

# HT10

## Laser light scanner with background suppression

en 01-2015/09 50130294



50 ... 8000mm



- Laser light scanner based on the principle of light propagation time measurement – simple operation using teachable switching points
- Sensor performance allows reliable detection of both glossy and less-reflective objects at extreme angles
- Preset hysteresis and reserve ensure reliable switching behavior
- Optimized for positioning applications and reliable object detection (e.g. compartment occupation check, shelf positioning, feed-through monitoring)
- External teach input for precise referencing (detection and storage of distance to the object)
- Window function

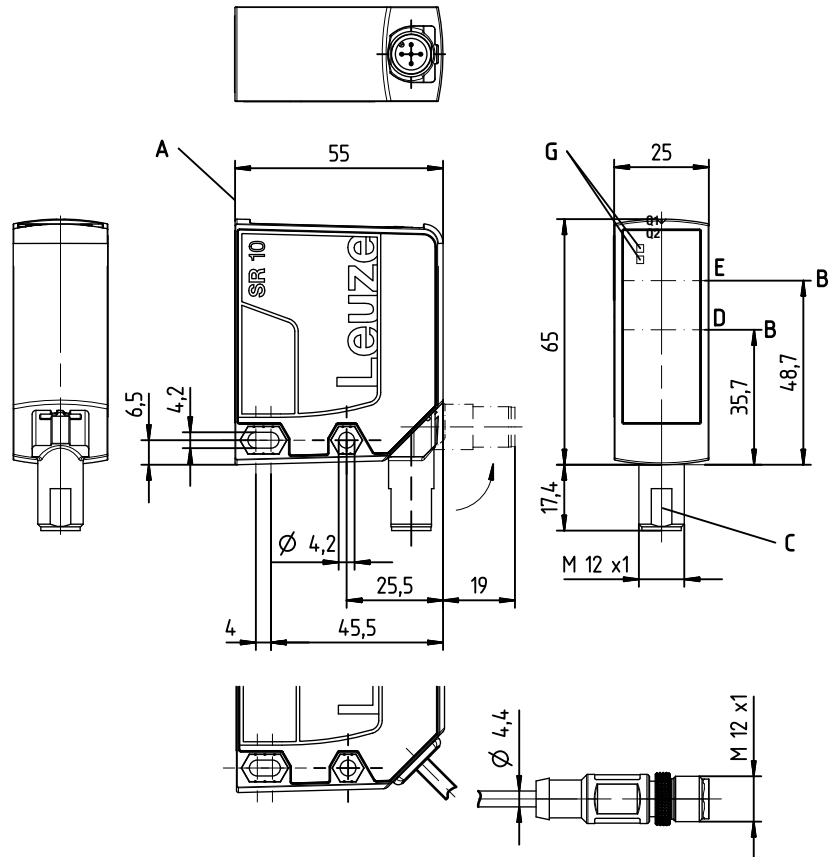


### Accessories:

(available separately)

- Mounting systems
- Cable with M12 connector (K-D ...)
- IO-Link master set  
SET MD12-US2-IL1.1 + accessories - diagnostics set (part no. 50121098)

### Dimensioned drawing



A Reference edge for the measurement

B Optical axis

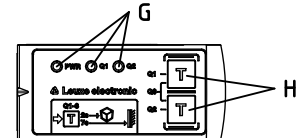
C Turning M12 connector, 90°

D Receiver

E Transmitter

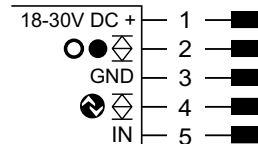
G Indicator diodes green/red (control panel)  
2 x yellow (control panel and lens cover)

