

## Technical data sheet Energetic diffuse sensor

Part no.: 50133941

FT328I.X3/2N-M12

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For illustration purposes only



## Technical data

### Basic data

|                     |                                          |
|---------------------|------------------------------------------|
| Series              | 328                                      |
| Operating principle | Diffuse reflection principle             |
| Application         | Detection of dark objects at short range |

### Special version

|                 |          |
|-----------------|----------|
| Special version | V-optics |
|-----------------|----------|

### Optical data

|                                  |                                      |
|----------------------------------|--------------------------------------|
| Operating range                  | Guaranteed operating range           |
| Operating range, white 90%       | 0.001 ... 0.11 m                     |
| Operating range, gray 50%        | 0.001 ... 0.1 m                      |
| Operating range, gray 18%        | 0.003 ... 0.08 m                     |
| Operating range, black 6%        | 0.005 ... 0.07 m                     |
| Operating range limit, white 90% | 0.001 ... 0.13 m                     |
| Operating range limit, gray 50%  | 0.001 ... 0.12 m                     |
| Operating range limit, gray 18%  | 0.003 ... 0.1 m                      |
| Operating range limit, black 6%  | 0.005 ... 0.085 m                    |
| Operating range limit            | Typical operating range              |
| Light source                     | LED, Infrared                        |
| Wavelength                       | 850 nm                               |
| Transmitted-signal shape         | Pulsed                               |
| LED group                        | Exempt group (in acc. with EN 62471) |

### Electrical data

|                    |                              |
|--------------------|------------------------------|
| Protective circuit | Polarity reversal protection |
|                    | Short circuit protected      |

### Performance data

|                      |                                        |
|----------------------|----------------------------------------|
| Supply voltage $U_B$ | 10 ... 30 V, DC, Incl. residual ripple |
| Residual ripple      | 0 ... 15 %, From $U_B$                 |
| Open-circuit current | 0 ... 20 mA                            |

### Outputs

|                                     |            |
|-------------------------------------|------------|
| Number of digital switching outputs | 2 Piece(s) |
|-------------------------------------|------------|

### Switching outputs

|                         |                                               |
|-------------------------|-----------------------------------------------|
| Type                    | Digital switching output                      |
| Voltage type            | DC                                            |
| Switching current, max. | 100 mA                                        |
| Switching voltage       | high: $\geq(U_B - 2.5V)$<br>low: $\leq 2.5 V$ |

### Switching output 1

|                     |                     |
|---------------------|---------------------|
| Assignment          | Connection 1, pin 4 |
| Switching element   | Transistor, NPN     |
| Switching principle | Light switching     |

### Switching output 2

|                     |                     |
|---------------------|---------------------|
| Assignment          | Connection 1, pin 2 |
| Switching element   | Transistor, NPN     |
| Switching principle | Dark switching      |

### Time behavior

|                     |        |
|---------------------|--------|
| Switching frequency | 500 Hz |
| Response time       | 1 ms   |
| Readiness delay     | 300 ms |

### Connection

|                       |            |
|-----------------------|------------|
| Number of connections | 1 Piece(s) |
|-----------------------|------------|

### Connection 1

|                    |                |
|--------------------|----------------|
| Function           | Signal OUT     |
|                    | Voltage supply |
| Type of connection | Connector      |
| Thread size        | M12            |
| Type               | Male           |
| Material           | Plastic        |
| No. of pins        | 4 -pin         |
| Encoding           | A-coded        |

### Mechanical data

|                                      |                 |
|--------------------------------------|-----------------|
| Dimension ( $\varnothing \times L$ ) | 18 mm x 46 mm   |
| Thread size                          | M18 x 1 mm      |
| Housing material                     | Plastic         |
|                                      | Stainless steel |
| Stainless steel housing              | V2A             |
| Plastic housing                      | ABS             |
| Lens cover material                  | Plastic         |
| Net weight                           | 70 g            |
| Housing color                        | Black           |
|                                      | Red             |

### Operation and display

|                      |              |
|----------------------|--------------|
| Type of display      | LED          |
| Number of LEDs       | 2 Piece(s)   |
| Operational controls | Teach button |

### Environmental data

|                                |               |
|--------------------------------|---------------|
| Ambient temperature, operation | -40 ... 60 °C |
| Ambient temperature, storage   | -40 ... 70 °C |

