

# Technical data sheet

## Smart camera

Part no.: 50146001

IPS 458i FIX-F4-102-I3-G-H



For illustration purposes only

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- Dimensioned drawings
- Electrical connection
- Diagrams
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Ethernet

EtherNet/IP<sup>®</sup>



## Technical data

### Basic data

|             |                          |
|-------------|--------------------------|
| Series      | IPS 400i                 |
| Application | Double compartment depth |

### Special version

|                 |         |
|-----------------|---------|
| Special version | Heating |
|-----------------|---------|

### Functions

|                    |                              |
|--------------------|------------------------------|
| Software functions | Compartment fine positioning |
|--------------------|------------------------------|

### Optical data

|                               |                                                 |
|-------------------------------|-------------------------------------------------|
| Working range                 | 350 ... 1,900 mm, up to 2,400 mm with reflector |
| Light source                  | LED, Infrared                                   |
| Transmitted-signal shape      | Pulsed                                          |
| Camera resolution, horizontal | 1,280 px                                        |
| Camera resolution, vertical   | 960 px                                          |
| Marker size (round)           | 13 ... 15 mm                                    |
| Electronic shutter speed      | 0.068 ... 5 ms                                  |
| Camera type                   | Monochrome                                      |

### Measurement data

|                           |                                                                    |
|---------------------------|--------------------------------------------------------------------|
| Reproducibility (1 sigma) | 0.2 mm, (Compartment depth 2: 0.5 mm) depending on the application |
|---------------------------|--------------------------------------------------------------------|

### Electrical data

|                    |                                                         |
|--------------------|---------------------------------------------------------|
| Protective circuit | Polarity reversal protection<br>Short circuit protected |
|--------------------|---------------------------------------------------------|

### Performance data

|                           |                 |
|---------------------------|-----------------|
| Supply voltage $U_B$      | 18 ... 30 V, DC |
| Average power consumption | 12 W            |

### Inputs

|                                    |            |
|------------------------------------|------------|
| Number of digital switching inputs | 3 Piece(s) |
|------------------------------------|------------|

### Switching inputs

|              |                         |
|--------------|-------------------------|
| Type         | Digital switching input |
| Voltage type | DC                      |

### Outputs

|                                     |            |
|-------------------------------------|------------|
| Number of digital switching outputs | 5 Piece(s) |
|-------------------------------------|------------|

### Switching outputs

|                         |                          |
|-------------------------|--------------------------|
| Type                    | Digital switching output |
| Voltage type            | DC                       |
| Switching current, max. | 100 mA                   |

### Switching output 1

|                     |                 |
|---------------------|-----------------|
| Switching principle | +24 V switching |
|---------------------|-----------------|

### Switching output 2

|                     |                 |
|---------------------|-----------------|
| Switching principle | +24 V switching |
|---------------------|-----------------|

### Switching output 3

|                     |                 |
|---------------------|-----------------|
| Switching principle | +24 V switching |
|---------------------|-----------------|

### Switching output 4

|                     |                 |
|---------------------|-----------------|
| Switching principle | +24 V switching |
|---------------------|-----------------|

### Switching output 5

|                     |                 |
|---------------------|-----------------|
| Switching principle | +24 V switching |
|---------------------|-----------------|

### Interface

|      |                       |
|------|-----------------------|
| Type | EtherNet IP, Ethernet |
|------|-----------------------|

### EtherNet IP

|                      |                                   |
|----------------------|-----------------------------------|
| Address assignment   | DHCP<br>Manual address assignment |
| Function             | Process                           |
| Switch functionality | None                              |
| Transmission speed   | 10 Mbit/s<br>100 Mbit/s           |

### Ethernet

|                       |                                   |
|-----------------------|-----------------------------------|
| Architecture          | Client<br>Server                  |
| Address assignment    | DHCP<br>Manual address assignment |
| Transmission speed    | 10 Mbit/s<br>100 Mbit/s           |
| Function              | Process                           |
| Switch functionality  | None                              |
| Transmission protocol | TCP/IP, UDP                       |

### Service interface

|      |          |
|------|----------|
| Type | Ethernet |
|------|----------|

### Ethernet

|          |         |
|----------|---------|
| Function | Service |
|----------|---------|

