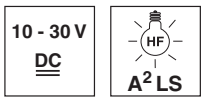
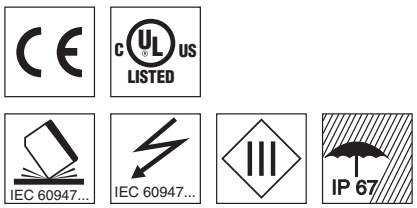
# HT5.1 Diffuse reflection sensor with background suppression

en 01-2016/06 50132435


**5 … 400 mm**
**200 mm with black-white error < 15%**




- Diffuse reflection sensor with visible red light and adjustable background suppression
- Large scanning range and reliable switching nearly independent of object or background properties
- Exact scanning range adjustment
- For all standard applications in the area of object detection and positioning (e.g. containers in conveyor and storage systems)
- Small and compact construction with robust plastic housing, degree of protection IP 67 for industrial application
- ***NEW***: Housing with two integrated M3 metal threaded sleeves

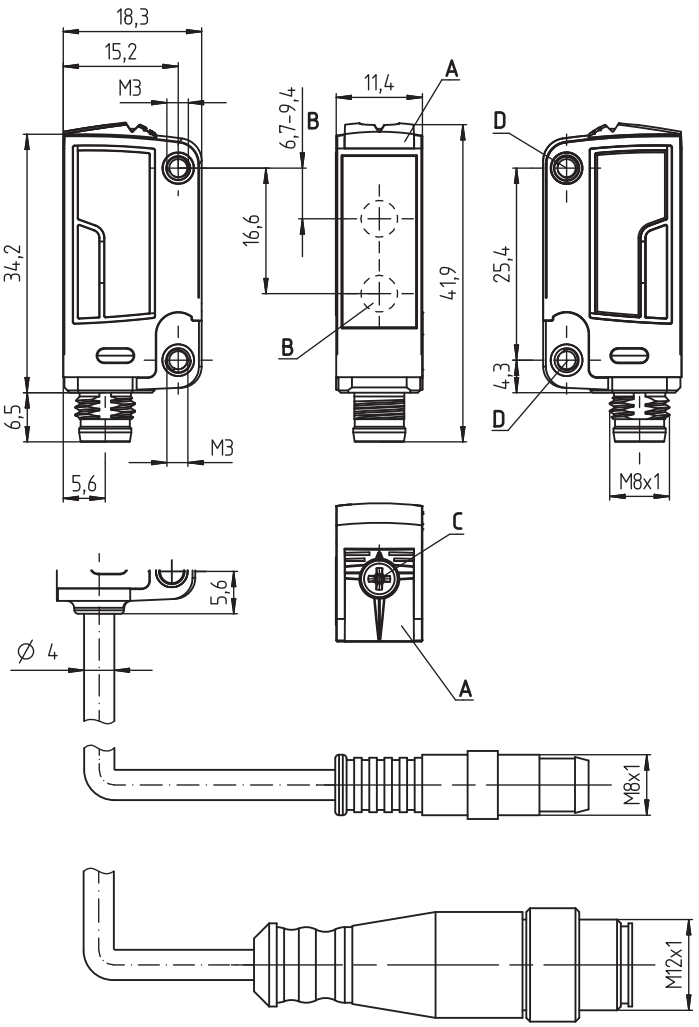



## Accessories:

**(available separately)**

- Mounting systems (BT …)
- Cables with M8 connector (K-D …)

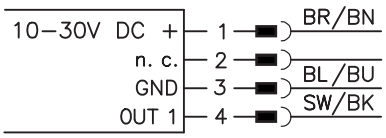
## Dimensioned drawing



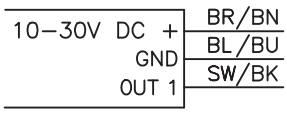

**A** Yellow indicator diode
**B** Optical axis
**C** Scanning range adjustment
**D** Threaded sleeve

## Electrical connection

Connector, 4-pin




Cable, 3-wires



# Technical data

## Optical data

| | |
|---|---|
| Typ. scanning range limit [1] | 5 … 400mm |
| Scanning range [2] | see tables |
| Adjustment range [1] | 15 … 400mm |
| Black/white error < 15% up to | 200mm |
| Light beam characteristic | focussed at 200mm |
| Light source [3] | LED (modulated light) |
| Wavelength | 633nm (visible red light) |

## Timing

| | |
|---|---|
| Switching frequency | 1,000Hz |
| Response time | 0.5?ms [4] |
| Response jitter | 166µs |
| Readiness delay | ≤ 300ms (acc. to. IEC 60947-5-2) |

