



# KTS/KTX

SIMPLY DETECT MORE.

Contrast sensors

**SICK**  
Sensor Intelligence.

# KTS AND KTX: SIMPLY DETECT MORE.

Nothing simply improves by itself. Except these: our new KTS and KTX incorporate more than just the reliability and availability of contrast sensors from the market and technology leader. We go further: TwinEye-Technology®, multifunctional display, individual setting options. And offer contrast sensors that now also detect colors. The advantages? Significantly higher performance and process stability as well as more possible applications. But without anything changing.



## Multi-functional 7-segment display

- Quick and easy input, simple navigation
- Enables a large variety of individualized adjustments
- Visualization of sensor function and process quality
- Visual feedback of mounting quality



## Integrated job memory

- Option of managing configurations (up to 5 different formats can be stored) directly in the storage bank, even without IO-Link
- Flexible format change thanks to simple access to stored configurations



## Smart sensor functions

- Enhanced sensing: Custom intelligence and performance for contrast and color detection
- Efficient communication: IO-Link and additional integrated functions such as sensor configuration or sensor visualization
- Diagnostics: Access to process, service, and analysis data
- Smart tasks: Configuration management for quick and easy format change



## High-precision RGB LED

- Excellent color mixture
- Clearly visible and precise light spot
- More precision, higher resolution and improved depth of field



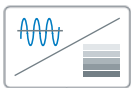
### TwinEye technology®

- Reliable detection and process stability, even with high-gloss and fluttering materials and materials with minor contrast differences
- Wide depth of field range
- Increased sensing range tolerance ( $\pm 5$  mm)



### Color mode

- Combination of contrast and color sensor technology
- Detection of difficult marks with very low contrast or very low color differences using special color mode
- More flexibility, more application possibilities for the sensor usage



### Special versions

- "High Precision" with 70 kHz switching frequency and 3  $\mu$ s jitter
- "High Sensitivity" with increased gray-scale resolution



Always the ideal solution:

**KTS – the new housing shape:** perfectly equipped for modern machine concepts.

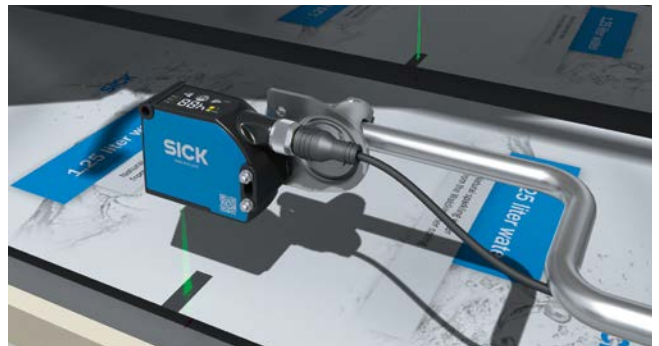
**KTX – the well-known mounting pattern:** for easy integration into existing machines.

# KTS UND KTX: MORE THAN JUST PRINT MARK SENSORS

Where most of the contrast sensors reach their limits, the KTS and KTX offer more applications, more areas of use, more flexibility. And all this without neglecting the core task:

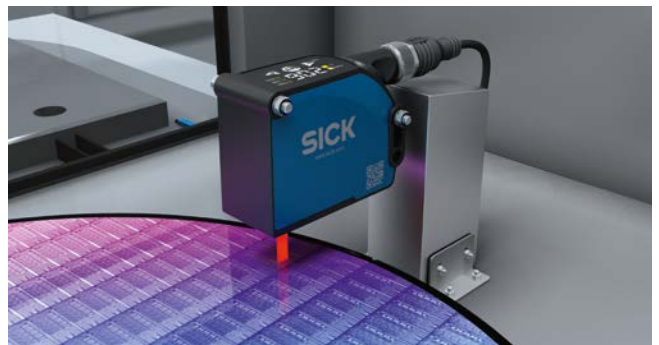
## Controlling print marks

With the KTS and KTX, you can control your packaging processes quickly and precisely. Thanks to TwinEye-Technology®, the KTS and KTX detect high-gloss materials and complex contrasts, even on heavily fluttering materials. The integrated color mode also enables reliable detection of even the most minor contrast differences and color features. Furthermore, the sensing range tolerance has been extended to  $\pm 5$  mm for stable detection even in the most unstable material transportation systems.



## Detection of wafers

When producing wafers, the individual layers must be correctly positioned for further processing. Depending on the layer, the wafers have different, sometimes high-gloss surfaces. Thanks to the TwinEye-Technology® and high grayscale resolution, KTS and KTX detection of all different types of wafer surfaces is not only reliable, but teach-in is also quick and easy.



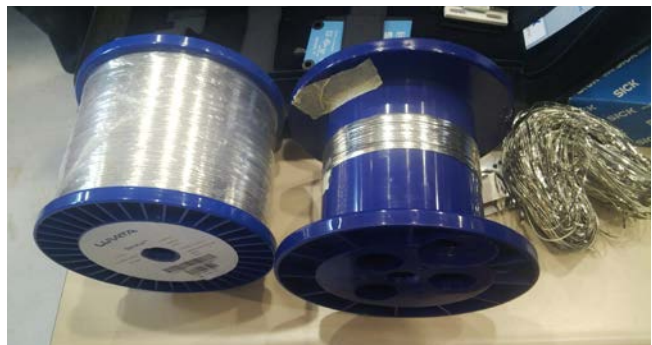
## Controlling the filling of tubes

With the KTS and KTX, you can precisely control the filling and adhesion of tubes. When doing so, the sensors reliably detect the necessary control marks - a complex task since the tubes rotate quickly and consist in part of high-gloss materials and welding seams make detection more difficult. It is here that the high accuracy of the sensors comes into effect, thanks to the 50 kHz switching frequency and 5  $\mu$ s jitter as well as the additional color mode.



## Control of roll changes

Supply material such as wire or backsplice foil is often wound around rolls. If the roll is changed too early or too late, material loss and machine downtimes are the result. The KTS and KTX reliably detect the difference between supply material and roll, so necessary roll changes are automatically signaled at the right time.



## Color detection and quality control

The perfect combination of contrast and color sensor technology: when producing cables or yarn, the KTS and KTX detect even the most minor color and contrast difference thanks to the color mode. Even faulty, incorrectly dyed material is detected reliably and sorted out in time.





# UNIVERSAL CONTRAST DETECTION IN MODERN HOUSING



## Product description

High performance for universal application in a range of applications: The new KTS Core in modern design with white LED or RGB LED and VISTAL® housing impresses with its switching frequency and gray line resolution, different teach-in variants and manual switching threshold adjustment. A response time of 20 µs and a jitter of 10 µs ensure reliable and accurate detection of contrast

differences, e.g. in print marks, even on high-gloss materials. Thanks to various teach-in processes and manual switching threshold adjustment, commissioning is more flexible and detection more stable. The KTS Core detects even the smallest differences in contrast and is therefore well-suited for use in a wide range of applications.