### Connection

|                       |            |
|-----------------------|------------|
| Number of connections | 2 Piece(s) |
|-----------------------|------------|

### Connection 1

|                    |                              |
|--------------------|------------------------------|
| Function           | Signal OUT<br>Voltage supply |
| Type of connection | Connector                    |
| Thread size        | M12                          |
| Type               | Male                         |
| Material           | Metal                        |
| No. of pins        | 12 -pin                      |
| Encoding           | A-coded                      |

### Connection 2

|                    |                                           |
|--------------------|-------------------------------------------|
| Function           | Configuration interface<br>Data interface |
| Type of connection | Connector                                 |
| Thread size        | M12                                       |
| Type               | Female                                    |
| Material           | Metal                                     |
| No. of pins        | 4 -pin                                    |
| Encoding           | D-coded                                   |

## Technical data

### Mechanical data

|                       |                              |
|-----------------------|------------------------------|
| Design                | Cubic                        |
| Dimension (W x H x L) | 43 mm x 61 mm x 44 mm        |
| Housing material      | Metal                        |
|                       | Plastic                      |
| Metal housing         | Diecast aluminum             |
| Plastic housing       | PC                           |
| Lens cover material   | Glass                        |
| Net weight            | 124 g                        |
| Housing color         | Silver                       |
| Type of fastening     | Mounting thread              |
|                       | Via optional mounting device |

### Operation and display

|                                     |                     |
|-------------------------------------|---------------------|
| Type of display                     | LED                 |
| Number of LEDs                      | 9 Piece(s)          |
| Type of configuration               | Configuration codes |
|                                     | Teach-in            |
|                                     | Via web browser     |
| Operational controls                | Button(s)           |
| Function of the operational control | Adjustment mode     |
|                                     | Auto-setup          |

### Environmental data

|                                    |               |
|------------------------------------|---------------|
| Ambient temperature, operation     | -30 ... 45 °C |
| Ambient temperature, storage       | -20 ... 70 °C |
| Relative humidity (non-condensing) | 90 %          |

### Certifications

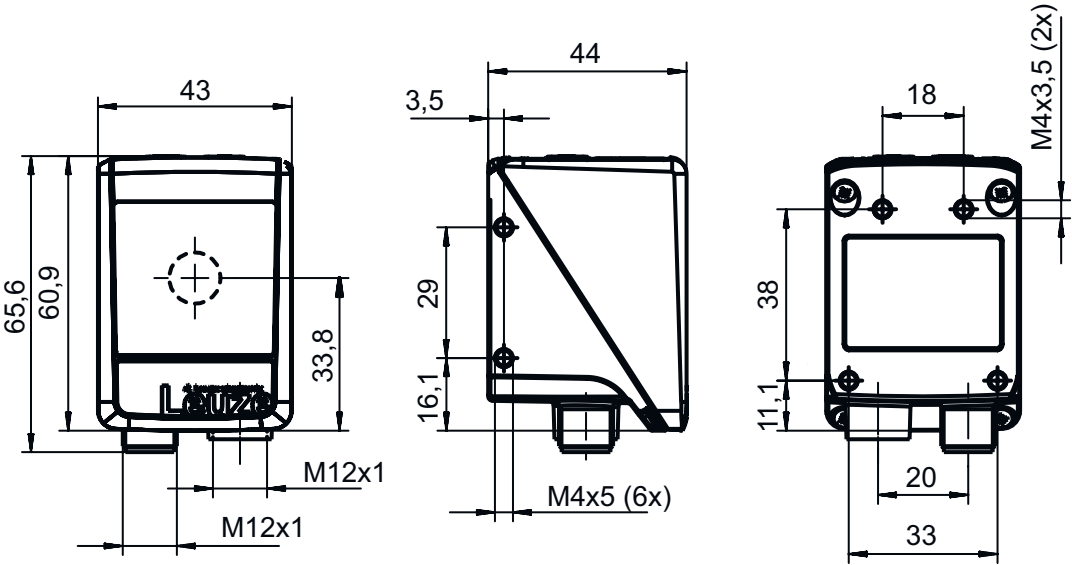
|                                                                 |                         |
|-----------------------------------------------------------------|-------------------------|
| Degree of protection                                            | IP 65                   |
| Protection class                                                | III                     |
| Approvals                                                       | c UL US                 |
| Test procedure for EMC in accordance with standard              | EN 61000-6-2            |
|                                                                 | EN 61000-6-4            |
| Test procedure for continuous shock in accordance with standard | IEC 60068-2-29, test Eb |
| Test procedure for vibration in accordance with standard        | IEC 60068-2-6, test Fc  |