H Key pad

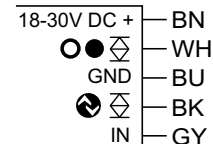


### Electrical connection

HT10L1.3/L6T-M12  
HT10L1.3/L6T.P1-M12  
HT10L1.3/L6T,200-M12



HT10L1.3/L6T



We reserve the right to make changes • DS\_HT10\_SON\_en\_50130294.fm

## Specifications

### Optical data

|                                                     |                                                |
|-----------------------------------------------------|------------------------------------------------|
| Typ. scanning range limit (white 90%) <sup>1)</sup> | 50 ... 8000mm                                  |
| Scanning range <sup>2)</sup>                        | 50 ... 3500mm                                  |
| Adjustment range (teach-in range)                   | 50 ... 8000/3500mm (90%/6% diffuse reflection) |
| Light source                                        | laser                                          |
| Laser class                                         | 1 (acc. to IEC 60825-1:2007)                   |
| Wavelength                                          | 658nm (visible red light)                      |
| Impulse duration                                    | 6ns                                            |
| Max. output power (peak)                            | 391mW                                          |
| Light spot                                          | approx. 7x7mm <sup>2</sup> at 7m               |

### Error limits

|                                        |         |
|----------------------------------------|---------|
| Accuracy <sup>3)</sup>                 | ± 30mm  |
| B/W detection thresh. (6 ... 90% rem.) | ± 10mm  |
| Temperature drift                      | ± 2mm/K |

### Timing

|                       |         |
|-----------------------|---------|
| Switching frequency   | 40Hz    |
| Response time         | < 50ms  |
| Delay before start-up | ≤ 300ms |

### Electrical data

|                                  |                                                                                                      |
|----------------------------------|------------------------------------------------------------------------------------------------------|
| Operating voltage U <sub>B</sub> | 18 ... 30VDC (incl. residual ripple)                                                                 |
| Residual ripple                  | ≤ 15% of U <sub>B</sub>                                                                              |
| Open-circuit current             | ≤ 150mA                                                                                              |
| Switching output                 | .../...6...<br>push-pull switching output <sup>4)</sup> ,<br>PNP light switching, NPN dark switching |
| Signal voltage high/low          | ≥ (U <sub>B</sub> -2 V)/≤ 2V                                                                         |
| IO-Link                          | COM2 (38.4kBaud), vers. 1.1, min. cycle time 2.3ms,<br>SIO is supported                              |

### Indicators

|                   |                        |                      |
|-------------------|------------------------|----------------------|
| Green/red LED     | green continuous light | ready                |
|                   | red                    | no signal            |
|                   | orange                 | warning, weak signal |
|                   | off                    | no voltage           |
| Yellow LEDs Q1/Q2 | on                     | object detected      |
|                   | off                    | object not detected  |

### Mechanical data

|                 |                                                                                                                                   |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Housing         | plastic                                                                                                                           |
| Optics cover    | glass                                                                                                                             |
| Weight          | 70g (M 12 connector)<br>133g (2m cable)<br>90g (cable with M 12 connector)                                                        |
| Connection type | turning M 12 connector, 90°<br>2m cable, core cross section 5 x 0.14mm <sup>2</sup> (5 x 26 AWG)<br>0.2m cable with M12 connector |

### Environmental data

|                                   |                                     |
|-----------------------------------|-------------------------------------|
| Ambient temp. (operation/storage) | -40 °C ... +50 °C/-40 °C ... +70 °C |
| Protective circuit <sup>5)</sup>  | 1, 2, 3                             |
| VDE safety class                  | III                                 |
| Degree of protection              | IP 67                               |
| Standards applied                 | IEC 60947-5-2                       |

### Options

#### Deactivation input

|                             |                         |
|-----------------------------|-------------------------|
| Transmitter inactive/active | ≥ 8V/≤ 2V <sup>6)</sup> |
| Activation/disable delay    | ≥ 20ms                  |
| Input resistance            | approx. 10kΩ            |

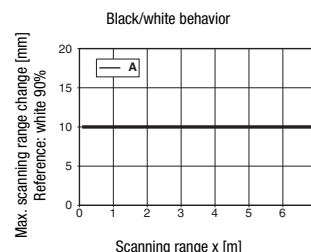
- 1) Typ. scanning range limit: max. attainable range without function reserve
- 2) Scanning range: recommended range with function reserve
- 3) For 50 ... 3500mm measurement range, luminosity coefficient 6% ... 90%, "Speed" operating mode, at 20 °C after 20min. warmup time, medium range of U<sub>B</sub>, measurement object ≥ 50x50mm<sup>2</sup>
- 4) The push-pull switching outputs must not be connected in parallel
- 5) 1=transient protection, 2=polarity reversal protection, 3=short circuit protection for all outputs
- 6) Upon deactivation of the laser, the outputs become inactive

