



WLD4FP-1H161130A00 W4

PHOTOELECTRIC SENSORS

SICK
Sensor Intelligence.



Ordering information

| Type | part no. |
|--------------------|----------|
| WLD4FP-1H161130A00 | 1107694 |

Other models and accessories → www.sick.com/W4

Illustration may differ



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) |

| Key LED figures | |
|------------------------|--|
| 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 $T_a = +25^\circ\text{C}$ |
| Adjustment | |
| Teach-in button | BluePilot: for sensitivity adjustment |
| IO-Link | For configuring the sensor parameters and Smart Task functions |
| Display | |
| 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 |

Safety-related parameters

| | |
|-------------------------------------|-----------|
| MTTF_D | 747 years |
| DC_{avg} | 0 % |
| T_M (mission time) | 20 years |

Communication interface

| IO-Link | |
|-----------------------------|--|
| Data transmission rate | ✓, IO-Link V1.1 |
| Cycle time | COM2 (38,4 kBaud) |
| Process data length | 2.3 ms |
| Process data structure | 16 Bit |
| | Bit 0 = switching signal Q _{L1} |
| | Bit 1 = switching signal Q _{L2} |
| | Bit 2 ... 15 = Current receiver level (live) |
| VendorID | 26 |
| DeviceID HEX | 0x8002B5 |
| DeviceID DEC | 8389301 |
| Compatible master port type | A |
| SIO mode support | Yes |

Electronics

| | |
|-------------------------------------|--|
| Supply voltage U_B | 10 V DC ... 30 V DC ¹⁾ |
| Ripple | $\leq 5 \text{ V}_{\text{pp}}$ |
| Usage category | DC-12 (According to EN 60947-5-2) DC-13 (According to EN 60947-5-2) |
| Current consumption | $\leq 20 \text{ mA}$, without load. At $U_B = 24 \text{ V}$ |
| Protection class | III |
| Digital output | |

¹⁾ Limit values.²⁾ Signal transit time with resistive load in switching mode.³⁾ With light/dark ratio 1:1.⁴⁾ This switching output must not be connected to another output.

| | |
|---------------------------------------|--|
| Number | 2 (Complementary) |
| Type | Push-pull: PNP/NPN |
| Switching mode | Light/dark 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 μ s |
| Repeatability (response time) | 150 μ s ²⁾ |
| Switching frequency | 1,000 Hz ³⁾ |
| Pin/Wire assignment | |
| Function of pin 4/black (BK) | Digital output, dark switching, object present \rightarrow output \bar{Q}_{L1} HIGH; IO-Link communication C ⁴⁾ |
| 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) | Digital output, light switching, object present \rightarrow output Q_{L1} LOW ⁴⁾ |
| Function of pin 2/white (WH) – detail | The pin 2 function of the sensor can be configured Additional possible settings via IO-Link |

¹⁾ Limit values.²⁾ Signal transit time with resistive load in switching mode.³⁾ With light/dark ratio 1:1.⁴⁾ This switching output must not be connected to another output.

Mechanics

| | |
|---|---------------------------|
| Housing | Rectangular |
| Design detail | Flat |
| Dimensions (W x H x D) | 16 mm x 40.1 mm x 12.1 mm |
| Connection | Cable, 4-wire, 2 m |
| Connection detail | |
| Deep-freeze property | Do not bend below 0 °C |
| Conductor size | 0.14 mm ² |
| Cable diameter | Ø 3.4 mm |
| Length of cable (L) | 2 m |
| Material | |
| Housing | Plastic, VISTAL® |
| Front screen | Plastic, PMMA |
| Cable | Plastic, PVC |
| Weight | Approx. 30 g |
| Maximum tightening torque of the fixing screws | 0.4 Nm |