## At a glance

- White LED or RGB LED
- High gray line resolution
- Very large dynamic range means reliable detection of contrasts on glossy materials
- 12.5 kHz / 25 kHz switching frequency
- Display for easy sensor adjustment
- 2-point and dynamic teach-in
- Manual switching threshold adjustment
- Light/dark switching

## Your benefits

- High switching frequency for use in quick machine processes with high switching accuracy requirements
- Display and flexible sensor settings for easy sensor handling and user-friendly operation
- High gray line resolution enables the detection of very small contrast differences and high-gloss materials - high process stability and fewer downtimes
- Various teach-in processes for ideal sensor and process setting in different applications
- Manual switching threshold adjustment supports stable material detection and individual sensor adaption to different contrasts



## Additional information

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→ [www.sick.com/KTS\\_Core](http://www.sick.com/KTS_Core)

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.



## Detailed technical data

### Features

|                                           |                                                                           |                        |
|-------------------------------------------|---------------------------------------------------------------------------|------------------------|
| <b>Dimensions (W x H x D)</b>             | 26 mm x 62 mm x 47.5 mm                                                   |                        |
| <b>Sensing distance</b>                   | 13 mm                                                                     |                        |
| <b>Housing design (light emission)</b>    | Rectangular                                                               |                        |
| <b>Sensing distance tolerance</b>         | ± 3 mm                                                                    |                        |
| <b>Light source</b>                       | LED, White <sup>1)</sup><br>LED, RGB <sup>1)</sup><br>(depending on type) |                        |
| <b>Wave length</b>                        | White                                                                     | 400 nm ... 750 nm      |
|                                           | RGB                                                                       | 470 nm, 525 nm, 625 nm |
| <b>Light emission</b>                     | Long side of housing                                                      |                        |
| <b>Light spot size</b>                    | 1.2 mm x 3.9 mm                                                           |                        |
| <b>Light spot direction <sup>2)</sup></b> | Vertical                                                                  |                        |
| <b>Teach-in mode</b>                      | 2-point teach-in<br>Dynamic Teach-in (depending on type)                  |                        |
| <b>Output function</b>                    | Light/dark switching                                                      |                        |

<sup>1)</sup> Average service life: 100,000 h at T<sub>0</sub> = +25 °C.

<sup>2)</sup> In relation to long side of housing.

### Mechanics/electronics

|                                          |                                                                                                                              |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>Supply voltage <sup>1)</sup></b>      | 10.8 V DC ... 28.8 V DC                                                                                                      |
| <b>Ripple <sup>2)</sup></b>              | ≤ 5 V <sub>pp</sub>                                                                                                          |
| <b>Power consumption <sup>3)</sup></b>   | < 100 mA                                                                                                                     |
| <b>Switching frequency <sup>4)</sup></b> | 12,5 kHz / 25 kHz (depending on type)                                                                                        |
| <b>Response time <sup>5)</sup></b>       | 40 μs / 20 μs (depending on type)                                                                                            |
| <b>Jitter</b>                            | 20 μs / 10 μs (depending on type)                                                                                            |
| <b>Output type</b>                       | PUSH/PULL, NPN (depending on type)                                                                                           |
| <b>Switching output (voltage)</b>        | Push/Pull: HIGH = V <sub>S</sub> - 3 V / LOW ≤ 3 V                                                                           |
| <b>Output current I<sub>max</sub></b>    | 100 mA                                                                                                                       |
| <b>Input, teach-in (ET)</b>              | Teach: U = 10 V ... < V <sub>S</sub> ; Run: U < 2 V                                                                          |
| <b>Retention time (ET)</b>               | 35 ms, non-volatile memory                                                                                                   |
| <b>Connection type</b>                   | Male connector M12, 4-pin                                                                                                    |
| <b>Protection class</b>                  | III                                                                                                                          |
| <b>Circuit protection</b>                | U <sub>v</sub> connections, reverse polarity protected<br>Output Q short-circuit protected<br>Interference pulse suppression |
| <b>Enclosure rating</b>                  | IP67                                                                                                                         |
| <b>Weight</b>                            | 68 g                                                                                                                         |
| <b>Housing material</b>                  | VISTAL®                                                                                                                      |

<sup>1)</sup> Limit values: DC 12 V (-10 %) ... DC 24 V (+20 %). Operation in short-circuit protected network max. 8 A.

<sup>2)</sup> May not exceed or fall below U<sub>v</sub> tolerances.

<sup>3)</sup> Without load.

<sup>4)</sup> With light/dark ratio 1:1.

<sup>5)</sup> Signal transit time with resistive load.

Ambient data

|                               |                                          |
|-------------------------------|------------------------------------------|
| Ambient operating temperature | -20 °C ... +60 °C                        |
| Ambient storage temperature   | -25 °C ... +75 °C                        |
| Shock load                    | According to IEC 60068-2-27 (30 g/11 ms) |
| UL File No.                   | E181493                                  |

Ordering information

KTS Core white LED

- **Fieldbus, industrial network:** -
- **Teach-in mode:** 2-point teach-in, dynamic Teach-in
- **Light emission:** Long side of housing
- **Light spot direction:** vertical
- **Light source:** LED, white (Average service life: 100,000 h at T<sub>U</sub> = +25 °C.)
- **Switching frequency:** 25 kHz
- **Response time:** 20 µs
- **Jitter:** 10 µs

| Sensing distance | Sensing distance tolerance | Switching output | Connection type           | Connection diagram | Type               | Part no. |
|------------------|----------------------------|------------------|---------------------------|--------------------|--------------------|----------|
| 13 mm            | ± 3 mm                     | PUSH/PULL        | Male connector M12, 4-pin | cd-380             | KTS-MB81141142ZZZZ | 1078119  |

KTS Core RGB-LED

- **Fieldbus, industrial network:** -
- **Teach-in mode:** 2-point teach-in, dynamic Teach-in
- **Light emission:** Long side of housing
- **Light spot direction:** vertical
- **Light source:** LED, RGB (Average service life: 100,000 h at T<sub>U</sub> = +25 °C.)
- **Switching frequency:** 25 kHz
- **Response time:** 20 µs
- **Jitter:** 10 µs

| Sensing distance | Sensing distance tolerance | Switching output | Connection type           | Connection diagram | Type               | Part no. |
|------------------|----------------------------|------------------|---------------------------|--------------------|--------------------|----------|
| 13 mm            | ± 3 mm                     | PUSH/PULL        | Male connector M12, 4-pin | cd-380             | KTS-WB81141142ZZZZ | 1078120  |

KTS Core Easy-Teach white LED

- **Fieldbus, industrial network:** -
- **Light emission:** Long side of housing
- **Light spot direction:** vertical
- **Light source:** LED, white (Average service life: 100,000 h at T<sub>U</sub> = +25 °C.)
- **Switching frequency:** 12,5 kHz
- **Response time:** 40 µs
- **Jitter:** 20 µs

| Teach-in mode    | Sensing distance | Sensing distance tolerance | Switching output | Connection type           | Connection diagram | Type               | Part no. |
|------------------|------------------|----------------------------|------------------|---------------------------|--------------------|--------------------|----------|
| 2-point teach-in | 13 mm            | ± 3 mm                     | PUSH/PULL        | Male connector M12, 4-pin | cd-380             | KTS-MB41141142ZZZZ | 1219606  |
|                  |                  |                            | NPN              | Male connector M12, 4-pin | cd-380             | KTS-MN41141142ZZZZ | 1219612  |



