W 150: Miniature photoelectric switch series with fully integrated electronics

Despite their miniature housing, the W 150 photoelectric switches have exactly the same system characteristics and features as standard photoelectric switches. They are especially characterised by their large scanning ranges. W 150 units are ideal for use at locations where installation space is limited.

They are, therefore, particularly suitable for the following areas of application:
- electronic component and printed circuit board production,
- the packaging and printing industries,
- assembly and handling systems,
- the construction of special-purpose machines.

The optical systems of the W 150 series and their scanning ranges:
- WS/WE 150 through-beam photoelectric switch: 4 m, slotted masks available as accessories,
- WL 150 photoelectric reflex switch: 2 m (PL 80 A), with polarising filter,
- WL 150 photoelectric reflex switch with enhanced sensitivity: especially suitable for detecting transparent objects such as glass and film,
- WT 150 photoelectric proximity switch, energetic: scanning distance 200 mm (90 % remission), for standard scanning tasks. With background suppression: scanning distance 100 mm on white, adjustable; for reliable operation in applications with background interference.

All electrical and mechanical values meet the standards for low-voltage devices: potentiometer for adjustment, IP 67, $V_S = 10\ldots30$ V DC, PNP or NPN switching output, M 8 plug or cable...

An added bonus: the visible red light of the sender LED facilitates handling.
WT 150 photoelectric proximity switch with background suppression used to detect wafer cassettes in a clean room through a glass window.

Minimum space requirements – maximum power: WT 150 miniature photoelectric proximity switch used to check the presence of printed circuit boards in the automated production of electronic components.

WT 150 photoelectric proximity switches with background suppression (BGS) used for the reliable detection of bread and confectionery on a conveyor belt – even if the distance between the scanned surface of the object being transported and the surface of the conveyor belt varies slightly.

Electronic components are coated with extremely thin transparent films during the production process. A WL 150 photoelectric reflex switch with decreased switching hysteresis is used for reliable detection of the film.
### WT 150 Photoelectric proximity switches, background suppression, red light – DC

- **Scanning distance**: 2...100 mm
- **Photoelectric proximity switches**

- With background suppression for reliable detection of dark objects, even in front of light backgrounds
- Switching point is largely independent of colour and surface of object
- Scanning distance continuously variable, control using 5-turn adjustment screw

### Adjustments possible

- WT 150-P 162
- WT 150-N 162
- WT 150-P 460
- WT 150-N 460

### Connection types

- WT 150-P 162
- WT 150-N 162
- WT 150-P 460
- WT 150-N 460

- **Accessories**: page 496
- **Cable receptacles**: 4-pin, M 8
- **Mounting brackets Type A**: 510

* included with delivery
### Technical data

#### Scanning distance, max. typical
2...100 mm, adjustable

#### Operating distance
Scanned object with 90% remission:
- Min. 2...6 mm to max. 10...100 mm
Scanned object with 18% remission:
- Min. 2...6 mm to max. 10...80 mm
Scanned object with 6% remission:
- Min. 3...6 mm to max. 10...60 mm

#### Background suppression
Potentiometer, 5 revolutions

#### (see characteristic curve)

### Light source and light type
- LED, visible red light
- Light spot diameter: approx. 4 mm at 40 mm
- Angle of dispersion of sender: approx. 5°