Ambient data

| | |
|-------------------------|-----------------|
| Enclosure rating | IP66 (EN 60529) |
|-------------------------|-----------------|

| | |
|--|---|
| Ambient operating temperature | IP67 (EN 60529) -40 °C ... +60 °C |
| Ambient temperature, storage | -40 °C ... +75 °C |
| Typ. Ambient light immunity | Artificial light: ≤ 50,000 lx Sunlight: ≤ 50,000 lx |
| Shock resistance | 30 g, 11 ms (3 positive and 3 negative shocks along X, Y, Z axes, 18 total shocks (EN60068-2-27)) |
| Vibration resistance | 10 Hz ... 1,000 Hz (Amplitude 1 mm, 3 x 30 min (EN60068-2-6)) |
| Air humidity | 35 % ... 95 %, relative humidity (no condensation) |
| Electromagnetic compatibility (EMC) | EN 60947-5-2 |
| Resistance to cleaning agent | ECOLAB |
| UL File No. | NRKH.E181493 & NRKH7.E181493 |

Smart Task

| | |
|----------------------------|---|
| Smart Task name | Base logics |
| Logic function | Direct AND OR |
| Timer function | Deactivated Switch-on delay Off delay ON and OFF delay Impulse (one shot) |
| Inverter | Yes |
| Switching frequency | SIO Logic: 800 Hz ¹⁾ IOL: 750 Hz ²⁾ |
| Response time | SIO Logic: 600 µs ¹⁾ IOL: 650 µs ²⁾ |
| Repeatability | SIO Logic: 200 µs ¹⁾ IOL: 250 µs ²⁾ |
| Switching signal | Switching signal Q _{L1} Switching output Switching signal \bar{Q}_{L1} Switching output |

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

²⁾ Use of Smart Task functions with IO-Link communication function.

Diagnosis

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

Certificates

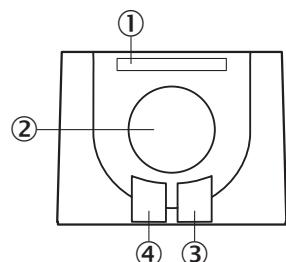
| | |
|-------------------------------------|---|
| EU declaration of conformity | ✓ |
|-------------------------------------|---|

| | |
|---|---|
| UK declaration of conformity | ✓ |
| ACMA declaration of conformity | ✓ |
| Moroccan declaration of conformity | ✓ |
| China-RoHS | ✓ |
| ECOLAB certificate | ✓ |
| cULus certificate | ✓ |
| EAC certificate / DoC | ✓ |
| IO-Link | ✓ |

Classifications

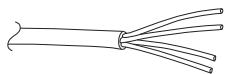
| | |
|-----------------------|----------|
| ECLASS 5.0 | 27270902 |
| ECLASS 5.1.4 | 27270902 |
| ECLASS 6.0 | 27270902 |
| ECLASS 6.2 | 27270902 |
| ECLASS 7.0 | 27270902 |
| ECLASS 8.0 | 27270902 |
| ECLASS 8.1 | 27270902 |
| ECLASS 9.0 | 27270902 |
| ECLASS 10.0 | 27270902 |
| ECLASS 11.0 | 27270902 |
| 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

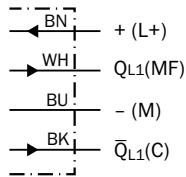


- ① LED blue
- ② Teach-in button
- ③ LED yellow
- ④ LED green

Connection type Cable, 4-wire



Connection diagram Cd-504

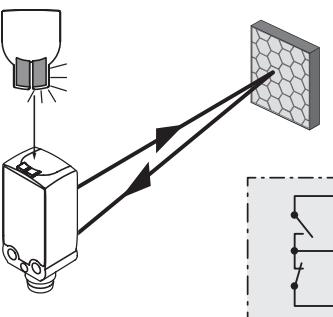


Truth table Push-pull: PNP/NPN - light switching Q

| 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 | ⚡ | ✗ |
| | | |

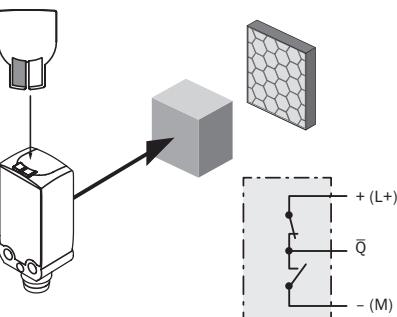
Truth table Push-pull: PNP/NPN – dark switching \bar{Q}

| 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 | ✗ | ✗ |



```

graph LR
    S1[Sensor] --> L1[Light Source]
    L1 --> R1[Receiver]
    R1 --> Q1[Q-bar]
    R1 --> L2[Load]
    L2 --> M1[Output M]
    L2 --> Q1
    style Q1 fill:none,stroke:none
    style L2 fill:none,stroke:none
    style M1 fill:none,stroke:none
    
```

