



DATA SHEET

WTB12H-24161120A00ZDZZZZZZZZZZ1

W12
Photoelectric sensors

SICK Sensor Intelligence

PHOTOELECTRIC SENSORS

WT- B12H-24161120A00ZDZZZZZZZZ1

ORDERING INFORMATION

| Type | part no. |
|-------------------------------|----------|
| WTB12H-24161120A00ZDZZZZZZZZ1 | 1150614 |

Further device versions and accessories at www.sick.com/W12



Illustration may differ

DETAILED TECHNICAL DATA

FEATURES

| | | |
|---|---|--|
| Functional principle | Photoelectric proximity sensor | |
| Functional principle detail | Background suppression | |
| Sensing range | Sensing range min. | 15 mm |
| | Sensing range max. | 800 mm |
| Adjustable switching threshold for background suppression | 40 mm ... 800 mm | |
| Reference object | Object with 90% remission factor (complies with standard white according to DIN 5033) | |
| Minimum distance between set sensing range and background (black 6% / white 90%) | 11 mm, at a distance of 300 mm | |
| Recommended sensing range for the best performance | 50 mm ... 350 mm | |
| Emitted beam | Light source | Hybrid LED |
| | Type of light | Infrared light |
| | Shape of light spot | Point-shaped |
| | Light spot size (distance) | 10 mm (300 mm) |
| Maximum dispersion of the emitted beam around the standardized transmission axis (squint angle) | < +/- 1.0° (at T ₀ = +23 °C) | |
| Focus position | 600 mm | |
| Key LED figures | Normative reference | EN 62471:2008-09 IEC 62471:2006, modified |
| | LED risk group marking | Free group |
| | Wave length | 875 nm |
| | Average service life | 100,000 h at T _a = +25 °C |
| 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 |
| Pilot transmission beam red | Hybrid LED: Alignment aid |

SAFETY-RELATED PARAMETERS

| | |
|-------------------------------|-------------|
| MTTF _D | 1,208 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 | 8 Bit |
| Process data structure | Bit 0 = switching signal Bit 1 = switching signal Q _{L1} Bit 2 = switching signal Q _{L2} Bit 3 ... 7 = empty |
| VendorID | 26 |
| DeviceID HEX | 0x8003A1 |
| DeviceID DEC | 8389537 |
| Compatible master port type | A |
| SIO mode support | Yes |