### Supply voltage
10...30 V DC

### Ripple
± 10%

### Current consumption
≤ 20 mA

### Max. output current
100 mA

### Switching outputs
- PNP, open collector: Q
- NPN, open collector: Q

### Max. switching frequency
1000/s

### Connection types
- cable: PVC, 2 mm²; 4 x 0.18 mm², Ø 3.5 mm
- plug: M 8 – 4-pin

### VDE protection class

### Circuit protection
A, B, C, D

### Enclosure rating
IP 67

### Ambient temperature
- Operation: –25 °C...+55 °C
- Storage: –40 °C...+75 °C

### Weight
- with cable 2 m: Approx. 44 g
- with plug M 8 – 4-pin: Approx. 7 g

### Housing material
- Housing: ABS / optics: PC

### Order information

#### Type
- WT 150-P 162
- WT 150-P 460
- WT 150-N 162
- WT 150-N 460

#### Part no.
- 6 011 048
- 6 011 050
- 6 011 045
- 6 011 047

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### Scanning distance

1. Scanning distance control set to MIN
2. Scanning distance control set to MAX

### Order information

#### Type
- WT 150-P 162
- WT 150-P 460
- WT 150-N 162
- WT 150-N 460

#### Part no.
- 6 011 048
- 6 011 050
- 6 011 045
- 6 011 047

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### Diagram

- WT 150 BGS
- 6%/90%
- 18%/90%
- 90%/90%

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### Notes
- 1) Object with 90 % remission (based on standard white to DIN 5033)
- 2) Average service life 100,000 h where TA = + 25 °C
- 3) Limit values
- 4) May not exceed or fall short of VS tolerances
- 5) Without load
- 6) Control cable open: NPN; light-switching
- 7) Signal transit time with resistive load
- 8) With light/dark ratio 1:1
- 9) Do not bend below 0 °C
- 10) Reference voltage 50 V DC
- 11) A = Vₜ connections reverse-polarity protected
- 12) Black = 6 % remission
- 13) Grey = 18 % remission
- 14) White = 90 % remission
- 15) Do not load
- 16) Control cable open: PNP; dark-switching
- 17) B = Inputs and outputs reverse-polarity protected
- 18) Interference pulse suppression
- 19) Outputs overcurrent and short-circuit protected
- 20) Black = 6 % remission
- 21) Grey = 18 % remission
- 22) White = 90 % remission
WT 150 Photoelectric proximity switches, energetic, red light – DC

- Energetic photoelectric proximity switches
  - for standard applications
  - for simple contrast detection
- Switching point adjustable with sensitivity potentiometer

**Accessories**

<table>
<thead>
<tr>
<th>Accessories</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable receptacles</td>
<td>496</td>
</tr>
<tr>
<td>Mounting brackets Type A*</td>
<td>510</td>
</tr>
</tbody>
</table>

* included with delivery

**Adjustments possible**

1. Centre of optical axis, receiver
2. Centre of optical axis, sender
3. Mounting holes ø 3.2 m
4. Sensitivity adjustment 270°
5. LED indicator, red:
   - Light received ≥ switching threshold
6. M 8 plug – 4-pin or connecting cable

**Connection types**

- WT 150-P 132
- WT 150-N 132
- WT 150-P 430
- WT 150-N 430

**Dimensional drawing**
### Technical data

<table>
<thead>
<tr>
<th>WT 150-</th>
<th>P 132</th>
<th>P 430</th>
<th>N 132</th>
<th>N 430</th>
</tr>
</thead>
</table>

