



WTF4FD-32161220A00

W4

PHOTOELECTRIC SENSORS

SICK
Sensor Intelligence.



Ordering information

| Type | part no. |
|--------------------|----------|
| WTF4FD-32161220A00 | 1118831 |

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

Illustration may differ



Detailed technical data

Features

| | |
|---|---|
| Functional principle | Photoelectric proximity sensor |
| Functional principle detail | Foreground suppression |
| Sensing range | |
| Sensing range min. | 0 mm |
| Sensing range max. | 100 mm |
| Adjustable switching threshold for background suppression | 15 mm ... 100 mm |
| Reference object | Object with 90% remission factor (complies with standard white according to DIN 5033) |
| Minimum object height at set sensing range in front of black background (6% remission factor) | 0.8 mm, at a distance of 40 mm |
| Recommended sensing range for the best performance | 30 mm ... 70 mm |
| Emitted beam | |
| Light source | PinPoint LED |
| Type of light | Visible red light |
| Shape of light spot | Point-shaped, Consisting of two parallel light spots |
| Light spot size (distance) | 2 mm x 2 mm (50 mm) |
| Maximum dispersion of the emitted beam around the standardized transmission axis (squint angle) | < +/- 1.5° (at $T_U = +23$ °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 $T_a = +25^\circ\text{C}$ |
| Smallest detectable object (MDO) typ. | 0.1 mm, At 50 mm distance (object with 90% remission (complies with standard white according to DIN 5033)) |
| Adjustment | |
| Teach-Turn adjustment | BluePilot For setting the sensing range |
| IO-Link | For configuring the sensor parameters and Smart Task functions |
| Display | |
| LED blue | BluePilot: sensing range indicator |
| LED green | Operating indicator Static on: power on Flashing: IO-Link mode |
| LED yellow | Status of received light beam Static on: object present Static off: object not present |
| Special applications | Detecting flat objects |

Safety-related parameters

| | |
|-------------------------------------|-----------|
| MTTF_D | 661 years |
| DC_{avg} | 0 % |
| T_M (mission time) | 20 years |

Communication interface

| | |
|-----------------------------|--|
| IO-Link | ✓, 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 _{L1} Bit 1 = switching signal Q _{L2} Bit 2 ... 15 = Current receiver level (live) |
| VendorID | 26 |
| DeviceID HEX | 0x8002BC |
| DeviceID DEC | 8389308 |
| Compatible master port type | A |
| SIO mode support | Yes |

Electronics

| | |
|-------------------------------------|-----------------------------------|
| Supply voltage U_B | 10 V DC ... 30 V DC ¹⁾ |
| Ripple | $\leq 5 \text{ V}_{\text{pp}}$ |

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.

| | |
|---------------------------------------|--|
| Usage category | DC-12 (According to EN 60947-5-2) DC-13 (According to EN 60947-5-2) |
| Current consumption | ≤ 25 mA, without load. At $U_B = 24$ V |
| Protection class | III |
| Digital 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 | ≤ 650 μ s |
| Repeatability (response time) | 300 μ s ²⁾ |
| Switching frequency | 750 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 with M8 male connector, 4-pin, 110 mm |
| 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) | 77 mm |
| Material | |
| Housing | Plastic, VISTAL® |
| Front screen | Plastic, PMMA |
| Cable | Plastic, PVC |

| | |
|---|------------------|
| Male connector | Plastic, VISTAL® |
| Weight | Approx. 30 g |
| Maximum tightening torque of the fixing screws | 0.4 Nm |

Ambient data

| | |
|--|---|
| Enclosure rating | IP66 (EN 60529) IP67 (EN 60529) |
| Ambient operating temperature | -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: 700 Hz ¹⁾ IOL: 700 Hz ²⁾ |
| Response time | SIO Logic: 700 µs ¹⁾ IOL: 700 µs ²⁾ |
| Repeatability | SIO Logic: 350 µs ¹⁾ IOL: 400 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 |