### Classification

|                       |          |
|-----------------------|----------|
| Customs tariff number | 90021100 |
| ECLASS 5.1.4          | 27310101 |
| ECLASS 8.0            | 27310101 |
| ECLASS 9.0            | 27310201 |
| ECLASS 10.0           | 27310101 |
| ECLASS 11.0           | 27310101 |
| ECLASS 12.0           | 27310101 |
| ECLASS 13.0           | 27310101 |
| ECLASS 14.0           | 27310101 |
| ECLASS 15.0           | 27310101 |
| ETIM 5.0              | EC002550 |
| ETIM 6.0              | EC002550 |
| ETIM 7.0              | EC002550 |
| ETIM 8.0              | EC002550 |
| ETIM 9.0              | EC002550 |
| ETIM 10.0             | EC002550 |

Dimensioned drawings

All dimensions in millimeters



Electrical connection

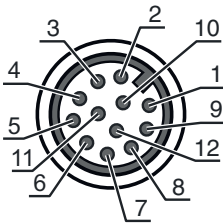
Connection 1

PWR / SWI / SWO

|                    |                |
|--------------------|----------------|
| Function           | Signal OUT     |
|                    | Voltage supply |
| Type of connection | Connector      |
| Thread size        | M12            |
| Type               | Male           |
| Material           | Metal          |
| No. of pins        | 12 -pin        |
| Encoding           | A-coded        |

Pin Pin assignment

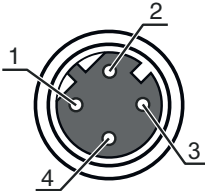
|    |         |
|----|---------|
| 1  | VIN     |
| 2  | GND     |
| 3  | SWIN 1  |
| 4  | SWOUT 2 |
| 5  | FE      |
| 6  | n.c.    |
| 7  | SWOUT 5 |
| 8  | SWOUT 6 |
| 9  | SWOUT 7 |
| 10 | SWOUT 8 |
| 11 | SWIO 3  |
| 12 | SWIO 4  |