#### Scanning distance, max. typical
10...250 mm<sup>1)</sup>

#### Operating distance
10...200 mm<sup>1)</sup>

#### Sensitivity, adjustable
Potentiometer, 270°

#### Light source<sup>2)</sup>, light type
LED, red light

#### Light spot diameter
Approx. 20 mm at 200 mm

#### Angle of dispersion of sender
Approx. 6°

#### Supply voltage $V_S$
10...30 V DC<sup>3)</sup>

#### Ripple<sup>4)</sup>
± 10 %

#### Current consumption<sup>5)</sup>
≤ 20 mA

#### Switching outputs
PNP, open collector: Q

#### NPN, open collector: Q

#### Max. output current $I_A$
100 mA

#### Switching mode<sup>6)</sup>
Dark-/light-switching via control cable L/D

#### + $V_S$ = light-switching

#### 0 V = dark-switching

#### Response time<sup>7)</sup>
≤ 0.5 ms

#### Max. switching frequency<sup>8)</sup>
1000/s

#### Connection types
- **cable**: PVC, 2 m<sup>9)</sup>; 4 x 0.18 mm<sup>2</sup>, Ø 3.5 mm
- **plug**: M 8 – 4-pin

#### VDE protection class<sup>10)</sup>

#### Circuit protection<sup>11)</sup>
A, B, C, D

#### Enclosure rating
IP 67

#### Ambient temperature $T_A$
- **Operation**: –25 °C...+55 °C
- **Storage**: –40 °C...+70 °C

#### Weight
- With cable 2 m: Approx. 44 g
- With plug M 8 – 4-pin: Approx. 7 g

#### Housing material
Housing: ABS/optics: PC

---

1) Object with 90 % remission (based on standard white to DIN 5033)
2) Average service life 100,000 h where $T_A = +25 ^\circ C$
3) Limit values
4) May not exceed or fall short of $V_S$ tolerances
5) Without load
7) Signal transit time with resistive load
8) With light/dark ratio 1:1
9) Do not bend below 0 °C
10) Reference voltage 50 V DC
11) A = $V_S$ connections reverse-polarity protected
   B = Inputs and outputs reverse-polarity protected
   C = Interference pulse suppression
   D = Outputs overcurrent and short-circuit protected

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#### Scanning distance

<table>
<thead>
<tr>
<th>1</th>
<th>10</th>
<th>70</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>10</td>
<td>100</td>
<td>150</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
<td>200</td>
<td>250</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>0 (mm)</th>
<th>100</th>
<th>200</th>
<th>300</th>
</tr>
</thead>
</table>

- **Operating distance**
- **Scanning distance** max. typical

#### Order information

<table>
<thead>
<tr>
<th>Type</th>
<th>Part no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WT 150-P 132</td>
<td>6 011 042</td>
</tr>
<tr>
<td>WT 150-N 132</td>
<td>6 011 044</td>
</tr>
<tr>
<td>WT 150-P 430</td>
<td>6 011 039</td>
</tr>
<tr>
<td>WT 150-N 430</td>
<td>6 011 041</td>
</tr>
</tbody>
</table>

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- **Scanning distance on black, 6 % remission**
- **Scanning distance on grey, 18 % remission**
- **Scanning distance on white, 90 % remission**
WL 150 Photoelectric reflex switches, red light – DC

- Scanning range 0.005…2.4 m

**Photoelectric reflex switches**

- Polarising filter which also permits reliable detection of objects with shiny surfaces
- Also suitable for "Diamond Grade" reflective tape
- Adjustable sensitivity

**Adjustments possible**

1. Centre of optical axis, receiver
2. Centre of optical axis, sender
3. Mounting hole Ø 3.2 mm
4. Sensitivity adjustment 270°
5. LED indicator, red: Light received ≥ switching threshold
6. M 8 plug – 4-pin or cable

**Connection types**

| WL 150-P 132 | WL 150-P 430 |
| WL 150-N 132 | WL 150-N 430 |

**Accessories**

- Cable receptacles: page 496
- Mounting brackets Type A*: page 510
- Refectors**: page 520

* included with delivery
** reflector PL 20 A included with delivery

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**Dimensional drawing**
### Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scanning range</strong>, max. typical</td>
<td>0.005…2.4 m/PL 80 A</td>
</tr>
<tr>
<td>on reflector</td>
<td>0.005…1.0 m/PL 20 A</td>
</tr>
<tr>
<td>(included)</td>
<td></td>
</tr>
<tr>
<td><strong>Operating range</strong></td>
<td>0.01…0.8 m/PL 20 A</td>
</tr>
<tr>
<td>Sensitivity, adjustable</td>
<td>Potentiometer 270°</td>
</tr>
<tr>
<td><strong>Light source</strong>, light type</td>
<td>LED, visible red light with polarising filter</td>
</tr>
<tr>
<td>Light spot diameter</td>
<td>Approx. 150 mm at 1.5 m</td>
</tr>
<tr>
<td>Angle of dispersion, sender</td>
<td>Approx. 6°</td>
</tr>
<tr>
<td><strong>Supply voltage</strong> $V_S$</td>
<td>10…30 V DC$^2$</td>
</tr>
<tr>
<td>Ripple$^3$</td>
<td>$\pm$ 10%</td>
</tr>
<tr>
<td>Current consumption$^4$</td>
<td>$\leq$ 20 mA</td>
</tr>
</tbody>
</table>