## Tables

| Switching points <sup>1)</sup> | no reflection | object detected |
|--------------------------------|---------------|-----------------|
| Yellow LED Q 1                 | off           | on              |
| Yellow LED Q 2                 | off           | on              |

1) applies for object teach

## Diagrams



A 6 ... 90% diffuse reflection

## Remarks

### Adjusting the switching points

- **Object teach:**  
Align sensor with object.  
Q1: Press teach button 1 for approx. 2s,  
Q2: Press teach button 2 for approx. 2s.  
Switching point is taught.  
Object is detected if the respective Q1/Q2 indicator illuminates.
- **Teach against background:**  
Point sensor at background.  
Q1: Press teach button 1 for approx. 7s,  
Q2: Press teach button 2 for approx. 7s.  
Switching point is taught.  
Objects between sensor and background are detected.
- **Hysteresis:**  
To ensure continuous object detection in the switching point, the sensor has a switch hysteresis.  
Object is no longer detected if:  
distance to sensor > teach point + hysteresis + reserve.
- **Factory setting:**  
hysteresis: approx. 50mm  
reserve: approx. 50mm.
- With the set scanning range, a tolerance of the upper scanning range limit is possible depending on the reflection properties of the material surface.
- Scanning range/reflectivity:

| Object/diffuse reflection |               |
|---------------------------|---------------|
| 6%                        | 0.05 ... 3.5m |
| 90%                       | 0.05 ... 8m   |

### Operate in accordance with intended use!

- ⚠ This product is not a safety sensor and is not intended as personnel protection.
- ⚠ The product may only be put into operation by competent persons.
- ⚠ Only use the product in accordance with the intended use.

## HT10

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### Laser safety notices



#### ATTENTION, LASER RADIATION – LASER CLASS 1

The device satisfies the requirements of IEC 60825-1:2007 (EN 60825-1:2007) safety regulations for a product in **laser class 1** as well as the U.S. 21 CFR 1040.10 regulations with deviations corresponding to "Laser Notice No. 50" from June 24th, 2007.

⚡ Adhere to the applicable legal and local regulations regarding protection from laser beams.

⚡ The device must not be tampered with and must not be changed in any way.

There are no user-serviceable parts inside the device.

Repairs must only be performed by Leuze electronic GmbH + Co. KG.

### IO-Link process data format

(IO-Link 1.1, M-sequence TYPE\_2\_1)

#### Output data device (8 bit)

| Data bit | Assignment          | Meaning                                                        |
|----------|---------------------|----------------------------------------------------------------|
| 7        | Switching output Q1 | 0 = inactive, 1 = active                                       |
| 6        | Switching output Q2 | 0 = inactive, 1 = active                                       |
| 5        | Switching output Q3 | 0 = inactive, 1 = active (if Q3 not present = 0)               |
| 4        | Measurement         | 0 = initialization/teach/deactivation, 1 = running measurement |
| 3        | Signal              | 0 = no signal or signal too weak, 1 = signal ok                |
| 2        | Warning             | 0 = no warning, 1 = warning, e.g., weak signal                 |
| 1        | 0                   | Not assigned (initial state = 0)                               |
| 0        | 0                   | Not assigned (initial state = 0)                               |

