



# WLD4FP-22165130A00

## W4

PHOTOELECTRIC SENSORS

**SICK**  
Sensor Intelligence.



Illustration may differ



Ordering information

| Type               | part no. |
|--------------------|----------|
| WLD4FP-22165130A00 | 1124612  |

Other models and accessories → [www.sick.com/W4](http://www.sick.com/W4)

Detailed technical data

Features

|   |   |
|---|---|
| Functional principle  | Photoelectric retro-reflective sensor                 |
| Functional principle detail   | With minimum distance to reflector (dual lens system) |
| Sensing range   |   |
| Sensing range min.  | 0 m   |
| Sensing range max.  | 4.5 m   |
| Maximum distance range from reflector to sensor (operating reserve 1)                           | 0.015 m ... 4.5 m                                     |
| Recommended distance range from reflector to sensor (operating reserve 3,75)                    | 0.035 m ... 3.9 m                                     |
| Reference reflector   | Reflector P250  |
| Recommended sensing range for the best performance  | 0.035 m ... 3.9 m                                     |
| Polarisation filters  | Yes   |
| Emitted beam  |   |
| Light source  | PinPoint LED  |
| Type of light   | Visible red light                                     |
| Shape of light spot   | Point-shaped  |
| Light spot size (distance)  | Ø 38 mm (1,000 mm)                                    |
| Maximum dispersion of the emitted beam around the standardized transmission axis (squint angle) | < +/- 1.5° (at Ta = +23 °C)                           |

|                         |                        |  |
|-------------------------|------------------------|--|
| <b>Key LED figures</b>  | Normative reference    | EN 62471:2008-09   IEC 62471:2006, modified  |
|                         | LED risk group marking | Free group   |
|                         | Wave length            | 635 nm   |
|                         | Average service life   | 100,000 h at T <sub>a</sub> = +25 °C   |
| <b>Adjustment</b>       | Teach-in button        | BluePilot: for sensitivity adjustment  |
|                         | IO-Link                | For configuring the sensor parameters and Smart Task functions   |
| <b>Display</b>          | LED blue               | BluePilot: Alignment aid   |
|                         | LED green              | Operating indicatorStatic on: power onFlashing: IO-Link mode   |
|                         | LED yellow             | Status of received light beamStatic on: object not presentStatic off: object presentFlashing: Below the 1.5 function reserve |
|                         |                        |  |
| <b>Special features</b> |                        | Pin2 pre-setting (MF): alarm output  |

## Safety-related parameters

|                                     |           |
|-------------------------------------|-----------|
| <b>MTTF<sub>D</sub></b>             | 747 years |
| <b>DC<sub>avg</sub></b>             | 0 %       |
| <b>T<sub>M</sub> (mission time)</b> | 20 years  |

## Communication interface

|                |                             |  |
|----------------|-----------------------------|--|
| <b>IO-Link</b> |                             | ✓ , IO-Link V1.1   |
|                | Data transmission rate      | COM2 (38,4 kBaud)  |
|                | Cycle time                  | 2.3 ms   |
|                | Process data length         | 16 Bit   |
|                | Process data structure      | Bit 0 = switching signal Q <sub>L1</sub><br>Bit 1 = switching signal Q <sub>L2</sub><br>Bit 2 ... 15 = Current receiver level (live) |
|                | VendorID                    | 26   |
|                | DeviceID HEX                | 0x8002F0   |
|                | DeviceID DEC                | 8389360  |
|                | Compatible master port type | A  |
|                | SIO mode support            | Yes  |
|                |                             |  |

## Electronics

|                                     |  |
|-------------------------------------|--|
| <b>Supply voltage U<sub>B</sub></b> | 10 V DC ... 30 V DC <sup>1)</sup>                                      |
| <b>Ripple</b>                       | ≤ 5 V <sub>pp</sub>  |
| <b>Usage category</b>               | DC-12 (According to EN 60947-5-2)<br>DC-13 (According to EN 60947-5-2) |
| <b>Current consumption</b>          | ≤ 20 mA, without load. At U <sub>B</sub> = 24 V                        |
| <b>Protection class</b>             | III  |

<sup>1)</sup> Limit values.<sup>2)</sup> Signal transit time with resistive load in switching mode.<sup>3)</sup> With light/dark ratio 1:1.<sup>4)</sup> This switching output must not be connected to another output.