### Switching outputs

<table>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNP, open collector: Q</td>
<td></td>
</tr>
<tr>
<td>NPN, open collector: Q</td>
<td></td>
</tr>
<tr>
<td><strong>Max. output current</strong> $I_M$</td>
<td>100 mA</td>
</tr>
<tr>
<td><strong>Switching mode</strong>$^5$</td>
<td>Dark-/light-switching via control cable L/D</td>
</tr>
<tr>
<td>$+ V_S$ = light-switching</td>
<td></td>
</tr>
<tr>
<td>$0 \ V$ = dark-switching</td>
<td></td>
</tr>
<tr>
<td><strong>Response time</strong>$^6$</td>
<td>$\leq$ 0.5 ms</td>
</tr>
<tr>
<td><strong>Max. switching frequency</strong>$^7$</td>
<td>1000/s</td>
</tr>
</tbody>
</table>

### Connection types

<table>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable</td>
<td>PVC, 2 m$^8$: 4 x 0.18 mm², $\varnothing$ 3.5 mm</td>
</tr>
<tr>
<td>Plug</td>
<td>M 8 – 4-pin</td>
</tr>
</tbody>
</table>

### VDE protection class$^9$ |

<table>
<thead>
<tr>
<th>Protection</th>
<th>Classification</th>
</tr>
</thead>
</table>

### Circuit protection$^{10}$ |

<table>
<thead>
<tr>
<th>Protection</th>
<th>Classification</th>
</tr>
</thead>
</table>

### Enclosure rating |

<table>
<thead>
<tr>
<th>Protection</th>
<th>Classification</th>
</tr>
</thead>
</table>

### Ambient temperature $T_A$

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation</td>
<td>$-25 \ ^\circ C \ldots +55 \ ^\circ C$</td>
</tr>
<tr>
<td>Storage</td>
<td>$-40 \ ^\circ C \ldots +75 \ ^\circ C$</td>
</tr>
</tbody>
</table>

### Weight

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>With cable (2 m)</td>
<td>Approx. 44 g</td>
</tr>
<tr>
<td>With M 8 plug – 4-pin</td>
<td>Approx. 7 g</td>
</tr>
</tbody>
</table>

### Housing material

<table>
<thead>
<tr>
<th>Material</th>
<th>Classification</th>
</tr>
</thead>
</table>

### Scanning range and operating reserve

<table>
<thead>
<tr>
<th>Reflector type</th>
<th>Operating range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 PL 80 A</td>
<td>0.01…2 m</td>
</tr>
<tr>
<td>2 P 250</td>
<td>0.01…1.5 m</td>
</tr>
<tr>
<td>3 PL 50 A or PL 40 A</td>
<td>0.01…1.5 m</td>
</tr>
<tr>
<td>4 PL 30 A or PL 31 A</td>
<td>0.01…1.2 m</td>
</tr>
<tr>
<td>5 PL 20 A</td>
<td>0.01…0.8 m</td>
</tr>
<tr>
<td>6 Reflect. tape «Diamond Grade»</td>
<td>0.01…0.5 m</td>
</tr>
</tbody>
</table>

### Order information

<table>
<thead>
<tr>
<th>Type</th>
<th>Part no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WL 150-P 132</td>
<td>6 011 036</td>
</tr>
<tr>
<td>WL 150-P 430</td>
<td>6 011 038</td>
</tr>
<tr>
<td>WL 150-N 132</td>
<td>6 011 033</td>
</tr>
<tr>
<td>WL 150-N 430</td>
<td>6 011 035</td>
</tr>
</tbody>
</table>
WL 150 Photoelectric reflex switches, for transparent objects, red light – DC