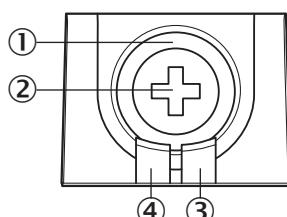
Certificates

| | |
|--|---|
| EU declaration of conformity | ✓ |
| UK declaration of conformity | ✓ |
| ACMA declaration of conformity | ✓ |
| Moroccan declaration of conformity | ✓ |
| China RoHS | ✓ |
| ECOLAB certificate | ✓ |
| cULus certificate | ✓ |
| IO-Link certificate | ✓ |
| Information according to Art. 3 of Data Act (Regulation EU 2023/2854) | ✓ |

Classifications

| | |
|-----------------------|----------|
| ECLASS 5.0 | 27270904 |
| ECLASS 5.1.4 | 27270904 |
| ECLASS 6.0 | 27270904 |
| ECLASS 6.2 | 27270904 |
| ECLASS 7.0 | 27270904 |
| ECLASS 8.0 | 27270904 |
| ECLASS 8.1 | 27270904 |
| ECLASS 9.0 | 27270904 |
| ECLASS 10.0 | 27270904 |
| ECLASS 11.0 | 27270904 |
| ECLASS 12.0 | 27270903 |
| ETIM 5.0 | EC002719 |
| ETIM 6.0 | EC002719 |
| ETIM 7.0 | EC002719 |
| ETIM 8.0 | EC002719 |
| UNSPSC 16.0901 | 39121528 |

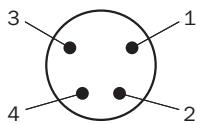
display and adjustment elements



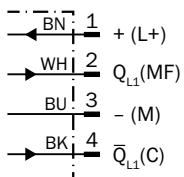
① LED blue

- ② Teach-Turn adjustment
- ③ LED yellow
- ④ LED green

Connection type Male connector M8, 4-pin



Connection diagram Cd-503



Truth table Push-pull: PNP/NPN - light switching Q_{L1}

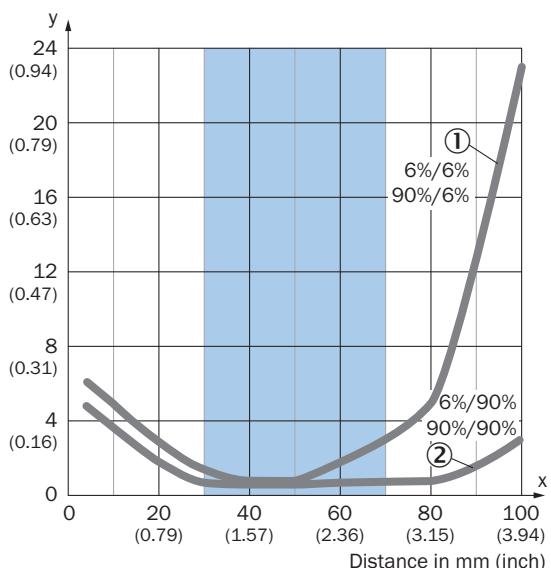
| Light switching Q_{L1} (normally closed (upper switch), normally open (lower switch)) | | |
|---|----------------------------------|-----------------------------|
| | Object not present → Output HIGH | Object present → Output LOW |
| Light receive | ✓ | ✗ |
| Light receive indicator | ✗ | ✗ |
| Load resistance to L+ | ✗ | ⚠ |
| Load resistance to M | ⚠ | ✗ |
| | | |

Truth table Push-pull: PNP/NPN – dark switching \bar{Q}_{L1}

| Dark switching \bar{Q}_{L1} (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

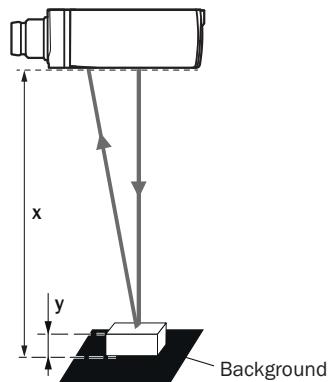
Minimum object height in mm (inch)