|                                       |  |
|---------------------------------------|--|
| <b>Digital output</b>                 |  |
| Number                                | 1  |
| Type                                  | Push-pull: PNP/NPN   |
| Switching mode                        | Light switching  |
| Signal voltage PNP HIGH/LOW           | Approx. $U_B$ -2.5 V / 0 V   |
| Signal voltage NPN HIGH/LOW           | Approx. $U_B$ / < 2.5 V  |
| Output current $I_{max.}$             | ≤ 100 mA   |
| Circuit protection outputs            | Reverse polarity protected   |
|                                       | Overcurrent protected  |
|                                       | Short-circuit protected  |
| Response time                         | ≤ 500 μs   |
| Repeatability (response time)         | 150 μs <sup>2)</sup>   |
| Switching frequency                   | 1,000 Hz <sup>3)</sup>   |
| <b>Pin/Wire assignment</b>            |  |
| Function of pin 4/black (BK)          | Digital output, light switching, object present → output $Q_{L1}$ LOW; IO-Link communication C <sup>4)</sup> |
| Function of pin 4/black (BK) – detail | The pin 4 function of the sensor can be configured   |
|                                       | Additional possible settings via IO-Link   |
| Function of pin 2/white (WH)          | Alarm output   |
| Function of pin 2/white (WH) – detail | The pin 2 function of the sensor can be configured   |
|                                       | Additional possible settings via IO-Link   |

<sup>1)</sup> Limit values.

<sup>2)</sup> Signal transit time with resistive load in switching mode.

<sup>3)</sup> With light/dark ratio 1:1.

<sup>4)</sup> This switching output must not be connected to another output.

## Mechanics

|   |                                 |
|---|---------------------------------|
| <b>Housing</b>  | Rectangular                     |
| <b>Design detail</b>                                  | Flat                            |
| <b>Dimensions (W x H x D)</b>                         | 16 mm x 40.1 mm x 12.1 mm       |
| <b>Connection</b>                                     | Male connector M8, 4-pin        |
| <b>Material</b>                                       |                                 |
|   | Housing Plastic, VISTAL®        |
|   | Front screen Plastic, PMMA      |
|   | Male connector Plastic, VISTAL® |
| <b>Weight</b>   | Approx. 30 g                    |
| <b>Maximum tightening torque of the fixing screws</b> | 0.4 Nm                          |

## Ambient data

|                                      |  |
|--------------------------------------|--|
| <b>Enclosure rating</b>              | IP66 (EN 60529)<br>IP67 (EN 60529)                     |
| <b>Ambient operating temperature</b> | -40 °C ... +60 °C                                      |
| <b>Ambient temperature, storage</b>  | -40 °C ... +75 °C                                      |
| <b>Typ. Ambient light immunity</b>   | Artificial light: ≤ 50,000 lx<br>Sunlight: ≤ 50,000 lx |

|  |   |
|--|---|
| <b>Shock resistance</b>                    | 30 g, 11 ms (3 positive and 3 negative shocks along X, Y, Z axes, 18 total shocks (EN60068-2-27)) |
| <b>Vibration resistance</b>                | 10 Hz ... 1,000 Hz (Amplitude 1 mm, 3 x 30 min (EN60068-2-6))                                     |
| <b>Air humidity</b>                        | 35 % ... 95 %, relative humidity (no condensation)  |
| <b>Electromagnetic compatibility (EMC)</b> | EN 60947-5-2  |
| <b>Resistance to cleaning agent</b>        | ECOLAB  |
| <b>UL File No.</b>                         | NRKH.E181493 & NRKH7.E181493  |

## Smart Task

|                                   |   |
|-----------------------------------|---|
| <b>Smart Task name</b>            | Base logics   |
| <b>Logic function</b>             | Direct<br>AND<br>OR   |
| <b>Timer function</b>             | Deactivated<br>Switch-on delay<br>Off delay<br>ON and OFF delay<br>Impulse (one shot) |
| <b>Inverter</b>                   | Yes   |
| <b>Switching frequency</b>        | SIO Logic: 800 Hz <sup>1)</sup><br>IOL: 750 Hz <sup>2)</sup>                          |
| <b>Response time</b>              | SIO Logic: 600 µs <sup>1)</sup><br>IOL: 650 µs <sup>2)</sup>                          |
| <b>Repeatability</b>              | SIO Logic: 200 µs <sup>1)</sup><br>IOL: 250 µs <sup>2)</sup>                          |
| <b>Switching signal</b>           |   |
| Switching signal Q <sub>L1</sub>  | Switching output  |
| Switching signal Q̄ <sub>L1</sub> | Switching output  |

<sup>1)</sup> Use of Smart Task functions without IO-Link communication (SIO mode).