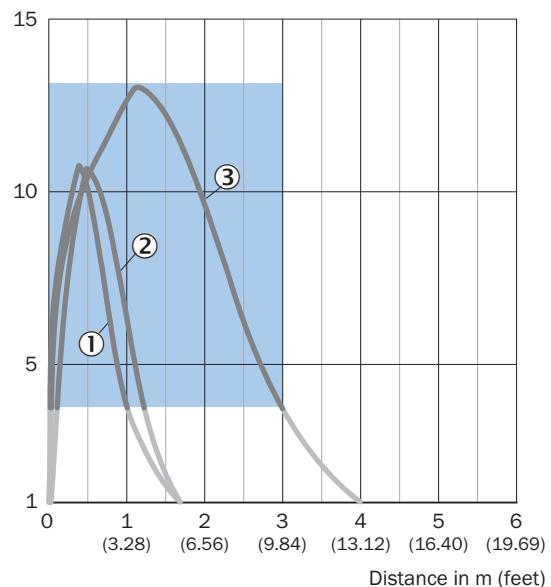


```

graph LR
    S2[Sensor] --> L3[Light Source]
    L3 --> R2[Receiver]
    R2 --> Q2[Q-bar]
    R2 --> L4[Load]
    L4 --> M2[Output M]
    L4 --> Q2
    style Q2 fill:none,stroke:none
    style L4 fill:none,stroke:none
    style M2 fill:none,stroke:none
    
```