## Electrical data

| | |
|---|---|
| Operating voltage $U_B$ [5] | 10 … 30VDC (incl. residual ripple) |
| Residual ripple | ≤ 15% of $U_B$ |
| Open-circuit current | ≤ 20mA |
| Switching output | see part number code on page 3 |
| Function | light/dark switching, see part number code on page 3 |
| Signal voltage high/low | ≥ ($U_B$-2V)/≤ 2V |
| Output current | max. 100mA |
| Scanning range | adjustable |

## Indicators

| | |
|---|---|
| Yellow LED | object detected - reflection |

## Mechanical data

| | |
|---|---|
| Housing | plastic (high-strength PC-ABS);<br>2x M3 brass threaded sleeves |
| Optics cover | plastic (PMMA) |
| Weight | with connector: 10g<br>with 2m cable: 50g |
| Connection type | M8 connector, plastic or<br>cable 2m (cross section 3 x 0.14mm²) |

## Environmental data

| | |
|---|---|
| Ambient temp. (operation/storage) | -40°C … +60°C/-40°C … +70°C |
| Protective circuit [6] | 2, 3 |
| VDE safety class | III |
| Degree of protection | IP 67 |
| Light source | exempt group (in acc. with EN 62471) |
| Standards applied | IEC 60947-5-2 |
| Certifications | UL 508, CSA C22.2 no.14-13 [5] [7] |

1) Typ. scan. range limit/adjustment range: max. achievable scanning range/adjustment range for light objects (white 90%)
2) Scanning range: recommended scanning range for objects with different diffuse reflection
3) Average life expectancy 100,000h at an ambient temperature of 25°C
4) For short decay times, an ohmic load of approx. 5kOhm is recommended
5) For UL applications: use is permitted exclusively in Class 2 circuits according to NEC
6) 2=polarity reversal protection, 3=short circuit protection for all transistor outputs
7) These proximity switches shall be used with UL Listed Cable assemblies rated 30V, 0.5A min, in the field installation, or equivalent (categories: CYJV/CYJV7 or PVVA/PVVA7)

# Tables

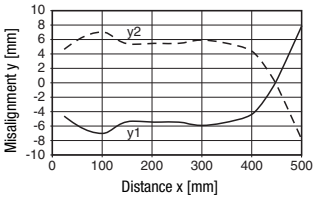
| | | |
|---|---|---|
| 1 | 5 | 400 |
| 2 | 10 | 300 |
| 3 | 15 | 200 |

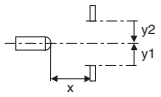
| | |
|---|---|
| 1 | white 90% |
| 2 | gray 18% |
| 3 | black 6% |

Scanning range [mm]

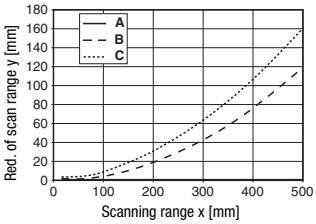
# Diagrams

Typ. response behavior (white 90%)

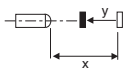



Typ. black/white behavior




**A** white 90%
**B** gray 18%
**C** black 6%




# Notes

**Observe 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 its intended use.

## HT5.1 Diffuse reflection sensor with background suppression

## Part number code

| H | T | 5 | | . | 1 | / | 4 | X | - | M | 8 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Operating principle**

| | |
|---|---|
| **HT** | Diffuse reflection sensor with background suppression |

**Series**

| | |
|---|---|
| **5** | 5 series |

**Light type**

| | |
|---|---|
| **N/A** | Red light |
| **I** | Infrared light |

**Equipment**

| | |
|---|---|
| **1** | Adjustable scanning range |

**Switching output/function /OUT1OUT2 (OUT1 = Pin 4, OUT2 = Pin 2)**

| | |
|---|---|
| **4** | PNP, light switching |
| **P** | PNP, dark switching |
| **2** | NPN, light switching |
| **N** | NPN, dark switching |
| **X** | Pin not assigned (n. c.- not connected) |

**Electrical connection**

| | |
|---|---|
| **-M8** | M8 connector, 4-pin |
| **N/A** | Cable, standard length 2m |
| **-200-M8** | 200mm cable with M8 connector |
| **-200-M12** | 200mm cable with M12 connector |

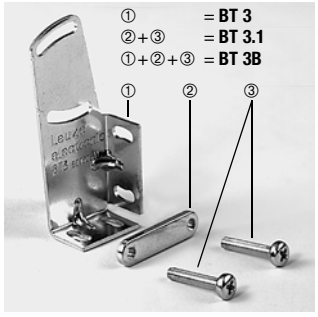
## Order guide

The sensors listed here are preferred types; current information at *www.leuze.com*.