<sup>2)</sup> Use of Smart Task functions with IO-Link communication function.

## Diagnosis

|  |                                      |
|--|--------------------------------------|
| <b>Device temperature</b>                          |                                      |
| Measuring range                                    | Very cold, cold, moderate, warm, hot |
| <b>Device status</b>                               | Yes                                  |
| <b>Detailed device status</b>                      | Yes                                  |
| <b>Operating hour counter</b>                      | Yes                                  |
| <b>Operating hours counter with reset function</b> | Yes                                  |
| <b>Quality of teach</b>                            | Yes                                  |
| <b>Quality of run</b>                              | Yes, Contamination display           |

## Certificates

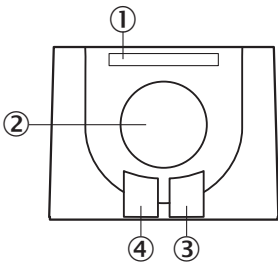
|   |   |
|---|---|
| <b>EU declaration of conformity</b>       | ✓ |
| <b>UK declaration of conformity</b>       | ✓ |
| <b>ACMA declaration of conformity</b>     | ✓ |
| <b>Moroccan declaration of conformity</b> | ✓ |
| <b>China-RoHS</b>                         | ✓ |

|                       |   |
|-----------------------|---|
| ECOLAB certificate    | ✓ |
| cULus certificate     | ✓ |
| EAC certificate / DoC | ✓ |
| IO-Link               | ✓ |

Classifications

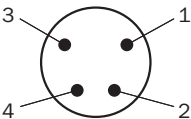
|                |          |
|----------------|----------|
| ECLASS 5.0     | 27270902 |
| ECLASS 5.1.4   | 27270902 |
| ECLASS 6.0     | 27270902 |
| ECLASS 6.2     | 27270902 |
| ECLASS 7.0     | 27270902 |
| ECLASS 8.0     | 27270902 |
| ECLASS 8.1     | 27270902 |
| ECLASS 9.0     | 27270902 |
| ECLASS 10.0    | 27270902 |
| ECLASS 11.0    | 27270902 |
| ECLASS 12.0    | 27270904 |
| ETIM 5.0       | EC002717 |
| ETIM 6.0       | EC002717 |
| ETIM 7.0       | EC002717 |
| ETIM 8.0       | EC002717 |
| UNSPSC 16.0901 | 39121528 |

display and adjustment elements

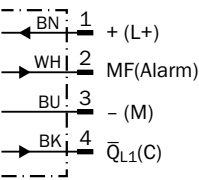


- ① LED blue
- ② Teach-in button
- ③ LED yellow
- ④ LED green

Connection type Male connector M8, 4-pin



Connection diagram Cd-523



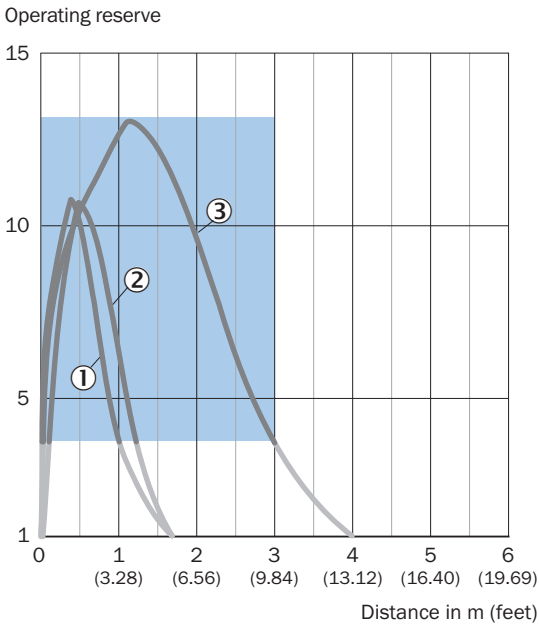
Truth table Push-pull: PNP/NPN - light switching Q

|                         | Light switching Q (normally closed (upper switch), normally open (lower switch)) |                             |
|-------------------------|--|-----------------------------|
|                         | Object not present → Output HIGH   | Object present → Output LOW |
| Light receive           | ✓  | ✗                           |
| Light receive indicator | ☀  | ✗                           |
| Load resistance to L+   | ✗  | ⚡                           |
| Load resistance to M    | ⚡  | ✗                           |
|                         |  |                             |