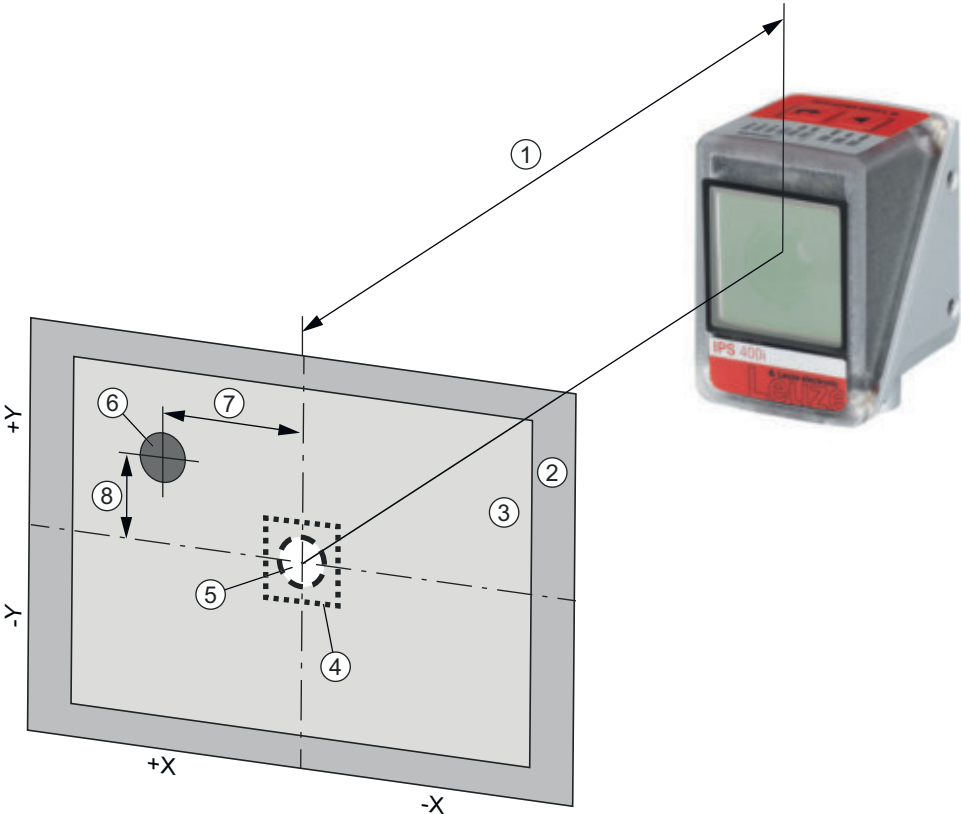
Electrical connection

| Connection 2       |  | HOST                    |
|--------------------|--|-------------------------|
| Function           |  | Configuration interface |
|                    |  | Data interface          |
| Type of connection |  | Connector               |
| Thread size        |  | M12                     |
| Type               |  | Female                  |
| Material           |  | Metal                   |
| No. of pins        |  | 4 -pin                  |
| Encoding           |  | D-coded                 |

| Pin | Pin assignment |
|-----|----------------|
| 1   | TD+            |
| 2   | RD+            |
| 3   | TD-            |
| 4   | RD-            |



Diagrams



- 1

Working distance
- 2

Field of view (FOV)
- 3

Region of interest (ROI)
- 4

Tolerance range
- 5

Nominal position (marker)
- 6

Actual position (marker)
- 7

X deviation (default)
- 8

Y deviation (default)

## Diagrams

Typical fields of view (width x height in mm)

| A        | IPS 2xxi  | IPS 4xxi ..F2 | IPS 4xxi ..F4 |
|----------|-----------|---------------|---------------|
| 100 mm   | 68 x 51   | --            | --            |
| 200 mm   | 136 x 102 | --            | --            |
| 250 mm   | 170 x 127 | 81 x 61       | --            |
| 300 mm   | 204 x 153 | 98 x 73       | 74 x 57       |
| 350 mm   | 238 x 178 | 114 x 86      | 86 x 66       |
| 400 mm   | 272 x 204 | 131 x 98      | 99 x 76       |
| 450 mm   | 306 x 229 | 148 x 111     | 111 x 85      |
| 500 mm   | 340 x 255 | 164 x 123     | 123 x 95      |
| 1,300 mm | --        | 430 x 322     | 321 x 246     |
| 1,400 mm | --        | 463 x 347     | 345 x 265     |
| 1,500 mm | --        | 496 x 371     | 370 x 284     |
| 1,600 mm | --        | 530 x 396     | 395 x 303     |
| 1,700 mm | --        | 563 x 421     | 419 x 321     |
| 1,800 mm | --        | 596 x 446     | 444 x 340     |
| 1,900 mm | --        | 629 x 471     | 469 x 359     |
| 2,400 mm | --        | --            | 592 x 454     |

A Working distance

NOTE The working range (capture range) of the camera results from the field of view minus the marker diameter

## Operation and display

| LED    | Display                  | Meaning                                                                |
|--------|--------------------------|------------------------------------------------------------------------|
| 1 PWR  | Off                      | No supply voltage                                                      |
|        | Green, flashing          | Initialization                                                         |
|        | Green, continuous light  | Operational readiness                                                  |
|        | Orange, continuous light | Service operation                                                      |
|        | Orange, flashing         | Wave function                                                          |
|        | Red, flashing            | Device OK, warning set                                                 |
|        | Red, continuous light    | Device error                                                           |
| 2 NET  | Off                      | No supply voltage                                                      |
|        | Green, flashing          | Initialization                                                         |
|        | Green, continuous light  | Operational readiness                                                  |
|        | Red, flashing            | Communication error                                                    |
|        | Red, continuous light    | Network error                                                          |
| 3 LINK | Green, continuous light  | Ethernet connection is established                                     |
|        | Yellow, flashing         | Data exchange active                                                   |
| 4 AUTO | Green, flashing          | Auto setup and teach-in of position                                    |
| 5 ADJ  | Green, flashing          | Alignment mode and teach-in of position                                |
| 6 ---  | Green, flashing          | Flashing frequency signals the marker distance to the nominal position |
|        | Green, continuous light  | Marker is in nominal position                                          |
| 7 ---  | Green, flashing          | Flashing frequency signals the marker distance to the nominal position |
|        | Green, continuous light  | Marker is in nominal position                                          |
| 8 ---  | Green, flashing          | Flashing frequency signals the marker distance to the nominal position |
|        | Green, continuous light  | Marker is in nominal position                                          |
| 9 ---  | Green, flashing          | Flashing frequency signals the marker distance to the nominal position |
|        | Green, continuous light  | Marker is in nominal position                                          |