ELECTRONICS

| | | | | | | | | | | | | | | | | | | | | | |
|---------------------------------------|--|------------------------------|--|---------------------------------------|--|------------------------------|---|---------------------------------------|--|-----------------------------|----------------------------------|---------------------------------|----------|----------------------------|--|---------------|----------|-------------------------------|--------|---------------------|----------|
| Supply voltage U _B | 10 V DC ... 30 V DC ¹⁾ | | | | | | | | | | | | | | | | | | | | |
| Ripple | ≤ 5 V | | | | | | | | | | | | | | | | | | | | |
| Usage category | DC-12 (According to EN 60947-5-2) DC-13 (According to EN 60947-5-2) | | | | | | | | | | | | | | | | | | | | |
| Current consumption | ≤ 40 mA, without load. At U _B = 24 V | | | | | | | | | | | | | | | | | | | | |
| Protection class | III | | | | | | | | | | | | | | | | | | | | |
| Digital output | <table border="0"> <tr> <td>Number</td> <td>2 (Complementary)</td> </tr> <tr> <td>Type</td> <td>Push-pull: PNP/NPN</td> </tr> <tr> <td>Switching mode</td> <td>Light/dark switching</td> </tr> <tr> <td>Signal voltage PNP HIGH/LOW</td> <td>Approx. U_B - 2.5 V / 0 V</td> </tr> <tr> <td>Signal voltage NPN HIGH/LOW</td> <td>Approx. U_B / < 2.5 V</td> </tr> <tr> <td>Output current I_{max}</td> <td>≤ 100 mA</td> </tr> <tr> <td>Circuit protection outputs</td> <td>Reverse polarity protected Overcurrent protected Short-circuit protected</td> </tr> <tr> <td>Response time</td> <td>≤ 330 μs</td> </tr> <tr> <td>Repeatability (response time)</td> <td>100 μs</td> </tr> <tr> <td>Switching frequency</td> <td>1,500 Hz</td> </tr> </table> | 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 | ≤ 330 μs | Repeatability (response time) | 100 μs | Switching frequency | 1,500 Hz |
| 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 | ≤ 330 μs | | | | | | | | | | | | | | | | | | | | |
| Repeatability (response time) | 100 μs | | | | | | | | | | | | | | | | | | | | |
| Switching frequency | 1,500 Hz | | | | | | | | | | | | | | | | | | | | |
| Pin/Wire assignment | <table border="0"> <tr> <td>Function of pin 4/black (BK)</td> <td>Digital output, light switching, object present → output Q_{L1} HIGH ²⁾ IO-Link communication C</td> </tr> <tr> <td>Function of pin 4/black (BK) – detail</td> <td>The pin 4 function of the sensor can be configured Additional possible settings via IO-Link</td> </tr> <tr> <td>Function of pin 2/white (WH)</td> <td>Digital output, dark switching, object present → output Q_{L1} LOW ²⁾</td> </tr> <tr> <td>Function of pin 2/white (WH) – detail</td> <td>The pin 2 function of the sensor can be configured</td> </tr> </table> | Function of pin 4/black (BK) | Digital output, light switching, object present → output Q _{L1} HIGH ²⁾ IO-Link communication C | 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, dark switching, object present → output Q _{L1} LOW ²⁾ | Function of pin 2/white (WH) – detail | The pin 2 function of the sensor can be configured | | | | | | | | | | | | |
| Function of pin 4/black (BK) | Digital output, light switching, object present → output Q _{L1} HIGH ²⁾ IO-Link communication C | | | | | | | | | | | | | | | | | | | | |
| 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, dark switching, object present → output Q _{L1} LOW ²⁾ | | | | | | | | | | | | | | | | | | | | |
| Function of pin 2/white (WH) – detail | The pin 2 function of the sensor can be configured | | | | | | | | | | | | | | | | | | | | |

¹⁾ Limit values.

²⁾ This switching output must not be connected to another output.

| | |
|--|--|
| | Additional possible settings via IO-Link |
|--|--|

¹⁾ Limit values.

²⁾ This switching output must not be connected to another output.

MECHANICS

| | | | | | | | |
|--|--|---------|---------------------|--------------|---------------|----------------|------------------|
| Housing | Rectangular | | | | | | |
| Dimensions (W x H x D) | 15.6 mm x 49.5 mm x 43.1 mm | | | | | | |
| Connection | Male connector M12, 4-pin | | | | | | |
| Material | <table border="0"> <tr> <td style="padding-right: 20px;">Housing</td> <td>Metal, zinc diecast</td> </tr> <tr> <td>Front screen</td> <td>Plastic, PMMA</td> </tr> <tr> <td>Male connector</td> <td>Plastic, VISTAL®</td> </tr> </table> | Housing | Metal, zinc diecast | Front screen | Plastic, PMMA | Male connector | Plastic, VISTAL® |
| Housing | Metal, zinc diecast | | | | | | |
| Front screen | Plastic, PMMA | | | | | | |
| Male connector | Plastic, VISTAL® | | | | | | |
| Weight | Approx. 77 g | | | | | | |
| Maximum tightening torque of the fixing screws | 1.4 Nm | | | | | | |