Truth table Push-pull: PNP/NPN – dark switching  $\bar{Q}$

|                         | Dark switching $\bar{Q}$ (normally open (upper switch), normally closed (lower switch)) |                              |
|-------------------------|---|------------------------------|
|                         | Object not present → Output LOW   | Object present → Output HIGH |
| Light receive           | ✓   | ✗                            |
| Light receive indicator | ☀   | ✗                            |
| Load resistance to L+   | ⚡   | ✗                            |
| Load resistance to M    | ✗   | ⚡                            |
|                         |   |                              |

Characteristic curve Reflective tape



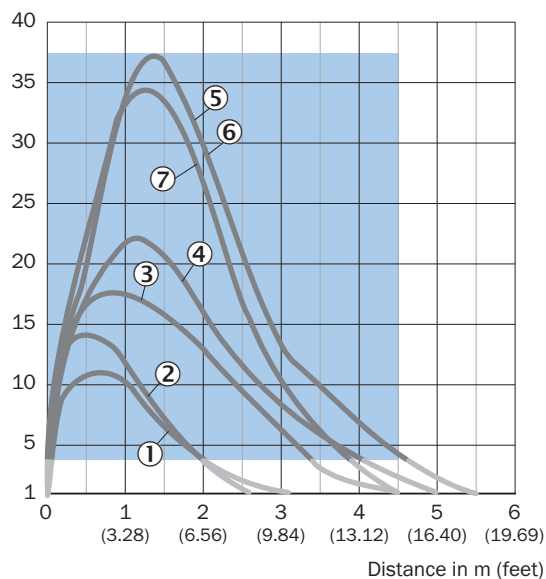
Recommended sensing range for the best performance

- ① Reflective tape REF-DG
- ② reflective tape REF-IRF-56
- ③ Reflective tape REF-AC1000



## Characteristic curve Standard reflectors

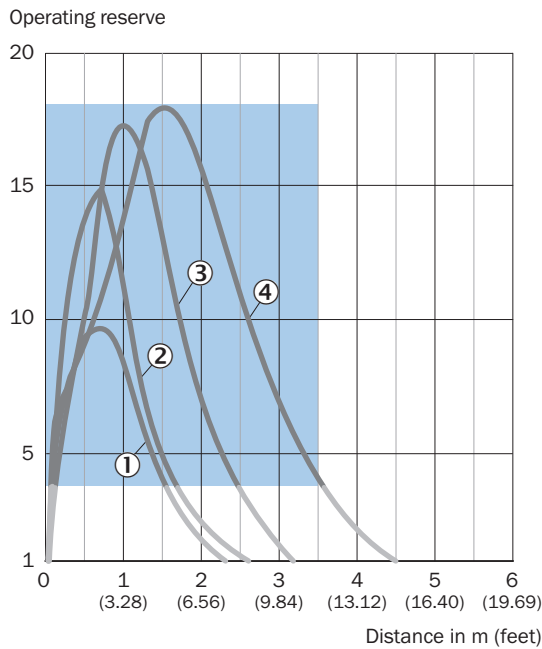
Operating reserve



Recommended sensing range for the best performance

- ① Reflector PL22
- ② Reflector PL20A
- ③ Reflector PL30A
- ④ Reflector PL40A
- ⑤ Reflector PL80A
- ⑥ Reflector C110A
- ⑦ Reflector P250

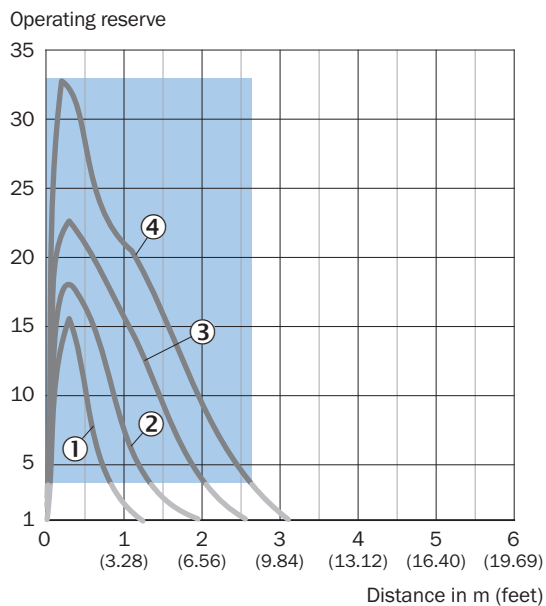
### Characteristic curve Fine triple reflectors