- Scanning range: 0.01...0.7 m
- Photoelectric reflex switches

- Ideal for detecting glass, transparent films or small parts
- Detection reliability:
  - min. attenuation 20%
  - min. transmission variation 15%
- Adjustable sensitivity

**Dimensions**

- Centre of optical axis, receiver: 1
- Centre of optical axis, sender: 2
- Mounting hole Ø 3.2 mm: 3
- Sensitivity adjustment 270°: 4
- LED indicator, red:
  - Light received ≥ switching threshold: 5
- M8 plug – 4-pin or cable: 6

**Connection types**

- WL 150-P 122
- WL 150-N 122
- WL 150-P 420
- WL 150-N 420

**Accessories**

<table>
<thead>
<tr>
<th>Accessory</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable receptacles</td>
<td>496</td>
</tr>
<tr>
<td>Mounting brackets Type A*</td>
<td>510</td>
</tr>
<tr>
<td>Reflectors**</td>
<td>520</td>
</tr>
</tbody>
</table>

* Included with delivery
** Reflector PL 20 A included with delivery
## Technical data

### WL 150-...

#### WL 150-P 122

#### WL 150-P 420

#### WL 150-N 122

#### WL 150-N 420

### Detection of transparent objects

<table>
<thead>
<tr>
<th>Attenuation along light beam</th>
<th>min. 20 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attenuation difference along light beam</td>
<td>min. 15 %</td>
</tr>
<tr>
<td>Attenuation difference of object</td>
<td>min. 7.5 %</td>
</tr>
</tbody>
</table>

### Scanning range, max. typical /

<table>
<thead>
<tr>
<th>Type</th>
<th>Part no.</th>
<th>WL 150-P 122</th>
<th>WL 150-P 420</th>
<th>WL 150-N 122</th>
<th>WL 150-N 420</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL 80 A</td>
<td>6 020 686</td>
<td>0.01 ... 0.70 m</td>
<td>0.01 ... 0.35 m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PL 20 A</td>
<td>6 020 685</td>
<td>0.01 ... 0.60 m</td>
<td>0.01 ... 0.30 m</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Operating range

<table>
<thead>
<tr>
<th>Type</th>
<th>Part no.</th>
<th>WL 150-P 122</th>
<th>WL 150-P 420</th>
<th>WL 150-N 122</th>
<th>WL 150-N 420</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL 80 A</td>
<td>6 020 686</td>
<td>0.01 ... 0.60 m</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>PL 20 A</td>
<td>6 020 685</td>
<td>0.01 ... 0.60 m</td>
<td>0.01 ... 0.30 m</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Light source, light type

- LED, visible red light

### Light spot diameter

- Approx. 40 mm at 0.3 mm

### Angle of dispersion of sender

- Approx. 7.5°

### Supply voltage $V_S$

- $10 ... 30 \text{ V DC}$

### Ripple

- $\pm 10 \%$

### Current consumption

- $\leq 30 \text{ mA}$

### Switching outputs

- PNP, open collector: $Q$
- NPN, open collector: $Q$

### Max. output current $I_{ox}$

- $100 \text{ mA}$

### Supply voltage $V_S$

- $10 ... 30 \text{ V DC}$

### Circuit protection

- A, B, C, D

### Enclosure rating

- IP 67

### Ambient temperature $T_A$

- Operation: $-25 °C ... +55 °C$
- Storage: $-40 °C ... +75 °C$

### Poids

- with cable 2 m: Approx. 44 g
- with plug M 8 – 4-pin: Approx. 7 g

### Housing material

- Housing: ABS / optics: PC

### Reflector type

<table>
<thead>
<tr>
<th>Type</th>
<th>Operating range</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL 80 A</td>
<td>0.01 ... 0.60 m</td>
</tr>
<tr>
<td>PL 20 A</td>
<td>0.01 ... 0.30 m</td>
</tr>
</tbody>
</table>