AMBIENT DATA

| | |
|-------------------------------------|---|
| Enclosure rating | IP66 (EN 60529) IP67 (EN 60529) IP69 (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 | 50 g, 11 ms (25 positive and 25 negative shocks along X, Y, Z axes, 150 total shocks (EN60068-2-27)) |
| Vibration resistance | 10 Hz ... 2,000 Hz (Amplitude 0.5 mm / 10 g, 20 sweeps per axis, for X, Y, Z axes, 1 octave/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: 1300 Hz ¹⁾ IOL: 1200 Hz ²⁾ |
| Response time | SIO Logic: 390 μs ¹⁾ IOL: 420 μs ²⁾ |
| Repeatability | SIO Logic: 140 μs ¹⁾ IOL: 170 μs ²⁾ |
| Switching signal | Switching signal Q _{cl} 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.

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.

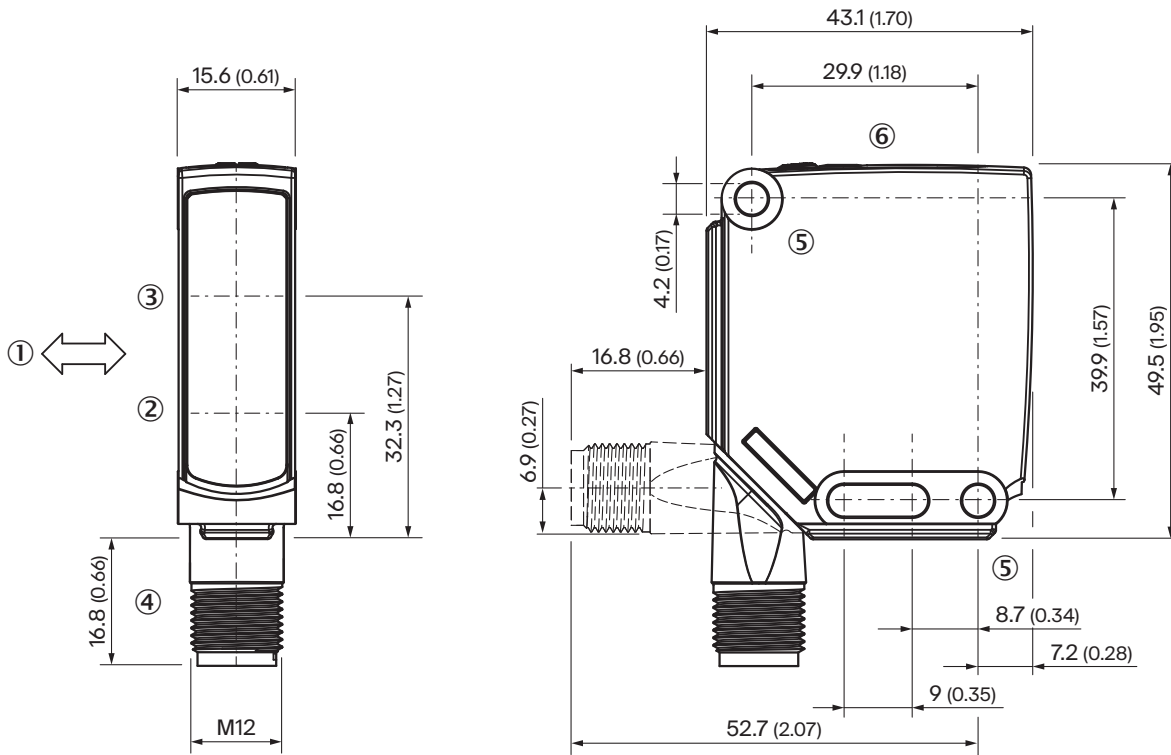
DIAGNOSIS

| | | |
|---|-----------------|--------------------------------------|
| 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 | ✓ |
| Photobiological safety (IEC EN 62471) | ✓ |
| Information according to Art. 3 of Data Act (Regulation EU 2023/2854) | ✓ |

