C} \dots +70\text{ }^\circ\text{C}$											
<b>Weight</b>	Approx. 330 g											
<b>Housing material</b>	Zinc die-cast housing											

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

<sup>2)</sup> Supply with switching amplifier  
EN 2 Ex

<sup>3)</sup> Limit values

<sup>4)</sup> May not exceed or fall short of  
 $V_S$  tolerances

<sup>5)</sup> Signal transit time with resistive load

<sup>6)</sup> With light/dark ratio 1:1

<sup>7)</sup> Reference voltage 50 V DC

<sup>8)</sup> A =  $V_S$  connections reverse-polarity  
protected

C = Interference pulse suppression

Order information	
Type	Order no.
WLL 24-X 2301	1 011 562
WLL 24-X 4301	1 012 711