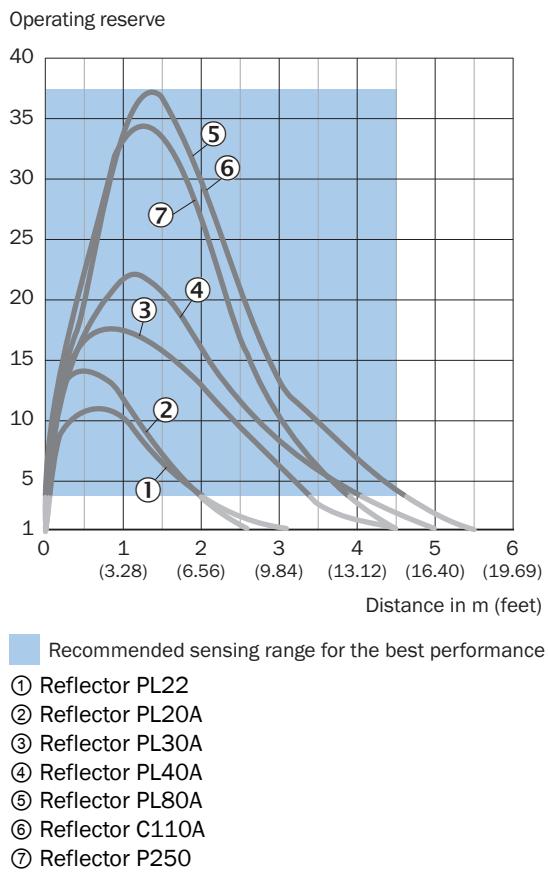
Characteristic curve Reflective tape

Operating reserve



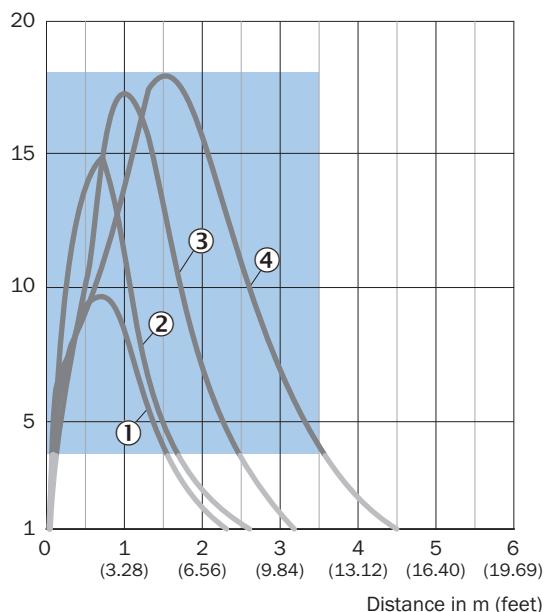
- Recommended sensing range for the best performance
- ① Reflective tape REF-DG
- ② reflective tape REF-IRF-56
- ③ Reflective tape REF-AC1000

Characteristic curve Standard reflectors



Characteristic curve Fine triple reflectors

Operating reserve



■ Recommended sensing range for the best performance

① PL10FH reflector

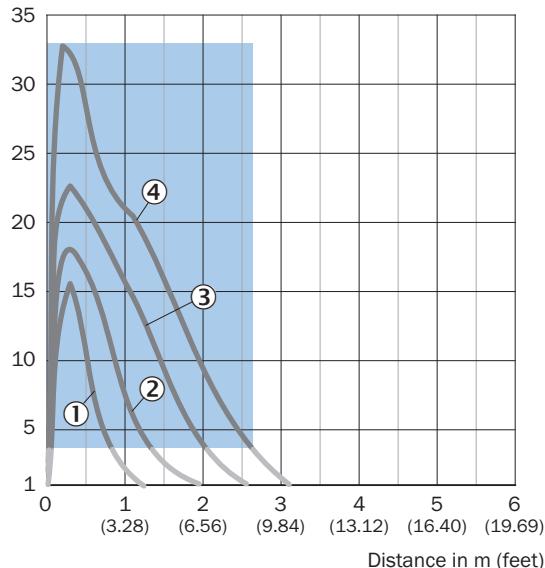
② PL10F reflector

③ Reflector PL20F

④ Reflector P250F

Characteristic curve Chemical-resistant reflectors

Operating reserve



■ Recommended sensing range for the best performance

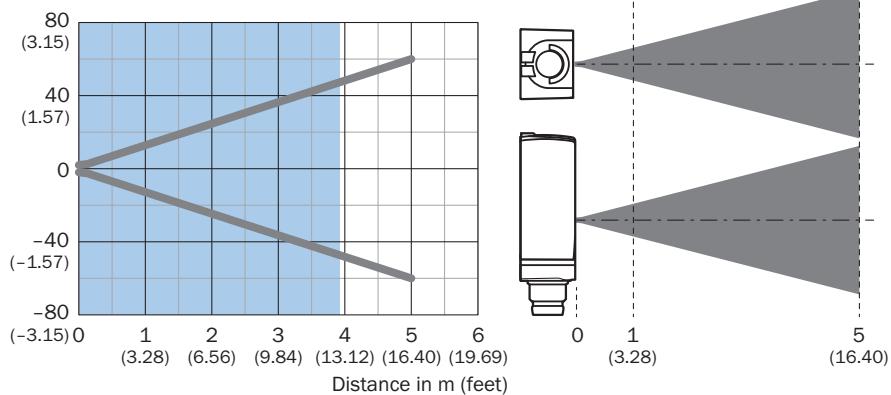
① PL10F CHEM reflector

② Reflector PL20 CHEM

- ③ Reflector P250 CHEM
- ④ Reflector P250H

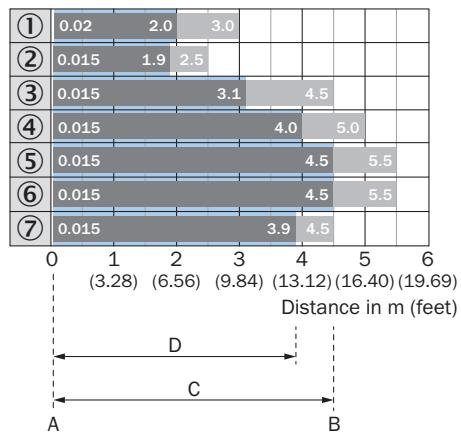
Light spot size

Dimensions in mm (inch)