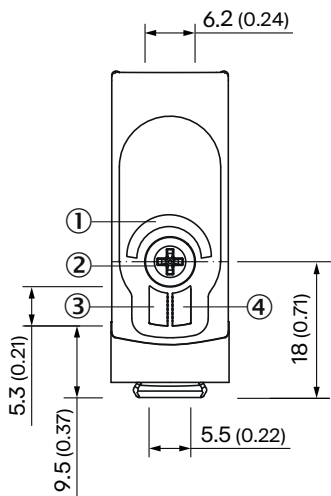
DIMENSIONAL DRAWING, SENSOR



Dimensions in mm (inch)

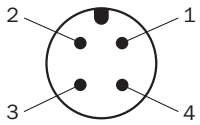
- ① Standard direction of the material being detected
- ② Center of optical axis, sender
- ③ Center of optical axis, receiver
- ④ Connection
- ⑤ Mounting hole, Ø 4.2 mm
- ⑥ display and adjustment elements

DISPLAY AND ADJUSTMENT ELEMENTS

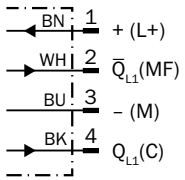


- ① LED blue
- ② Teach-Turn adjustment
- ③ LED green
- ④ LED yellow

CONNECTION TYPE M12 MALE CONNECTOR, 4-PIN



CONNECTION DIAGRAM CD-490



TRUTH TABLE PUSH-PULL: PNP/NPN - LIGHT SWITCHING Q

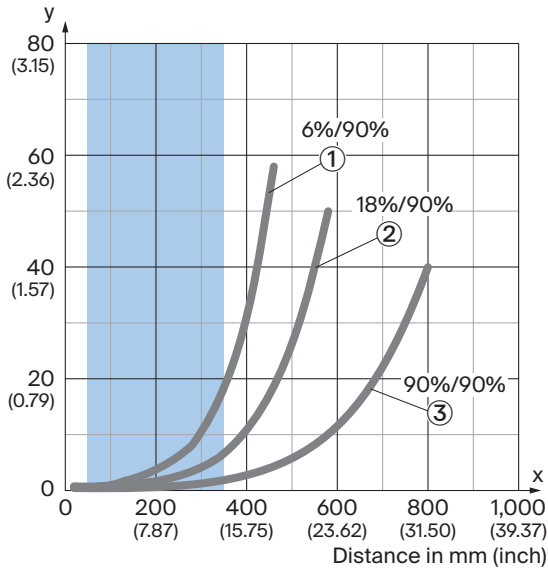
| | Light switching Q (normally open (upper switch), normally closed (lower switch)) | |
|-------------------------|--|------------------------------|
| | Object not present → Output LOW | Object present → Output HIGH |
| Light receive | ✗ | ✔ |
| Light receive indicator | ✗ | 💡 |
| Load resistance to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

TRUTH TABLE PUSH-PULL: PNP/NPN - DARK SWITCHING \bar{Q}

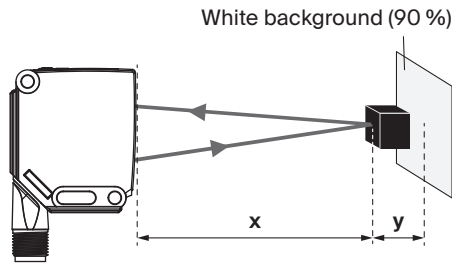
| | Dark switching \bar{Q} (normally closed (upper switch), normally open (lower switch)) | |
|-------------------------|---|-----------------------------|
| | Object not present → Output HIGH | Object present → Output LOW |
| Light receive | ⊗ | ✓ |
| Light receive indicator | ⊗ | ☀ |
| Load resistance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

CHARACTERISTIC CURVE

Minimum distance in mm (y) between the set sensing range and white background (90 % remission)