## Part number code

Part designation: **IPS AAAA BBB-DC-EEE-FG-H-J**

|             |                                                                                                                                                        |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>IPS</b>  | <b>Operating principle</b><br>Imaging Positioning Sensor (camera-based)                                                                                |
| <b>AAAA</b> | <b>Series/interface (integrated fieldbus technology)</b><br>408i: Ethernet TCP/IP, UDP<br>448i: PROFINET-IO, Ethernet TCP/IP, UDP<br>458i: EtherNet/IP |
| <b>BBB</b>  | <b>Equipment</b><br>FIX: Fixed focal length                                                                                                            |
| <b>C</b>    | <b>Focus position</b><br>F: Far Density                                                                                                                |
| <b>D</b>    | <b>Lens</b><br>2: 12 mm<br>4: 16 mm                                                                                                                    |
| <b>EEE</b>  | <b>Beam exit</b><br>102: front                                                                                                                         |
| <b>F</b>    | <b>Illumination</b><br>I: infrared light                                                                                                               |
| <b>G</b>    | <b>Resolution range</b><br>3: 1280 x 960 pixels                                                                                                        |
| <b>H</b>    | <b>Protective screen</b><br>G: Glass                                                                                                                   |
| <b>J</b>    | <b>Special equipment</b><br>H: with heating                                                                                                            |

### Note



↗ A list with all available device types can be found on the Leuze website at [www.leuze.com](http://www.leuze.com).

## 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.

### Configuration via configuration codes



↗ The positioning sensor can also be configured using configuration codes. The device/application parameters in the device are set and permanently saved after reading this code. Configuration codes are created with the Code Generator tool. You can find the Code Generator on the Internet at [www.leuze.com/code-generator](http://www.leuze.com/code-generator).

## Further information

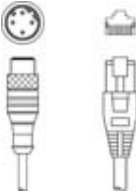
- Warmup time: minimum 30 min at +24 VDC and an ambient temperature of -30 °C
- The mounting location is to be selected such that the IPS 400i with heating is not directly exposed to a cold air stream. To achieve an optimal heating effect, the IPS 400i should be mounted so that it is thermally insulated.

## Accessories

### Connection technology - Connection cables

|                                                                                  | Part no. | Designation         | Article          | Description                                                                                                                                                                                                          |
|----------------------------------------------------------------------------------|----------|---------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 50130281 | KD S-M12-CA-P1-020  | Connection cable | Connection 1: Connector, M12, Axial, Female, A-coded, 12 -pin<br>Connector, LED: No<br>Connection 2: Open end<br>Shielded: Yes<br>Cable length: 2.000 mm<br>Sheathing material: PUR                                  |
|                                                                                  | 50135073 | KS ET-M12-4A-P7-020 | Connection cable | Suitable for interface: Ethernet<br>Connection 1: Connector, M12, Axial, Male, D-coded, 4 -pin<br>Connector, LED: No<br>Connection 2: Open end<br>Shielded: Yes<br>Cable length: 2.000 mm<br>Sheathing material: PUR |

### Connection technology - Interconnection cables

|                                                                                   | Part no. | Designation                 | Article               | Description                                                                                                                                                                                |
|-----------------------------------------------------------------------------------|----------|-----------------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 50135080 | KSS ET-M12-4A-RJ45-A-P7-020 | Interconnection cable | Suitable for interface: Ethernet<br>Connection 1: Connector, M12, Axial, Male, D-coded, 4 -pin<br>Connection 2: RJ45<br>Shielded: Yes<br>Cable length: 2,000 mm<br>Sheathing material: PUR |