### Light source, light type

1. LED, visible red light
2. LED, visible green light

### Angle of dispersion of sender

- Approx. 7.5°

### Operating range

<table>
<thead>
<tr>
<th>Type</th>
<th>Part no.</th>
<th>WL 150-P 122</th>
<th>WL 150-P 420</th>
<th>WL 150-N 122</th>
<th>WL 150-N 420</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL 80 A</td>
<td>6 020 686</td>
<td>0.01 ... 0.60 m</td>
<td>0.01 ... 0.30 m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PL 20 A</td>
<td>6 020 685</td>
<td>0.01 ... 0.60 m</td>
<td>0.01 ... 0.30 m</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Light source, light type

1. LED, visible red light
2. LED, visible green light

### Angle of dispersion of sender

- Approx. 7.5°

### Operating range

<table>
<thead>
<tr>
<th>Type</th>
<th>Part no.</th>
<th>WL 150-P 122</th>
<th>WL 150-P 420</th>
<th>WL 150-N 122</th>
<th>WL 150-N 420</th>
</tr>
</thead>
<tbody>
<tr>
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<td>6 020 686</td>
<td>0.01 ... 0.60 m</td>
<td>0.01 ... 0.30 m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PL 20 A</td>
<td>6 020 685</td>
<td>0.01 ... 0.60 m</td>
<td>0.01 ... 0.30 m</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
WS/WE 150 Through-beam photoelectric switches, red light – DC

- Slotted masks 0.5 mm, 1 mm and 2 mm for detection of small parts or for positioning tasks
- Adjustable sensitivity
- Direct voltage supply 10…30 V DC

**Adjustments possible**

- Centre of optical axis, sender (WS)
- Centre of optical axis, receiver (WE)
- Mounting holes Ø 3.2 mm
- Sensitivity adjustment 270° (WE only)
- LED indicator, red (WE only):
  - Light received ≥ switching threshold
- M 8 plug – 4-pin or cable

**Connection types**

- WS/WE150-P132
- WS/WE150-N132
- WS/WE150-P430
- WS/WE150-N430

**Accessories**

- Cable receptacles 496
- Mounting brackets Type A* 510
- Slotted masks 556

* included with delivery

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**Dimensional drawing**

- Scanning range 4.4 m
- Through-beam photoelectric switches

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**Connector types**

<table>
<thead>
<tr>
<th>Sender</th>
<th>Receiver</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x 0.18 mm²</td>
<td>4-pin, M 8</td>
</tr>
<tr>
<td>4 x 0.18 mm²</td>
<td>4-pin, M 8</td>
</tr>
</tbody>
</table>