### Certifications

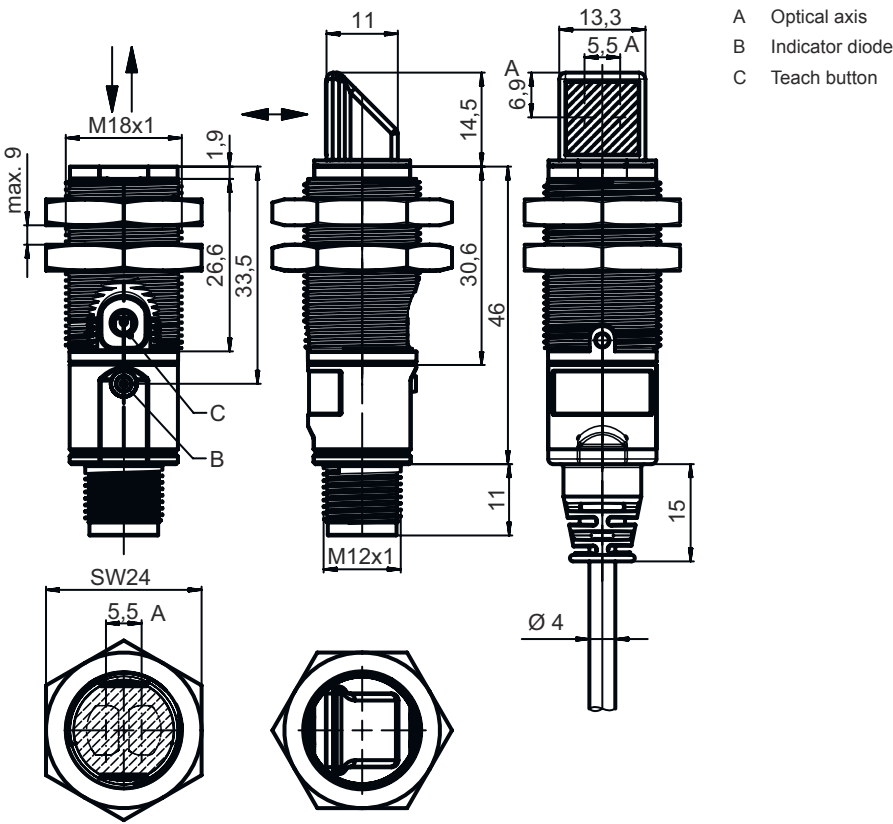
|                      |               |
|----------------------|---------------|
| Degree of protection | IP 67         |
| Protection class     | III           |
| Approvals            | c UL US       |
| Standards applied    | IEC 60947-5-2 |

### Classification

|                       |          |
|-----------------------|----------|
| Customs tariff number | 85365019 |
| ECLASS 5.1.4          | 27270903 |
| ECLASS 8.0            | 27270903 |
| ECLASS 9.0            | 27270903 |
| ECLASS 10.0           | 27270903 |
| ECLASS 11.0           | 27270903 |
| ECLASS 12.0           | 27270903 |
| ECLASS 13.0           | 27270903 |
| ECLASS 14.0           | 27270903 |
| ECLASS 15.0           | 27270903 |
| ECLASS 16.0           | 27270903 |
| ETIM 5.0              | EC001821 |
| ETIM 6.0              | EC001821 |
| ETIM 7.0              | EC001821 |
| ETIM 8.0              | EC001821 |
| ETIM 9.0              | EC001821 |
| ETIM 10.0             | EC001821 |

Dimensioned drawings

All dimensions in millimeters



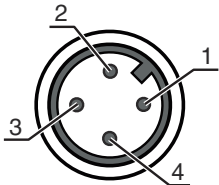
Electrical connection

Connection 1

|                    |                |
|--------------------|----------------|
| Function           | Signal OUT     |
|                    | Voltage supply |
| Type of connection | Connector      |
| Thread size        | M12            |
| Type               | Male           |
| Material           | Plastic        |
| No. of pins        | 4 -pin         |
| Encoding           | A-coded        |

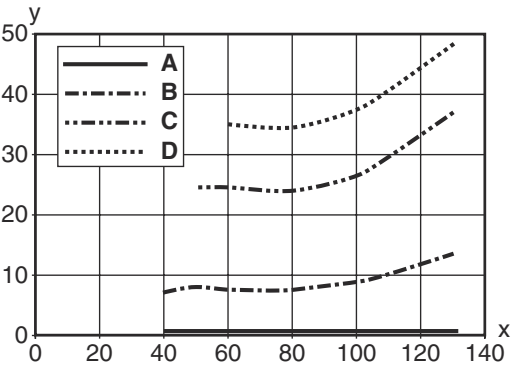
Pin Pin assignment

|   |       |
|---|-------|
| 1 | V+    |
| 2 | OUT 2 |
| 3 | GND   |
| 4 | OUT 1 |



Diagrams

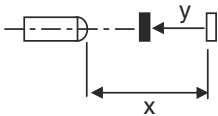
Typ. black/white behavior



x Range [mm]  
y Reduction of range [mm]

- A White 90%
- B Gray 50%
- C Gray 18%
- D Black 6%

**Fading: black/white error < 50 %**  
The black/white error is calculated from the operating range against white and the reduction of the operating range against black:  
**black/white error = reduction of the operating range against black / operating range against white x 100%**



Operation and display

| LED | Display                  | Meaning               |
|-----|--------------------------|-----------------------|
| 1   | Green, continuous light  | Operational readiness |
|     | Yellow, continuous light | Object detected       |