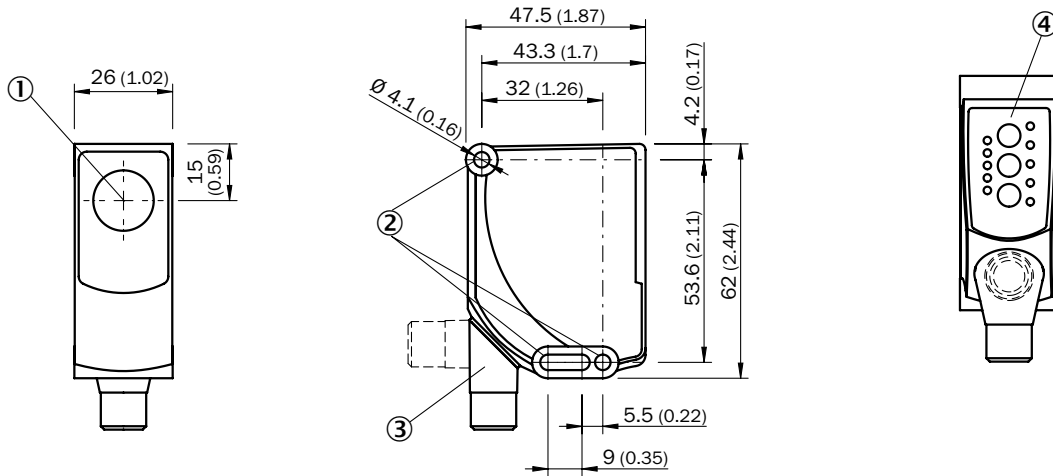
**KTS Core Easy-Teach RGB-LED**

- **Fieldbus, industrial network:** -
- **Light emission:** Long side of housing
- **Light spot direction:** vertical
- **Light source:** LED, RGB (Average service life: 100,000 h at  $T_U = +25\text{ °C.}$ )
- **Switching frequency:** 25 kHz
- **Response time:** 20  $\mu\text{s}$
- **Jitter:** 10  $\mu\text{s}$

| Teach-in mode    | Sensing distance | Sensing distance tolerance | Switching output | Connection type           | Connection diagram | Type               | Part no. |
|------------------|------------------|----------------------------|------------------|---------------------------|--------------------|--------------------|----------|
| 2-point teach-in | 13 mm            | $\pm 3\text{ mm}$          | PUSH/PULL        | Male connector M12, 4-pin | cd-380             | KTS-WB41141142ZZZZ | 1218200  |
|                  |                  |                            | NPN              | Male connector M12, 4-pin | cd-380             | KTS-WN41141142ZZZZ | 1219611  |
| dynamic Teach-in | 13 mm            | $\pm 3\text{ mm}$          | PUSH/PULL        | Male connector M12, 4-pin | cd-380             | KTS-WB51141142ZZZZ | 1219064  |

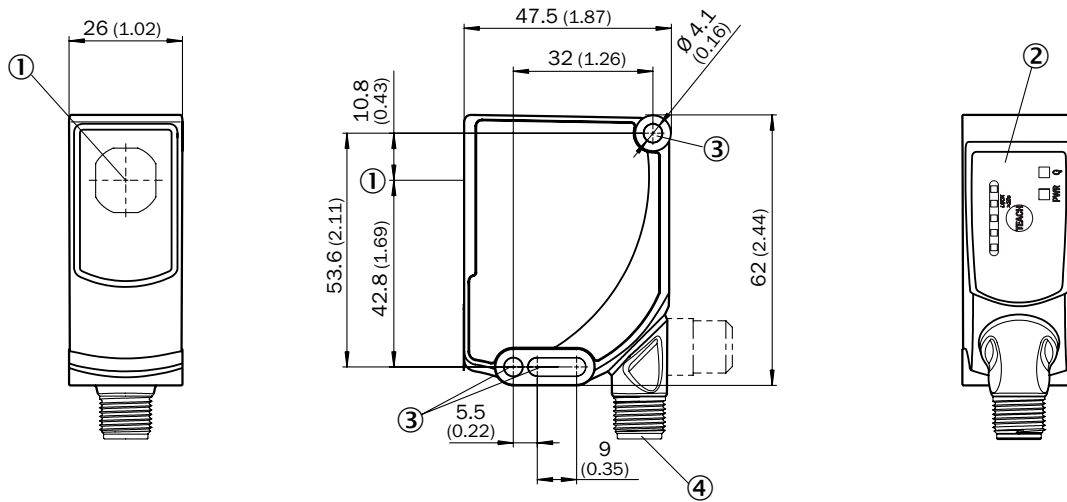
**Dimensional drawings** (Dimensions in mm (inch))

KTS Core



- ① Optical axis, sender
- ② Fixing hole
- ③ Connector M12 (rotatable up to 180°)
- ④ Control panel

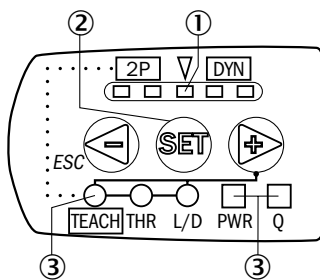
KTS Core Easy-Teach



- ① Optical axis, sender
- ② Control panel
- ③ Fixing hole
- ④ Connector M12 (rotatable up to 180°)

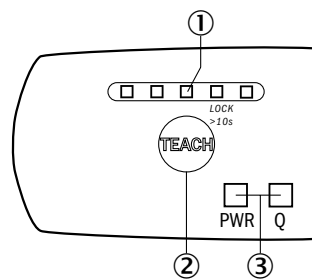
Adjustments

KTS Core



- ① Bar graph
- ② Navigation buttons
- ③ Status indicator LED

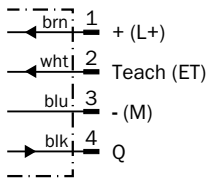
KTS Core Easy-Teach



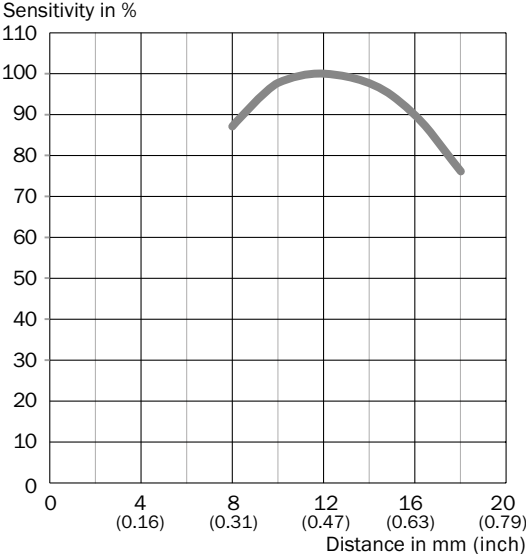
- ① Bar graph
- ② Single teach-in button
- ③ LED status indicator

Connection type and diagram

Cd-380



### Sensing distance

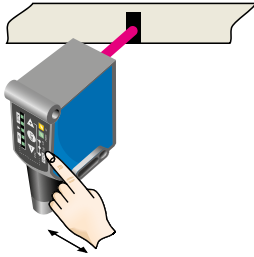


## Setting the switching threshold

### KTS Core - Setting the switching threshold (2-point teach-in)

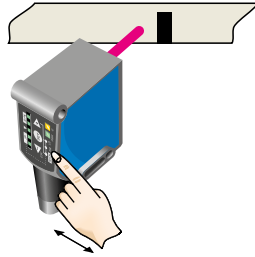
Suitable for manual positioning of the object to be detected, e.g. marks and background.