Recommended sensing range for the best performance

- ① PL10FH reflector
- ② PL10F reflector
- ③ Reflector PL20F
- ④ Reflector P250F

### Characteristic curve Chemical-resistant reflectors



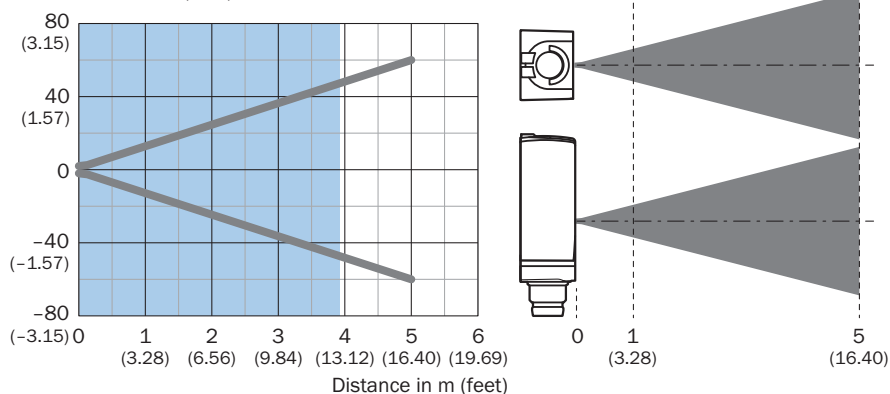
Recommended sensing range for the best performance

- ① PL10F CHEM reflector
- ② Reflector PL20 CHEM

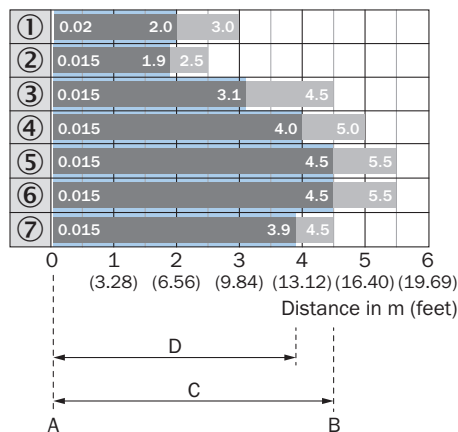
- ③ Reflector P250 CHEM
- ④ Reflector P250H

## Light spot size

Dimensions in mm (inch)



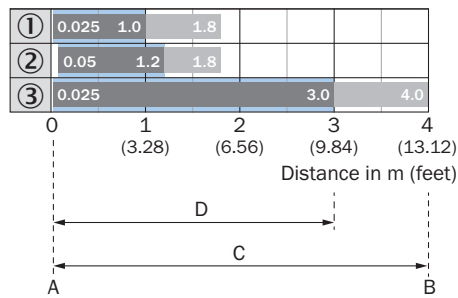
## Sensing range diagram Standard reflectors



Recommended sensing range for the best performance

- ① Reflector PL22
- ② Reflector PL20A
- ③ Reflector PL30A
- ④ Reflector PL40A
- ⑤ Reflector PL80A
- ⑥ Reflector C110A
- ⑦ Reflector P250

### Sensing range diagram Reflective tape



A = Sensing range min. in m

B = Sensing range max. in m

C = Maximum distance range from reflector to sensor (operating reserve 1)

D = Recommended distance range from reflector to sensor (operating reserve 3.75)

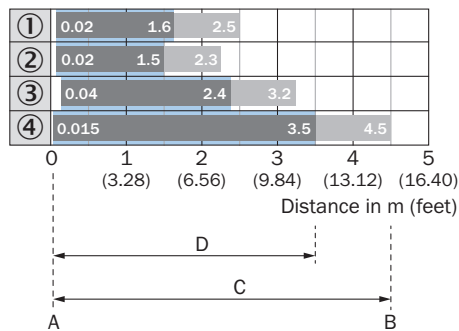
 Recommended sensing range for the best performance

① Reflective tape REF-DG (50 x 50 mm)