■ Recommended sensing range for the best performance

Sensing range diagram Standard reflectors



A = Sensing range min. in m

B = Sensing range max. in m

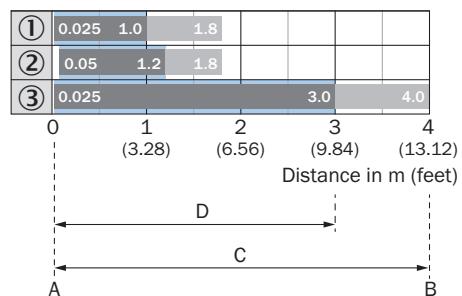
C = Maximum distance range from reflector to sensor (operating reserve 1)

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

■ Recommended sensing range for the best performance

- ① 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)

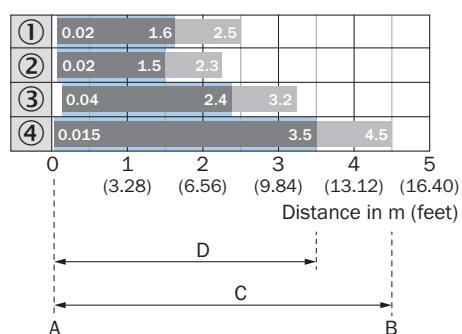
Recommended sensing range for the best performance

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

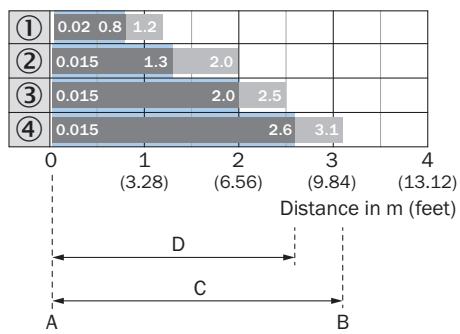
① PL10FH reflector

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

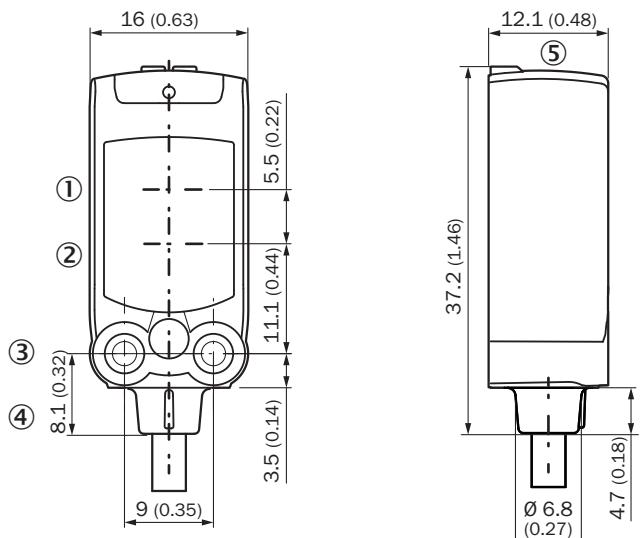
① PL10F CHEM reflector

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

| | Brief description | Type | part no. |
|--|---|------------|----------|
| Mounting systems | | | |
|  | <ul style="list-style-type: none"> Description: Mounting bracket for wall mounting Material: Stainless steel Details: Stainless steel 1.4571 Items supplied: Mounting hardware included Suitable for: W4S, W4F, W4S | BEF-W4-A | 2051628 |
| reflectors and optics | | | |
|  | <ul style="list-style-type: none"> Description: Fine triple reflector, screw connection, suitable for laser sensors Dimensions: 20 mm 32 mm Ambient operating temperature: -30 °C ... +65 °C | PL10F | 5311210 |
| connectors and cables | | | |
|  | <ul style="list-style-type: none"> Connection type head A: Male connector, M12, 4-pin, straight, A-coded Description: Unshielded Connection systems: Screw-type terminals Permitted cross-section: ≤ 0.75 mm² | STE-1204-G | 6009932 |

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."

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