#### 1. Position mark



When setting the contrasts to be detected, the first LED (green) flashes in the bar graph. Press Teach-in pushbutton.

#### 2. Position background

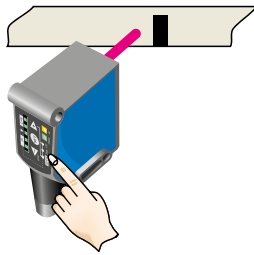


When setting the contrasts to be detected, the second LED (green) flashes in the bar graph. Press Teach-in pushbutton. The Quality of Teach is displayed.

### KTS Core - Setting the switching threshold (dynamic Teach-in)

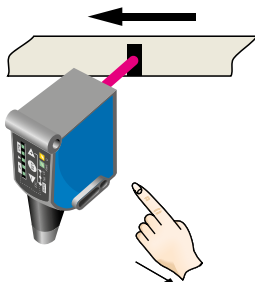
Suitable for teaching in moving objects.

#### 1. Position background

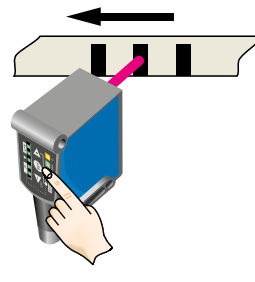


Press the Teach-in pushbutton < 1 s.

#### 2. Move at least the mark and background using the light spot

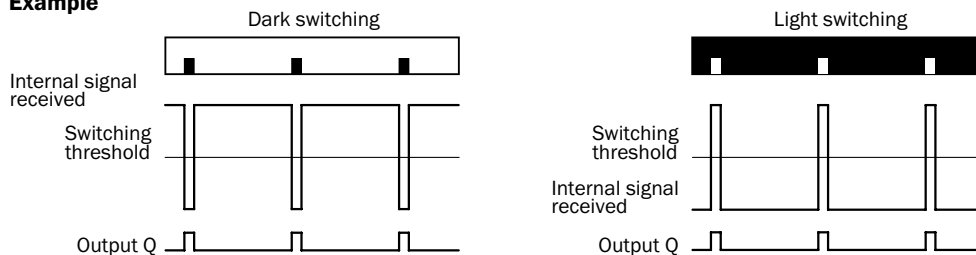


The bar graph display flashes during repeat length detection.



Press the Teach-in pushbutton to end the teach-in process. The Quality of Teach is displayed.

### Example



### Switching characteristics

The optimum emitted light is selected automatically (at RGB variants).

Static teach-in: light/dark setting is defined using teach-in sequence.

Dynamic teach-in: switching output active on mark, if background is longer in the field of view during the teach-in. The switching threshold is set in the center between the background and the mark.

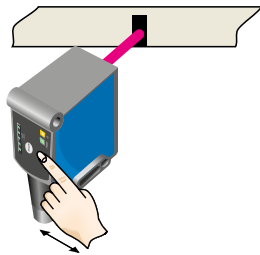
Keylock (activation and deactivation): Press and hold the “+” pushbutton > 10 s.

Teach-in failure: The Q-LED (yellow) flashes and all LEDs flash on the bar graph (green).

**KTS Core Easy-Teach - Setting the switching threshold (2-point teach-in)**

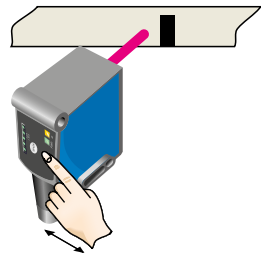
Suitable for manual positioning of the object to be detected, e.g. marks and background.

**1. Position mark**



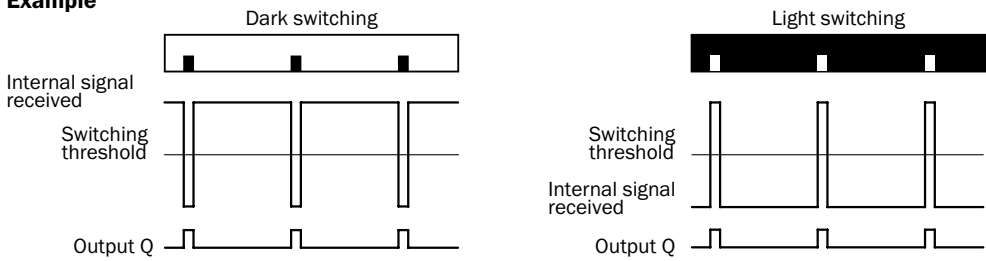
When setting the contrasts to be detected, the first LED (green) flashes in the bar graph. Press Teach-in pushbutton.

**2. Position background**



When setting the contrasts to be detected, the second LED (green) flashes in the bar graph. Press Teach-in pushbutton. The Quality of Teach is displayed.

**Example**



**Switching characteristics**

The optimum emitted light is selected automatically (at RGB variants).  
 Static teach-in: light/dark setting is defined using teach-in sequence.

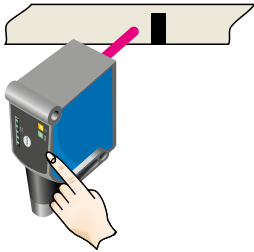
Keylock (activation and deactivation): Press and hold the Teach-in pushbutton > 10 s.

Teach-in failure: The Q-LED (yellow) flashes and all LEDs flash on the bar graph (green).

KTS Core Easy-Teach - Setting the switching threshold (dynamic Teach-in)

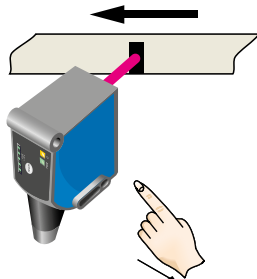
Suitable for teaching in moving objects.

**1. Position background**

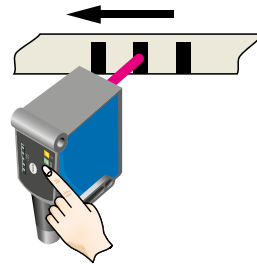


Press the Teach-in pushbutton < 1 s.