---

**CE, UL**
### Technical data

<table>
<thead>
<tr>
<th>Scanning range, max. typical</th>
<th>4.4 m</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating range</strong></td>
<td>4 m</td>
</tr>
<tr>
<td><strong>Operating range with mask</strong></td>
<td></td>
</tr>
<tr>
<td>Aperture width 2.0 mm</td>
<td>2.0 m</td>
</tr>
<tr>
<td>Aperture width 1.0 mm</td>
<td>1.0 m</td>
</tr>
<tr>
<td>Aperture width 0.5 mm</td>
<td>0.5 m</td>
</tr>
<tr>
<td><strong>Sensitivity, adjustable</strong></td>
<td>Potentiometer, 270°</td>
</tr>
<tr>
<td><strong>Light source</strong>&lt;sup&gt;3&lt;/sup&gt;, light type</td>
<td>LED, red light</td>
</tr>
<tr>
<td><strong>Light spot diameter</strong></td>
<td>Approx. 400 mm at 4 mm</td>
</tr>
<tr>
<td><strong>Angle of dispersion of sender</strong></td>
<td>Approx. 6°</td>
</tr>
<tr>
<td><strong>Angle of reception of receiver</strong></td>
<td>Approx. 15°</td>
</tr>
<tr>
<td><strong>Supply voltage</strong>&lt;sup&gt;1&lt;/sup&gt;</td>
<td>10…30 V DC&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Ripple</strong>&lt;sup&gt;3&lt;/sup&gt;</td>
<td>± 10 %</td>
</tr>
<tr>
<td><strong>Current consumption</strong>&lt;sup&gt;4&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>sender</td>
<td>≤ 15 mA</td>
</tr>
<tr>
<td>receiver</td>
<td>≤ 20 mA</td>
</tr>
<tr>
<td><strong>Switching outputs</strong></td>
<td></td>
</tr>
<tr>
<td>PNP, open collector: Q</td>
<td></td>
</tr>
<tr>
<td>NPN, open collector: Q</td>
<td></td>
</tr>
<tr>
<td><strong>Max. output current</strong>&lt;sup&gt;1&lt;/sup&gt;</td>
<td>100 mA</td>
</tr>
<tr>
<td><strong>Switching mode</strong>&lt;sup&gt;5&lt;/sup&gt;</td>
<td>Dark-/light-switching via control cable L/D</td>
</tr>
<tr>
<td><strong>Response time</strong>&lt;sup&gt;6&lt;/sup&gt;</td>
<td>≤ 0.5 ms</td>
</tr>
<tr>
<td><strong>Max. switching frequency</strong>&lt;sup&gt;7&lt;/sup&gt;</td>
<td>1000/s</td>
</tr>
<tr>
<td><strong>Connection types</strong></td>
<td>cable PVC, 2 m&lt;sup&gt;8&lt;/sup&gt;</td>
</tr>
<tr>
<td>sender WS</td>
<td>2 x 0.18 mm², φ 3.5 mm</td>
</tr>
<tr>
<td>receiver WE</td>
<td>4 x 0.18 mm², φ 3.5 mm</td>
</tr>
<tr>
<td><strong>Plug</strong></td>
<td>M 8 – 4-pin</td>
</tr>
<tr>
<td><strong>VDE protection class</strong>&lt;sup&gt;9&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td><strong>Circuit protection</strong>&lt;sup&gt;10&lt;/sup&gt;</td>
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</tr>
<tr>
<td><strong>Enclosure rating</strong></td>
<td>IP 67</td>
</tr>
<tr>
<td><strong>Ambient temperature</strong>&lt;sup&gt;11&lt;/sup&gt;</td>
<td>Operation –25 °C...+55 °C</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>Storage –40 °C...+70 °C</td>
</tr>
<tr>
<td>with cable 2 m</td>
<td></td>
</tr>
<tr>
<td>Sender: appr. 44 g, receiver: appr. 44 g</td>
<td></td>
</tr>
<tr>
<td>with plug</td>
<td>Sender: appr. 7 g, receiver: appr. 7 g</td>
</tr>
<tr>
<td><strong>Housing material</strong></td>
<td>Housing: ABS / optics: PC</td>
</tr>
</tbody>
</table>

#### Scanning range and operating reserve

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>0 (m)</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Operating range</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scanning range, max. typical</td>
<td>4.4</td>
<td>2.2</td>
<td>1.2</td>
<td>0.6</td>
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</tr>
</tbody>
</table>

#### Reduction in scanning range with slotted masks

1. Without slotted mask
2. Mask aperture width 2.0 mm
3. Mask aperture width 1.0 mm
4. Mask aperture width 0.5 mm

#### Order information

<table>
<thead>
<tr>
<th>Type</th>
<th>Part no.&lt;sup&gt;11&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>WS/WE 150-P132</td>
<td>6 011 030</td>
</tr>
<tr>
<td>WS/WE 150-P430</td>
<td>6 011 032</td>
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<tr>
<td>WS/WE 150-N132</td>
<td>6 011 027</td>
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<tr>
<td>WS/WE 150-N430</td>
<td>6 011 029</td>
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