Example:
Safe suppression of the background



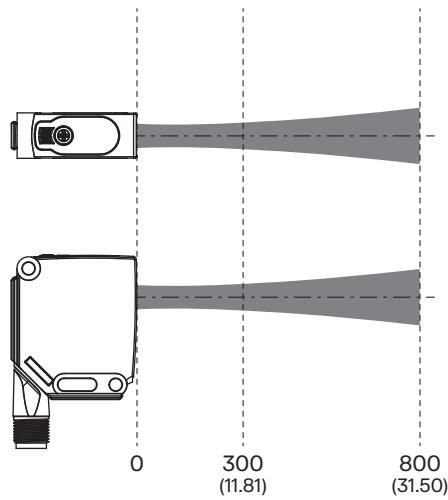
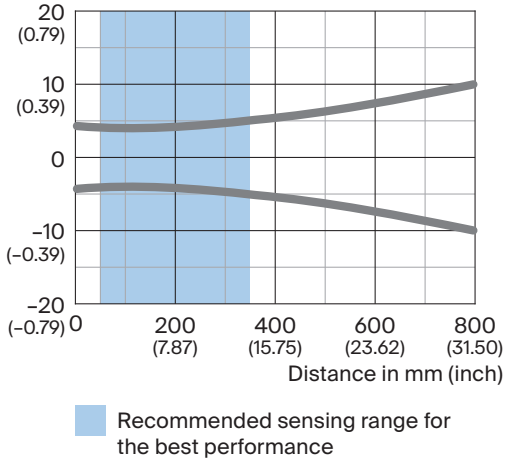
Black object (6 % remission)
Set sensing range $x = 300$ mm
Needed minimum distance to white background $y = 11$ mm

Recommended sensing range for the best performance

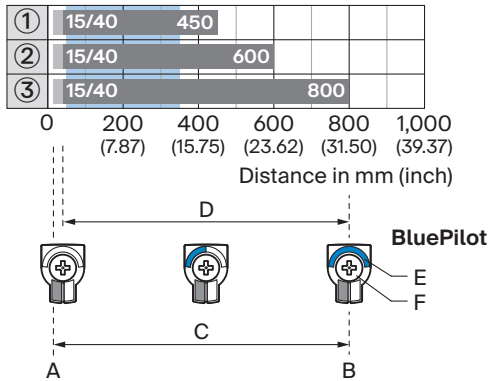
- ① Sensing range on black, 6% remission factor
- ② Sensing range on gray, 18% remission factor
- ③ Sensing range on white, 90% remission factor

LIGHT SPOT SIZE

Dimensions in mm (inch)



SENSING RANGE DIAGRAM



Recommended sensing range for the best performance

| | |
|---|---|
| 1 | Black object, 6% remission factor |
| 2 | Gray object, 18% remission factor |
| 3 | White object, 90% remission factor |
| A | Sensing range min. in mm |
| B | Sensing range max. in mm |
| C | Field of view |
| D | Adjustable switching threshold for background suppression |
| E | Sensing range indicator |
| F | Teach-Turn adjustment |

Further information as well as suitable accessories, example applications and downloads such as CAD dimensional models, operating instructions and software can be found at www.sick.com/1150614



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SICK AT A GLANCE

SICK is a leading global technology company for intelligent sensors and integrated solutions in industrial automation. Our technologies set benchmarks, making your industrial processes more efficient, safer and more sustainable – both in logistics and manufacturing operations.

SICK combines sensor intelligence with industry expertise and certified consulting services. We provide the ideal foundation for scalable as well as tailor-made automation solutions and create added value along the entire value chain. Our close partnerships with our customers are more than just a promise: Together, we optimize productivity, improve quality, protect health and safety, and help build a sustainable future. All with empathy and trust.

Since 1946, we have been developing innovative technologies with passion and a pioneering spirit. With a global network in around 40 countries, SICK has a global presence and is always close by. The company's headquarters are located in Waldkirch near Freiburg, Germany. Our customers benefit from our understanding of both local and global requirements, which enables us to deliver tailor-made solutions

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