**2. Move at least the mark and background using the light spot**

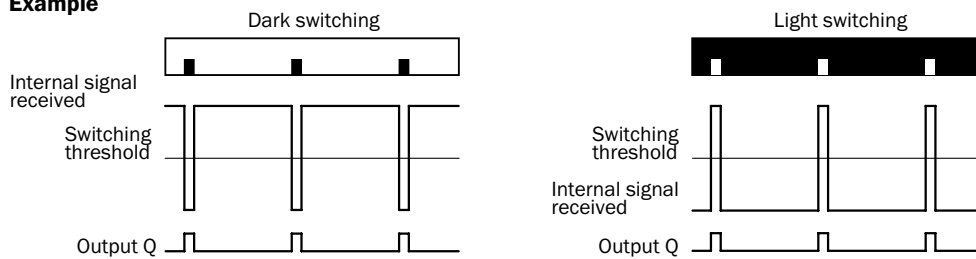


The bar graph display flashes during repeat length detection.



Press the Teach-in pushbutton to end the teach-in process. The Quality of Teach is displayed.

**Example**



**Switching characteristics**

The optimum emitted light is selected automatically (at RGB variants).

Dynamic teach-in: switching output active on mark, if background is longer in the field of view during the teach-in.

The switching threshold is set in the center between the background and the mark.

Keylock (activation and deactivation): Press and hold the “+” pushbutton > 10 s.

Teach-in failure: The Q-LED (yellow) flashes and all LEDs flash on the bar graph (green).





# INNOVATIVE TWINEYE-TECHNOLOGY FOR BETTER CONTRAST DETECTION



## Additional information

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## Product description

Outstanding performance for a variety of applications, even with difficult frame-work conditions: The new KTS Prime with modern design, high-precision RGB LED and VISTAL® housing impresses with TwinEye-Technology, color mode, high switching frequency, excellent gray line resolution, 7-segment display and IO-Link. The response time of 10 µs and a jitter of 5 µs ensure accurate detec-

tion of contrast differences, even at high machine speeds. Thanks to various teach-in processes, integrated color mode and variable sensor adjustment, commissioning is more flexible and the processes more stable. The KTS Prime provides additional diagnosis and analysis data via IO-Link. The new KTS Prime - it can easily do more.

## At a glance

- TwinEye-Technology for increased depth of field and sensing distance tolerance
- 50 kHz switching frequency and 5 µs jitter
- Large dynamic range means reliable detection of contrasts on glossy materials
- 7-segment display
- Color mode
- Assembly feedback
- IO-Link and automation functions
- Flexible sensor setting thanks to various sensor parameters

## Your benefits

- Small design for installation even where space is limited
- TwinEye-Technology for better performance on glossy or jittering materials - less machine downtime and more process stability
- Multi-functional sensor adjustment for individual sensor adjustment
- Excellent contrast resolution and a large dynamic range for good performance on complex materials
- High flexibility thanks to a range of teach-in processes
- Integrated color mode - stable detection even with complex color differences
- Job storage in sensor - flexible process design and format change
- Diagnostics and visualization as well as easy format change via IO-Link

→ [www.sick.com/KTS\\_Prime](http://www.sick.com/KTS_Prime)

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.



## Detailed technical data

### Features

|                                           |                                                                 |
|-------------------------------------------|-----------------------------------------------------------------|
| <b>Dimensions (W x H x D)</b>             | 26 mm x 62 mm x 47.5 mm                                         |
| <b>Sensing distance</b>                   | 13 mm / 25 mm (depending on type)                               |
| <b>Housing design (light emission)</b>    | Rectangular                                                     |
| <b>Sensing distance tolerance</b>         | ± 5 mm / ± 6 mm (depending on type)                             |
| <b>Light source <sup>1)</sup></b>         | LED, RGB                                                        |
| <b>Wave length</b>                        | 470 nm, 525 nm, 625 nm                                          |
| <b>Light emission</b>                     | Long side of housing                                            |
| <b>Light spot size</b>                    |                                                                 |
| Vertical 13 mm                            | 0.9 mm x 3.8 mm                                                 |
| Vertical 25 mm                            | 1.2 mm x 5.3 mm                                                 |
| Horizontal 13 mm                          | 3.8 mm x 0.9 mm                                                 |
| Horizontal 25 mm                          | 5.3 mm x 1.2 mm                                                 |
| Round                                     | Ø 0.9 mm                                                        |
| <b>Light spot direction <sup>2)</sup></b> | Vertical<br>Horizontal<br>Round<br>(depending on type)          |
| <b>Teach-in mode</b>                      | 1-point teach-in, 2-point teach-in, dynamic Teach-in, auto mode |
| <b>Output function</b>                    | Light/dark switching                                            |
| <b>Delay time</b>                         | Adjustable                                                      |

<sup>1)</sup> Average service life: 100,000 h at  $T_U = +25\text{ °C}$ .

<sup>2)</sup> In relation to long side of housing.

### Mechanics/electronics

|                                                      |                                                                                                                                                        |
|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Supply voltage <sup>1)</sup></b>                  | 10.8 V DC ... 28.8 V DC                                                                                                                                |
| <b>Ripple <sup>2)</sup></b>                          | ≤ 5 V <sub>pp</sub>                                                                                                                                    |
| <b>Power consumption <sup>3)</sup></b>               | < 100 mA                                                                                                                                               |
| <b>Switching frequency <sup>4)</sup></b>             |                                                                                                                                                        |
| KTS Prime                                            | 50 kHz                                                                                                                                                 |
| KTS Prime High Precision                             | 70 kHz                                                                                                                                                 |
| KTS Prime High Sensitivity                           | 25 kHz                                                                                                                                                 |
| <b>Response time <sup>5)</sup></b>                   |                                                                                                                                                        |
| KTS Prime                                            | 10 μs                                                                                                                                                  |
| KTS Prime High Precision                             | 3 μs                                                                                                                                                   |
| KTS Prime High Sensitivity                           | 20 μs                                                                                                                                                  |
| <b>Jitter</b>                                        |                                                                                                                                                        |
| KTS Prime                                            | 5 μs                                                                                                                                                   |
| KTS Prime High Precision                             | 3 μs                                                                                                                                                   |
| KTS Prime High Sensitivity                           | 10 μs                                                                                                                                                  |
| <b>Output type</b>                                   | PUSH/PULL / PNP / NPN (depending on type)                                                                                                              |
| <b>Switching output (voltage)</b>                    | Push/Pull: HIGH = $V_S - 3\text{ V}$ / LOW ≤ 3 V<br>PNP: HIGH = $V_S - 3\text{ V}$ / LOW = 0 V<br>NPN: HIGH = $V_S$ / LOW ≤ 3 V<br>(depending on type) |
| <b>Output current I<sub>max.</sub> <sup>6)</sup></b> | 100 mA                                                                                                                                                 |