■ Recommended sensing range for the best performance

① Black background, 6% remission factor
 ② White background, 90% remission factor

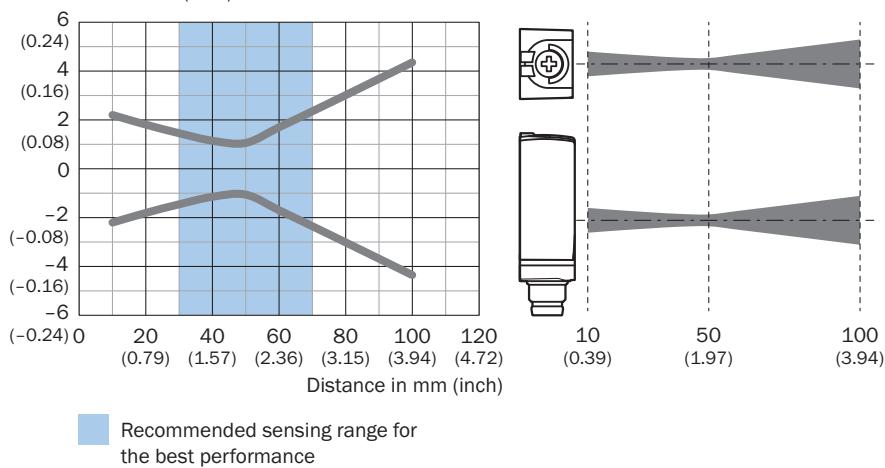
Example:
 Reliable detection of the object



Black background (6 % remission factor)
 Distance of sensor to background x = 40 mm
 Required minimum object height y = 0.8 mm
 For all objects regardless of their colors

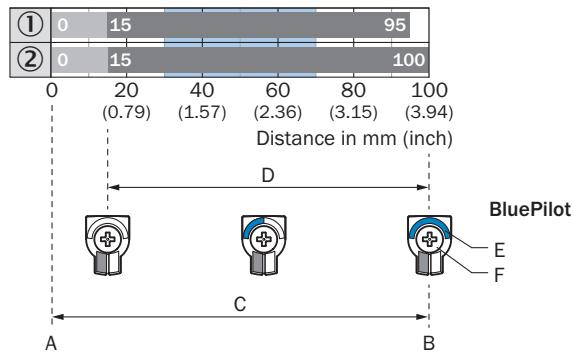
Light spot size

Dimensions in mm (inch)