#### Input data device

None

### Teach-in via teach input (pin 5)

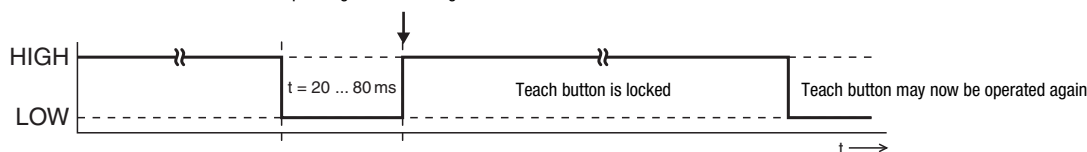


Signal level LOW  $\leq 2V$

Signal level HIGH  $\geq (U_B - 2V)$

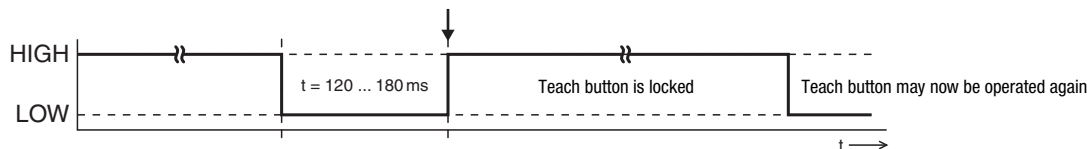
#### Line teach Q1/pin 4 (operating level 1)

Teach in operating level 1 is being carried out



#### Line teach Q2/pin 2 (operating level 2)

Teach in operating level 2 is being carried out



### Window function

Located symmetrically around the teach point is a **switching window**. In principle, the window width must be set by teaching the upper and lower limit: **Window width = (upper limit - lower limit) + 2 x hysteresis** (2 x 50mm).

| Teach duration | Function                            |
|----------------|-------------------------------------|
| 2s             | Window teach (teach against object) |
| 7s             | Upper limit of switching window     |
| 12s            | Lower limit of switching window     |

## Part number code

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| H | T | 1 | 0 | L | 1 | . | 3 | / | L | 6 | T | . | P | 1 | , | 2 | 0 | 0 | - | M | 1 | 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

### Operating principle

**HT** Laser light scanner with background suppression

### Series

**10** Series 10

### Laser class

**L1** Laser class 1 (acc. to IEC 60825-1:2007)

### Equipment

**3** Membrane keyboard for teach-in

### Assignment pin 4

**L** IO-Link (with dual channel, also push/pull switching output)

### Assignment pin 2

**6** Push/pull switching output

### Assignment pin 5

**T** Teach input for external teach-in (> 8VDC, configurable)

### Additional function

**P1** Window function

### Electrical connection

**-M12** M12 connector, 5-pin

**N/A** Cable, length 2000mm with wire-end sleeves, 5-wire

**,200-M12** Cable, length 200mm with M12 connector, 5-pin

## Order guide

|                                                                                                                           | Designation                                        | Part no. |
|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|----------|
| <b>Connection: M12 connector, 5-pin</b>                                                                                   |                                                    |          |
| IO-Link 1.1/switching output, 1 push/pull switching output, teach input                                                   | HT10L1.3/L6T-M12                                   | 50129538 |
| IO-Link 1.1/switching output, 1 push/pull switching output, teach input, window function                                  | HT10L1.3/L6T.P1-M12                                | 50129539 |
| <b>Connection: cable, length 2000mm with wire-end sleeves, 5-wire</b>                                                     |                                                    |          |
| IO-Link 1.1/switching output, 1 push/pull switching output, teach input                                                   | HT10L1.3/L6T                                       | 50129545 |
| <b>Connection: cable, length 200mm with M12 connector, 5-pin</b>                                                          |                                                    |          |
| IO-Link 1.1/switching output, 1 push/pull switching output, teach input                                                   | HT10L1.3/L6T,200-M12                               | 50129550 |
| <b>Accessories</b>                                                                                                        |                                                    |          |
| HighGain reflective tape, 100mm x 100mm, self-adhesive                                                                    | REF 7-A-100x100                                    | 50111527 |
| Mounting system for mounting on rods Ø 10mm                                                                               | BTU 460M-D10                                       | 50128379 |
| Mounting system for mounting on rods Ø 12mm                                                                               | BTU 460M-D12                                       | 50128380 |
| Connection cable with M12 connector, angled, 5-pin, length 2m, PVC sheathing (many other connection cables are available) | K-D M12W-5P-2m-PVC                                 | 50104556 |
| IO-Link master set                                                                                                        | SET MD12-US2-IL1.1 + accessories - diagnostics set | 50121098 |