|                                    |                                                                                                                              |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>Analog output</b>               | 0 mA ... 20 mA<br>0 V ... 10 V<br>(depending on type)                                                                        |
| <b>Max. resistance at I analog</b> | 400 Ω                                                                                                                        |
| <b>Max. resistance at U analog</b> | 1000 Ω                                                                                                                       |
| <b>Measured value at white 90%</b> |                                                                                                                              |
| I analog output                    | 4.5 mA (= 400 digits)                                                                                                        |
| U analog output                    | 2 V (= 400 digits)                                                                                                           |
| <b>Input, teach-in (ET)</b>        |                                                                                                                              |
| Push/Pull, PNP                     | Teach: U = 10 V ... < V <sub>S</sub> ; Run: U < 2 V                                                                          |
| NPN                                | Teach: U < 2 V; Run: U = 10 V ... < U <sub>v</sub>                                                                           |
| <b>Input, blanking input (AT)</b>  |                                                                                                                              |
| Push/Pull, PNP                     | Blanked: U = 10 V ... < U <sub>v</sub> ; free-running: U < 2 V                                                               |
| NPN                                | Blanked: U < 2 V; free-running: U = 10 V ... < U <sub>v</sub>                                                                |
| <b>Input, fine/coarse (F/C)</b>    |                                                                                                                              |
| Push/Pull, PNP                     | Coarse: U = 10 V ... < U <sub>v</sub> ; fine: U < 2 V                                                                        |
| NPN                                | Coarse: U < 2 V; fine: U = 10 V ... < U <sub>v</sub>                                                                         |
| <b>Input, light/dark (L/D)</b>     |                                                                                                                              |
| Push/Pull, PNP                     | Light switching: U < 2 V / dark switching: 10 V ... < U <sub>v</sub>                                                         |
| NPN                                | Light switching: 10 V ... < U <sub>v</sub> / dark switching: U < 2 V                                                         |
| <b>Retention time (ET)</b>         | 25 ms, non-volatile memory                                                                                                   |
| <b>Connection type</b>             | Male connector M12, 4-pin / male connector M12, 5-pin (depending on type)                                                    |
| <b>Protection class</b>            | III                                                                                                                          |
| <b>Circuit protection</b>          | U <sub>v</sub> connections, reverse polarity protected<br>Output Q short-circuit protected<br>Interference pulse suppression |
| <b>Enclosure rating</b>            | IP67                                                                                                                         |
| <b>Weight</b>                      | 68 g                                                                                                                         |
| <b>Housing material</b>            | VISTAL®                                                                                                                      |

<sup>1</sup> Limit values: DC 12 V (-10 %) ... DC 24 V (+20 %). Operation in short-circuit protected network max. 8 A.

<sup>2</sup> May not exceed or fall below U, tolerances.

<sup>3</sup> Without load.

<sup>4</sup> With light/dark ratio 1:1.

<sup>5</sup> Signal transit time with resistive load.

<sup>6</sup> Total current of all Outputs.

## Ambient data

|                                      |                                          |
|--------------------------------------|------------------------------------------|
| <b>Ambient operating temperature</b> | -20 °C ... +60 °C                        |
| <b>Ambient storage temperature</b>   | -25 °C ... +75 °C                        |
| <b>Shock load</b>                    | According to IEC 60068-2-27 (30 g/11 ms) |
| <b>UL File No.</b>                   | E181493                                  |

## Communication interface

|                             |                    |
|-----------------------------|--------------------|
| <b>Fieldbus integration</b> | IO-Link V1.1       |
| <b>Mode</b>                 | COM 2 (38,4 kBaud) |
| <b>Cycle time</b>           | 2.3 ms             |
| <b>Process data length</b>  | 16 Bit             |
| <b>VendorID</b>             | Dez: 26; Hex: 001A |

|                                                                          |                                                                                                                                                                       |
|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Process data structure - standard device</b>                          | Bit 0 = switching signal $Q_{L1}$<br>Bit 1 = empty<br>Bit 2 = quality of run alarm<br>Bit 3 ... 5 = emission color<br>Bit 6 ... 15 = measurement value emission color |
| <b>DeviceID - standard device</b>                                        | Dez: 8388772; Hex: 8000a4                                                                                                                                             |
| <b>Process data structure A - device with Timestamp in standard mode</b> | Bit 0 = switching signal $Q_{L1}$<br>Bit 1 = empty<br>Bit 2 = quality of run alarm<br>Bit 3 ... 5 = emission color<br>Bit 6 ... 15 = measurement value emission color |
| <b>Process data structure B - device with Timestamp in standard mode</b> | Bit 0 = switching signal $Q_{L1}$<br>Bit 1 = switching signal $Q_{L2}$<br>Bit 2 ... 15 = time stamp                                                                   |
| <b>DeviceID - device with Timestamp</b>                                  | Dez: 8388773; Hex: 8000a5                                                                                                                                             |

## Ordering information

### KTS Prime

- **Teach-in mode:** 1-point teach-in, 2-point teach-in, dynamic Teach-in, auto mode
- **Light emission:** Long side of housing
- **Light source:** LED, RGB (Average service life: 100,000 h at  $T_0 = +25\text{ °C.}$ )

| Fieldbus, industrial network | Light spot direction      | Sensing distance | Sensing distance tolerance | Switching output          | Connection type           | Connection diagram        | Type               | Part no.                  |
|------------------------------|---------------------------|------------------|----------------------------|---------------------------|---------------------------|---------------------------|--------------------|---------------------------|
|                              | Vertical                  | 13 mm            | ± 5 mm                     | PNP, NPN                  | Male connector M12, 4-pin | cd-381                    | KTS-WS91141142ZZZZ | 1218594                   |
|                              |                           |                  |                            | PUSH/PULL                 | Male connector M12, 4-pin | cd-381                    | KTS-WB91141142ZZZZ | 1078121                   |
|                              |                           |                  |                            |                           | Male connector M12, 5-pin | cd-382                    | KTS-WB91141152ZZZZ | 1078122                   |
|                              |                           | 25 mm            | ± 6 mm                     | PUSH/PULL                 | Male connector M12, 4-pin | cd-381                    | KTS-WB91241142ZZZZ | 1084207                   |
|                              |                           |                  |                            |                           | Male connector M12, 5-pin | cd-382                    | KTS-WB91241152ZZZZ | 1078124                   |
|                              |                           |                  |                            |                           | Horizontal                | 13 mm                     | ± 5 mm             | PUSH/PULL                 |
|                              | Male connector M12, 5-pin | cd-382           | KTS-WB92141152ZZZZ         | 1078123                   |                           |                           |                    |                           |
|                              | 25 mm                     | ± 6 mm           | PUSH/PULL                  | Male connector M12, 5-pin | cd-382                    | KTS-WB92241152ZZZZ        | 1078125            |                           |
|                              |                           |                  |                            | Round                     | 13 mm                     | ± 5 mm                    | PUSH/PULL          | Male connector M12, 5-pin |
|                              | IO-Link                   | Vertical         | 13 mm                      | ± 5 mm                    | PUSH/PULL                 | Male connector M12, 5-pin | cd-387             | KTS-WB9114115AZZZZ        |
| 25 mm                        |                           |                  | ± 6 mm                     | PUSH/PULL                 | Male connector M12, 5-pin | cd-387                    | KTS-WB9124115AZZZZ | 1078128                   |
| Horizontal                   |                           | 13 mm            | ± 5 mm                     | PUSH/PULL                 | Male connector M12, 5-pin | cd-387                    | KTS-WB9214115AZZZZ | 1078127                   |
|                              |                           | 25 mm            | ± 6 mm                     | PUSH/PULL                 | Male connector M12, 5-pin | cd-387                    | KTS-WB9224115AZZZZ | 1078129                   |
| Round                        |                           | 13 mm            | ± 5 mm                     | PUSH/PULL                 | Male connector M12, 5-pin | cd-387                    | KTS-WB9414115AZZZZ | 1218831                   |
| IO-Link + Timestamp          |                           | Vertical         | 13 mm                      | ± 5 mm                    | PUSH/PULL                 | Male connector M12, 5-pin | cd-387             | KTS-WB9114115AA90Z        |