| Sensors | | Designation | Part no. |
|---|---|---|---|
| **with 4-pin M8 connector** | | | |
| | Pin 4 PNP, light switching, pin 2 not assigned (n. c.) | HT5.1/4X-M8 | 50129401 |
| **with cable, cable length 2m** | | | |
| | Pin 4 PNP, dark switching, pin 2 not assigned (n. c.) | HT5.1/PX | 50129402 |
| | Pin 4 PNP, light switching, pin 2 not assigned (n. c.) | HT5.1/4X | 50129400 |
| | Pin 4 NPN, light switching, pin 2 not assigned (n. c.) | HT5.1/2X | 50129399 |
| **Accessories mounting systems** | | | |
| | Mounting bracket, galvanized steel | BT 3 | 50060511 |
| | Mounting strap set, galvanized steel | BT 3.1 [1] | 50105585 |
| | Mounting bracket + mounting strap set, galvanized steel | BT 3B | 50105546 |
| | Mounting bracket, stainless steel V2A | BT 200M.5 | 50118542 |
| | Mounting bracket, galvanized steel | BT 205M [1] | 50124651 |
| | Rod mount Ø 10mm, galvanized steel + aluminum | BTU 200M-D10 | 50117256 |
| | Rod mount Ø 12mm, galvanized steel + aluminum | BTU 200M-D12 | 50117255 |
| | Rod mount Ø 12mm, stainless steel V2A | BTU 200M.5-D12 | 50120426 |
| | Rod mount Ø 14mm, galvanized steel + aluminum | BTU 200M-D14 | 50117254 |

1) Packaging unit: PU = 10 pcs.

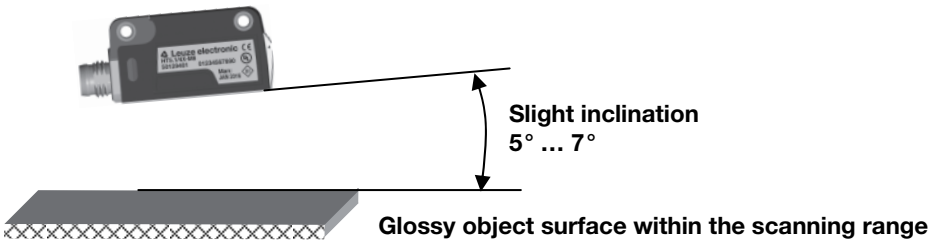
## Mounting systems





## Application notes

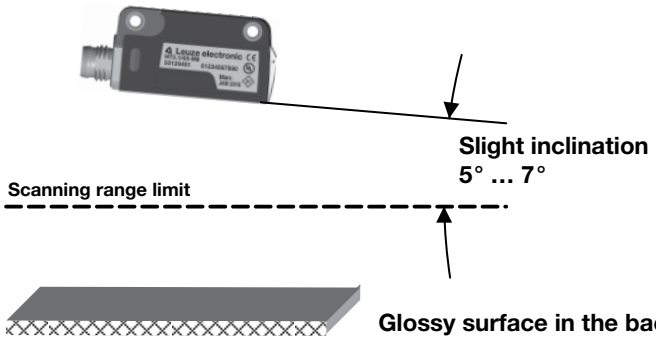
- **<u>Detection of glossy surfaces</u> within the scanning range**:
  When detecting glossy surfaces (e.g. metals), the light beam should not hit the object surface at a right angle. A slight inclination is enough to detect the object reliably. The following applies: the smaller the scanning range, the greater the angle of inclination (approx. 5° to 7°).




**Glossy object surface within the scanning range**

- **<u>Avoiding interference from glossy surfaces</u> in the background**:
  If a glossy surface is in the background (distance larger than scanning range limit), reflections may cause interfering signals. They may be avoided by mounting the device at a slight inclination (see figure below).

**Attention!**
It is imperative to note the task and the associated inclination of the sensor of approx. 5° … 7°.




**Glossy surface in the background**

- Objects should only be moved in laterally from the right or left. Moving in objects from the connector side or operating side is to be avoided.
- Outside of the scanning range, the sensor operates as an energetic diffuse reflection sensor. Light objects can still be reliably detected up to the scanning range limit.
- The sensors are equipped with effective measures for the maximum avoidance of mutual interference should they be mounted opposite one another. Opposite mounting of multiple sensors of the same type should, however, absolutely be avoided.