② reflective tape REF-IRF-56

③ Reflective tape REF-AC1000

### Sensing range diagram Fine triple reflectors



A = Sensing range min. in m

B = Sensing range max. in m

C = Maximum distance range from reflector to sensor (operating reserve 1)

D = Recommended distance range from reflector to sensor (operating reserve 3.75)

 Recommended sensing range for the best performance

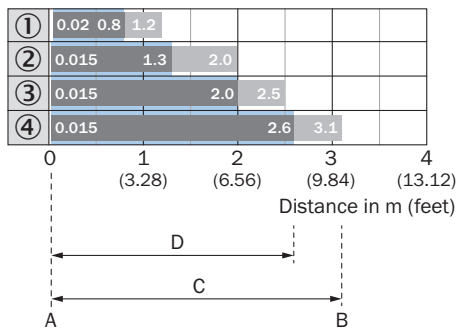
① PL10FH reflector

② PL10F reflector

③ Reflector PL20F

④ Reflector P250F

## Sensing range diagram Chemical-resistant reflectors



A = Sensing range min. in m

B = Sensing range max. in m

C = Maximum distance range from reflector to sensor (operating reserve 1)

D = Recommended distance range from reflector to sensor (operating reserve 3.75)

Recommended sensing range for the best performance

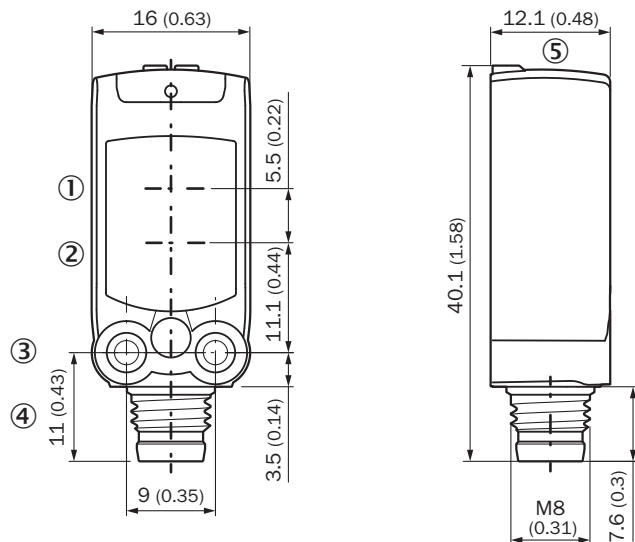
① PL10F CHEM reflector

② Reflector PL20 CHEM

③ Reflector P250 CHEM

④ Reflector P250H

## Dimensional drawing



Dimensions in mm (inch)

① Center of optical axis, sender

② Center of optical axis, receiver




③ M3 mounting hole

④ Connection

⑤ display and adjustment elements

## Recommended accessories

Other models and accessories → [www.sick.com/W4](http://www.sick.com/W4)

|  | Brief description   | Type       | part no. |
|--|---|------------|----------|
| Mounting systems   |   |            |          |
|   | <ul style="list-style-type: none"> <li><b>Description:</b> Mounting bracket for wall mounting</li> <li><b>Material:</b> Stainless steel</li> <li><b>Details:</b> Stainless steel 1.4571</li> <li><b>Items supplied:</b> Mounting hardware included</li> <li><b>Suitable for:</b> W4S, W4F, W4S</li> </ul> | BEF-W4-A   | 2051628  |
| reflectors and optics  |   |            |          |
|   | <ul style="list-style-type: none"> <li><b>Description:</b> Fine triple reflector, screw connection, suitable for laser sensors</li> <li><b>Dimensions:</b> 20 mm 32 mm</li> <li><b>Ambient operating temperature:</b> -30 °C ... +65 °C</li> </ul>  | PL10F      | 5311210  |
| connectors and cables  |   |            |          |
|  | <ul style="list-style-type: none"> <li><b>Connection type head A:</b> Male connector, M8, 4-pin, straight, A-coded</li> <li><b>Description:</b> Unshielded</li> <li><b>Connection systems:</b> Screw-type terminals</li> <li><b>Permitted cross-section:</b> 0.14 mm² ... 0.5 mm²</li> </ul>              | STE-0804-G | 6037323  |

## SICK AT A GLANCE

SICK is one of the leading manufacturers of intelligent sensors and sensor solutions for industrial applications. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in a wide range of industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services complete our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

For us, that is “Sensor Intelligence.”

## WORLDWIDE PRESENCE:

Contacts and other locations –[www.sick.com](http://www.sick.com)