KTS Prime Analog

- **Fieldbus, industrial network:** -
- **Teach-in mode:** 1-point teach-in, 2-point teach-in, dynamic Teach-in, auto mode
- **Light emission:** Long side of housing
- **Light source:** LED, RGB (Average service life: 100,000 h at  $T_U = +25\text{ °C.}$ )
- **Switching output:** PUSH/PULL

| Light spot direction | Sensing distance | Sensing distance tolerance | Analog output  | Connection type           | Connection diagram | Type               | Part no. |
|----------------------|------------------|----------------------------|----------------|---------------------------|--------------------|--------------------|----------|
| Vertical             | 13 mm            | ± 5 mm                     | 0 mA ... 20 mA | Male connector M12, 4-pin | cd-383             | KTS-WB9114114IZZZZ | 1078851  |
|                      |                  |                            | 0 V ... 10 V   | Male connector M12, 4-pin | cd-384             | KTS-WB9114114UZZZZ | 1084197  |
|                      |                  |                            |                | Male connector M12, 5-pin | cd-385             | KTS-WB9114115UZZZZ | 1084194  |
| Horizontal           | 13 mm            | ± 5 mm                     | 0 V ... 10 V   | Male connector M12, 5-pin | cd-385             | KTS-WB9214115UZZZZ | 1081387  |

KTS Prime High Precision

- **Teach-in mode:** 1-point teach-in, 2-point teach-in, dynamic Teach-in, auto mode
- **Light emission:** Long side of housing
- **Light spot direction:** vertical
- **Light source:** LED, RGB (Average service life: 100,000 h at  $T_U = +25\text{ °C.}$ )
- **Switching output:** PUSH/PULL

| Fieldbus, industrial network | Sensing distance | Sensing distance tolerance | Connection type           | Connection diagram | Type               | Part no. |
|------------------------------|------------------|----------------------------|---------------------------|--------------------|--------------------|----------|
| -                            | 13 mm            | ± 5 mm                     | Male connector M12, 5-pin | cd-382             | KTS-WB91141152ZZZZ | 1081730  |
| IO-Link                      | 13 mm            | ± 5 mm                     | Male connector M12, 5-pin | cd-387             | KTS-WB9114115AZZZZ | 1081731  |

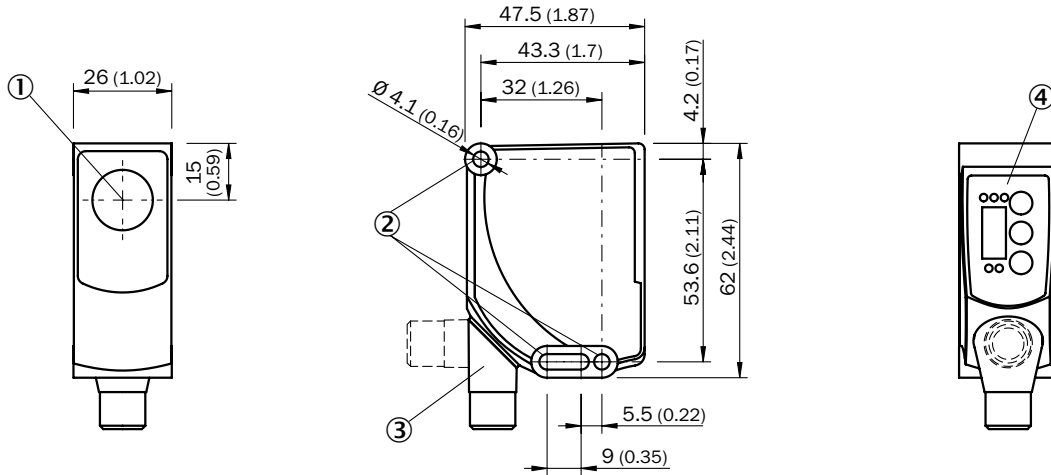
KTS Prime High Sensitivity

- **Teach-in mode:** 1-point teach-in, 2-point teach-in, dynamic Teach-in, auto mode
- **Light emission:** Long side of housing
- **Light source:** LED, RGB (Average service life: 100,000 h at  $T_U = +25\text{ °C.}$ )
- **Switching output:** PUSH/PULL

| Fieldbus, industrial network | Light spot direction | Sensing distance | Sensing distance tolerance | Connection type           | Connection diagram | Type               | Part no. |
|------------------------------|----------------------|------------------|----------------------------|---------------------------|--------------------|--------------------|----------|
| -                            | Vertical             | 13 mm            | ± 5 mm                     | Male connector M12, 4-pin | cd-381             | KTS-WB91141142ZZZZ | 1218193  |
|                              |                      |                  |                            | Male connector M12, 5-pin | cd-382             | KTS-WB91141152ZZZZ | 1078114  |
|                              |                      | 25 mm            | ± 6 mm                     | Male connector M12, 5-pin | cd-382             | KTS-WB91241152ZZZZ | 1218195  |
|                              | Horizontal           | 13 mm            | ± 5 mm                     | Male connector M12, 5-pin | cd-382             | KTS-WB92141152ZZZZ | 1218194  |
|                              |                      |                  |                            | Male connector M12, 5-pin | cd-382             | KTS-WB92241152ZZZZ | 1218196  |
|                              |                      | 25 mm            | ± 6 mm                     | Male connector M12, 5-pin | cd-382             | KTS-WB92241152ZZZZ | 1218196  |
| IO-Link                      | Vertical             | 13 mm            | ± 5 mm                     | Male connector M12, 5-pin | cd-387             | KTS-WB9114115AZZZZ | 1218198  |
|                              | Horizontal           | 13 mm            | ± 5 mm                     | Male connector M12, 5-pin | cd-387             | KTS-WB9214115AZZZZ | 1218199  |