Recommended sensing range for the best performance

Sensing range diagram



A = Sensing range min. in mm

B = Sensing range max. in mm

C = Viewing range

D = Adjustable switching threshold for foreground suppression

E = Sensing range indicator

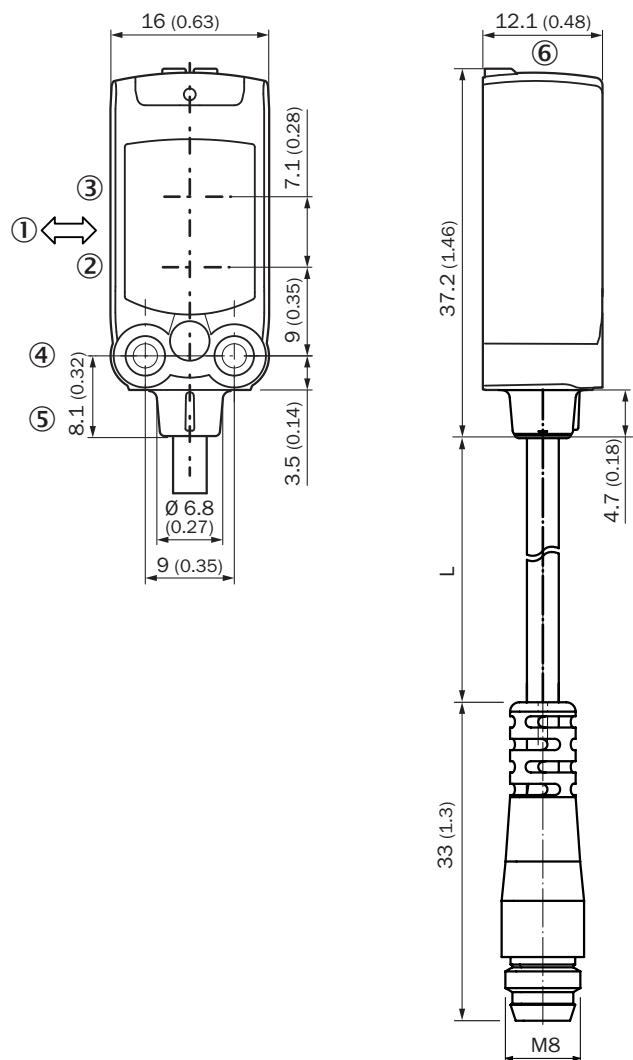
F = Teach-Turn adjustment

Recommended sensing range for the best performance

① Black background, 6% remission factor

② White background, 90% remission factor

Dimensional drawing



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 |
|  | <ul style="list-style-type: none"> Description: Mounting bracket for floor mounting Material: Stainless steel Details: Stainless steel 1.4571 Items supplied: Mounting hardware included Suitable for: W4S, W4F, W4S | BEF-W4-B | 2051630 |
|  | <ul style="list-style-type: none"> Description: Plate N08 for universal clamp bracket Material: Steel, zinc diecast Details: Zinc plated steel (sheet), Zinc die cast (clamping bracket) Items supplied: Universal clamp (5322626), mounting hardware Usable for: W100, W150, W4S, W4F, W8, W9-3, W8G, W8 Laser, W8 Inox, G6, W100 Laser, W100-2, W10, G6 Inox, RAY10, W4SLG-3, W9, GR18, MultiPulse, Reflex Array, MultiLine, LUT3, KT5, KT8, KT10, CS8 | BEF-KHS-N08 | 2051607 |

| | Brief description | Type | part no. |
|--|--|--------------------|-----------------|
| connectors and cables | | | |
|  | <ul style="list-style-type: none"> Connection type head A: Female connector, M12, 4-pin, straight, A-coded Connection type head B: Flying leads Signal type: Sensor/actuator cable Cable: 5 m, 4-wire, PVC Description: Sensor/actuator cable, unshielded Application: Uncontaminated zones, Zones with chemicals | YF2A14-050VB3XLEAX | 2096235 |
|  | <ul style="list-style-type: none"> Connection type head A: Female connector, M12, 4-pin, straight, A-coded Connection type head B: Flying leads Signal type: Sensor/actuator cable Cable: 5 m, 4-wire, PUR, halogen-free Description: Sensor/actuator cable, unshielded Application: Drag chain operation, Zones with oils and lubricants, Robot, Drag chain operation | YF2A14-050UB3XLEAX | 2095608 |
|  | <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: $\leq 0.75 \text{ mm}^2$ | STE-1204-G | 6009932 |
|  | <ul style="list-style-type: none"> Connection type head A: Female connector, M8, 4-pin, straight, A-coded Connection type head B: Flying leads Signal type: Sensor/actuator cable Cable: 5 m, 4-wire, PVC Description: Sensor/actuator cable, unshielded Application: Uncontaminated zones, Zones with chemicals | YF8U14-050VA3XLEAX | 2095889 |
|  | <ul style="list-style-type: none"> Connection type head A: Male connector, M8, 4-pin, straight, A-coded Description: Unshielded Connection systems: Screw-type terminals Permitted cross-section: $0.14 \text{ mm}^2 \dots 0.5 \text{ mm}^2$ | STE-0804-G | 6037323 |
|  | <ul style="list-style-type: none"> Connection type head A: Female connector, M8, 4-pin, straight, A-coded Connection type head B: Flying leads Signal type: Sensor/actuator cable Cable: 5 m, 4-wire, PUR, halogen-free Description: Sensor/actuator cable, unshielded Application: Drag chain operation, Zones with oils and lubricants, Robot, Drag chain operation | YF8U14-050UA3XLEAX | 2094792 |

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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