Part number code

Part designation: XXX328BY-AAAF.BB/CC-DDD

|        |                                                                                                                                                                                                                                                                                                |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| XXX328 | <b>Operating principle</b><br>PRK: Retro-reflective photoelectric sensor with polarization filter<br>ET: energetic diffuse reflection sensor<br>FT: diffuse reflection sensor with fading<br>LE: Throughbeam photoelectric sensor receiver<br>LS: throughbeam photoelectric sensor transmitter |
| Y      | <b>Light type</b><br>n/a: red light<br>I: infrared light                                                                                                                                                                                                                                       |
| AAAF   | <b>Preset range (optional)</b><br>n/a: operating range acc. to data sheet<br>xxxF: Preset range [mm]                                                                                                                                                                                           |
| BB     | <b>Equipment</b><br>n/a: axial optics<br>W: 90° angular optics<br>3: teach-in via button<br>X: reinforced fading                                                                                                                                                                               |

## Part number code

|                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CC                                                                                                                                                                                                                             | <b>Switching output / function (OUT1 = pin 4, OUT2 = pin 2):</b><br>4: PNP transistor output, light switching<br>P: PNP transistor output, dark switching<br>2: NPN transistor output, light switching<br>N: NPN transistor output, dark switching<br>9: input for transmitter deactivation (deactivation with HIGH signal)<br>D: Input for transmitter deactivation (deactivation with LOW signal)<br>X: pin not used |
| DDD                                                                                                                                                                                                                            | <b>Electrical connection</b><br>n/a: cable, standard length 2000 mm, 4-wire<br>M12: M12 connector, 4-pin (plug)                                                                                                                                                                                                                                                                                                        |
| <b>Note</b><br> A list with all available device types can be found on the Leuze website at <a href="http://www.leuze.com">www.leuze.com</a> . |                                                                                                                                                                                                                                                                                                                                                                                                                        |

## Notes

|                                                                                                                |                                                                                                                                                                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <b>Observe intended use!</b> |                                                                                                                                                                                                                                                                                 |
|                               | <ul style="list-style-type: none"> <li>This product is not a safety sensor and is not intended as personnel protection.</li> <li>The product may only be put into operation by competent persons.</li> <li>Only use the product in accordance with its intended use.</li> </ul> |

|                                                                                    |                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>For UL applications:</b>                                                        |                                                                                                                                                                                                                                                                                                                                                             |
|  | <ul style="list-style-type: none"> <li>For UL applications, use is only permitted in Class 2 circuits in accordance with the NEC (National Electric Code).</li> <li>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)</li> </ul> |

## Further information

- Sum of the output currents for both outputs, 50 mA for ambient temperatures > 40 °C
- With the set scanning range, a tolerance of the operating range is possible depending on the reflection properties of the material surface.

## Accessories

### Connection technology - Connection cables

|                                                                                                                                                                         | Part no. | Designation        | Article          | Description                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | 50130652 | KD U-M12-4A-V1-050 | Connection cable | Application: Chemical resistant<br>Connection 1: Connector, M12, Axial, Female, A-coded, 4 -pin<br>Connector, LED: No<br>Connection 2: Open end<br>Shielded: No<br>Cable length: 5,000 mm<br>Sheathing material: PVC |

## Accessories

|                                                                                  | Part no. | Designation        | Article          | Description                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------|----------|--------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 50130690 | KD U-M12-4W-V1-050 | Connection cable | Application: Chemical resistant<br>Connection 1: Connector, M12, Angled, Female, A-coded, 4 -pin<br>Connector, LED: No<br>Connection 2: Open end<br>Shielded: No<br>Cable length: 5,000 mm<br>Sheathing material: PVC |

## Mounting technology - Mounting brackets

|                                                                                  | Part no. | Designation | Article          | Description                                                                                                                                                                                                                  |
|----------------------------------------------------------------------------------|----------|-------------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 50113548 | BT D18M.5   | Mounting bracket | Diameter, inner: 18 mm<br>Design of mounting device: Angle, L-shape<br>Fastening, at system: Through-hole mounting<br>Mounting bracket, at device: Screw type<br>Type of mounting device: Rigid<br>Material: Stainless steel |

## Mounting technology - Rod mounts

|                                                                                    | Part no. | Designation  | Article         | Description                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------|----------|--------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 50117490 | BTU D18M-D12 | Mounting system | Design of mounting device: Mounting system<br>Fastening, at system: Through-hole mounting<br>Mounting bracket, at device: Screw type<br>Type of mounting device: Clampable, Adjustable, Turning, 360°<br>Material: Metal |

## Mounting technology - Other

|                                                                                    | Part no. | Designation | Article   | Description                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------|----------|-------------|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 50126631 | BT 328M     | Fastening | Contains: 2x M18 mounting nut<br>Design of mounting device: Mounting clamp<br>Fastening, at system: For 18 mm rod, Through-hole mounting<br>Mounting bracket, at device: Screw type<br>Type of mounting device: Turning, 360°<br>Material: Stainless steel<br>Shock absorber: No |

### Note



A list with all available accessories can be found on the Leuze website in the Download tab of the article detailed page.