### Mounting technology - Mounting brackets

|                                                                                     | Part no. | Designation | Article          | Description                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------|----------|-------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 50132151 | BT 320M     | Mounting bracket | 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: Metal      |
|                                                                                     | 50144298 | BT 330M     | Mounting bracket | 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: Adjustable<br>Material: Metal |

### Mounting technology - Rod mounts

|                                                                                    | Part no. | Designation  | Article         | Description                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------|----------|--------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 50132150 | BTU 320M-D12 | Mounting system | Design of mounting device: Mounting system<br>Fastening, at system: For 12 mm rod<br>Mounting bracket, at device: Screw type<br>Type of mounting device: Clampable, Adjustable, Turning, 360°<br>Material: Metal |

## Accessories

|                                                                                  | Part no. | Designation | Article         | Description                                                                                                                                                                                               |
|----------------------------------------------------------------------------------|----------|-------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | 50144299 | BTU 330M-1  | Mounting device | Design of mounting device: Mounting system<br>Fastening, at system: For 10-16 mm rods<br>Mounting bracket, at device: Screw type<br>Type of mounting device: Adjustable, Turning, 360°<br>Material: Metal |

## Standard reflectors

|                                                                                    | Part no. | Designation    | Article   | Description                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------------------------------------|----------|----------------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | 50130343 | MTKZ 13-30 SET | Reflector | Design: Round<br>Reflective surface, diameter: 15 mm<br>Material: Plastic<br>Base material: Plastic<br>Chemical designation of the material: PA<br>Fastening: Clip<br>Suitable for bore hole diameter: 12.5 ... 13.5 mm<br>Suitable for material thickness: 0.8 ... 5 mm<br>Processing temperature: 5 ... 45 °C |
|    | 50129092 | MTKZ 15-30 SET | Reflector | Design: Round<br>Reflective surface, diameter: 15 mm<br>Material: Plastic<br>Base material: Plastic<br>Chemical designation of the material: PA<br>Fastening: Clip<br>Suitable for bore hole diameter: 14.5 ... 15.5 mm<br>Suitable for material thickness: 0.8 ... 5 mm<br>Processing temperature: 5 ... 45 °C |
|  | 50140183 | MTKZ 7-30 SET  | Reflector | Design: Round<br>Reflective surface, diameter: 15 mm<br>Material: Plastic<br>Base material: Plastic<br>Chemical designation of the material: PA<br>Fastening: Clip<br>Suitable for bore hole diameter: 6 ... 7 mm<br>Suitable for material thickness: 0.8 ... 5 mm<br>Processing temperature: 5 ... 45 °C       |

## Reflective tapes for standard applications

|                                                                                    | Part no. | Designation       | Article         | Description                                                                                                              |
|------------------------------------------------------------------------------------|----------|-------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------|
|  | 50132911 | REF 7-A-15-30 SET | Reflective tape | Design: Round<br>Reflective surface, diameter: 15 mm<br>Fastening: Self-adhesive<br>Processing temperature: 15 ... 22 °C |

## Illuminations

|                                                                                    | Part no. | Designation            | Article      | Description                                                                                        |
|------------------------------------------------------------------------------------|----------|------------------------|--------------|----------------------------------------------------------------------------------------------------|
|  | 50144030 | IL AL 034/031 IR 110 H | Illumination | Special version: Heating<br>Functions: Strobed operation (edge-triggered), no continuous operation |

Accessories

Services

|                                                                                  | Part no. | Designation | Article          | Description                                                                                                                                                                                                                    |
|----------------------------------------------------------------------------------|----------|-------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | S981014  | CS30-S-110  | Start-up support | Details: Performed at location of customer's choosing, duration: max. 10 hours.<br>Conditions: Devices and connection cables are already mounted, price not including travel costs and, if applicable, accommodation expenses. |
|  | S981019  | CS30-T-110  | Product training | Details: Location and content to be agreed upon, duration: max. 10 hours.<br>Conditions: Price not including travel costs and, if applicable, accommodation expenses.                                                          |

Note



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