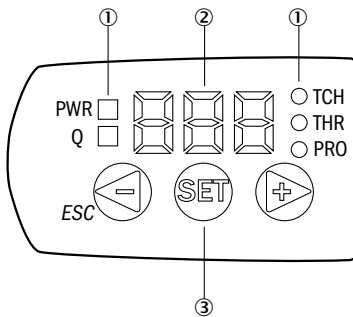


**Dimensional drawings** (Dimensions in mm (inch))



- ① Optical axis sender
- ② Fixing hole
- ③ Connector M12 (rotatable up to 180°)
- ④ Control panel

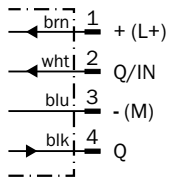
**Adjustments**



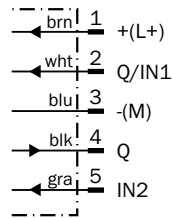
- ① LED status indicator
- ② Display
- ③ Control panel

**Connection type and diagram**

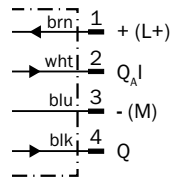
**Cd-381**



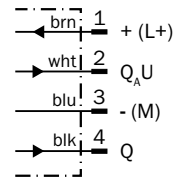
**Cd-382**



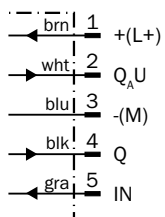
**Cd-383**



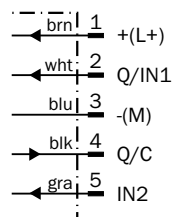
**Cd-384**



**Cd-385**

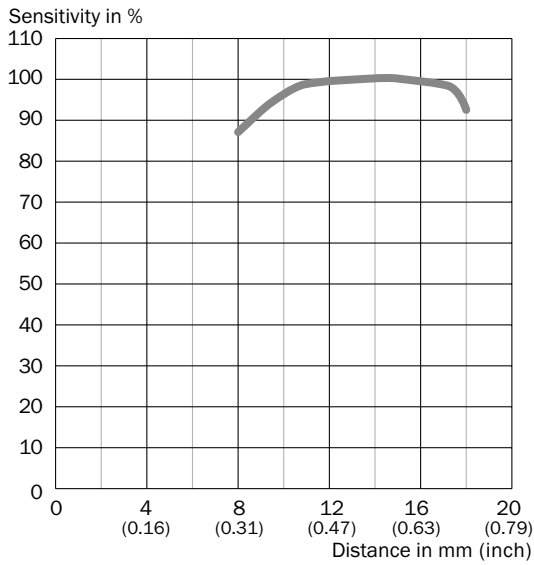


**Cd-387**

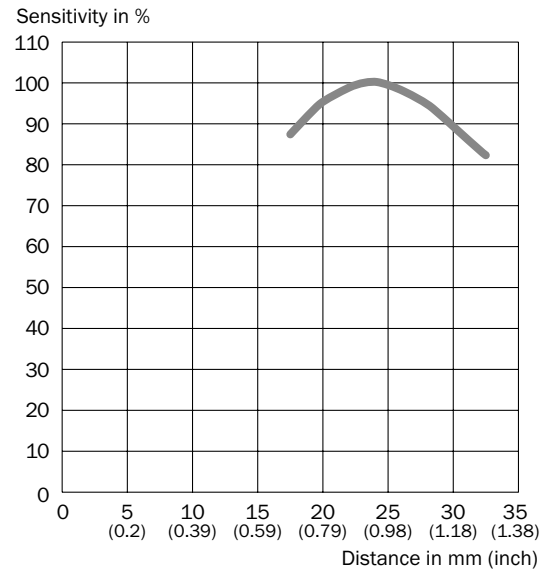


Sensing distance

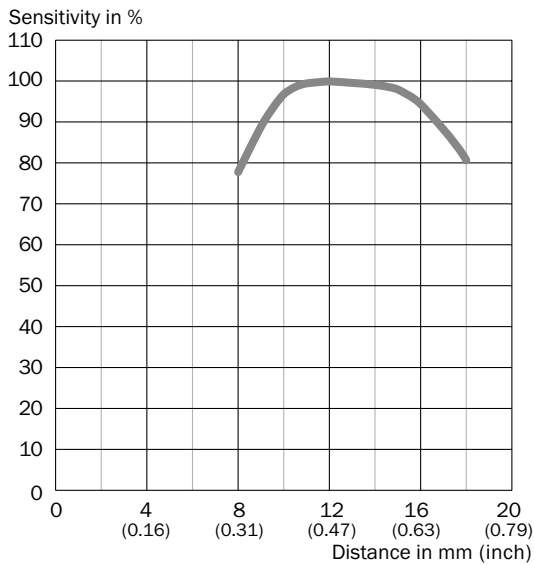
Sensing distance 13 mm,  
light spot direction horizontal/vertical



Sensing distance 25 mm,  
light spot direction horizontal/vertical



Sensing distance 13 mm,  
light spot direction round

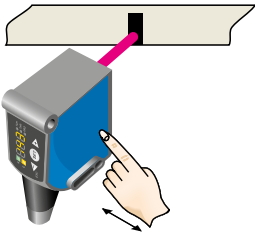


## Setting the switching threshold

KTS Prime - Setting the switching threshold (2-point teach-in)

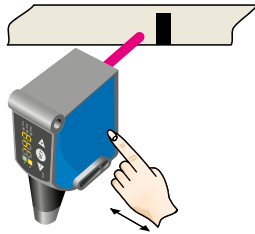
Suitable for manual positioning of the object to be detected, e.g. marks and background.

### 1. Position mark



When setting the contrasts to be detected, "1st" flashes. Press set button.

### 2. Position background

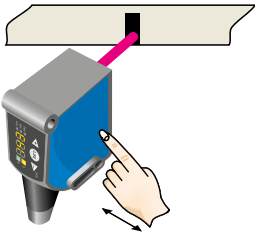


When setting the contrasts to be detected, "2nd" flashes. Press set button. The Quality of Teach is displayed.

KTS Prime - Setting the switching threshold (color mode)

Suitable for teaching in color properties.

### 1. Position mark/color property

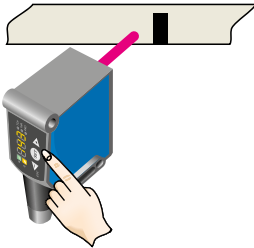


When detecting the contrast or color to be detected, "1st" flashes. Press set button. The Quality of Teach-in is displayed.

KTS Prime - Setting the switching threshold (dynamic Teach-in)

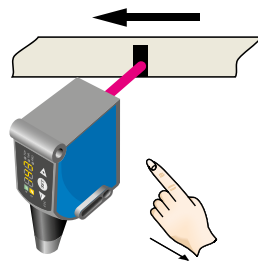
Suitable for teaching in moving objects.

**1. Position background**

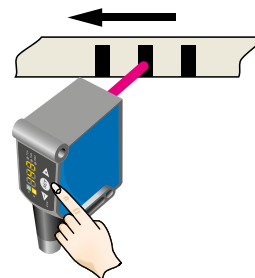


Press the Set pushbutton to start the teach-in process.

**2. Move at least the mark and background using the light spot**

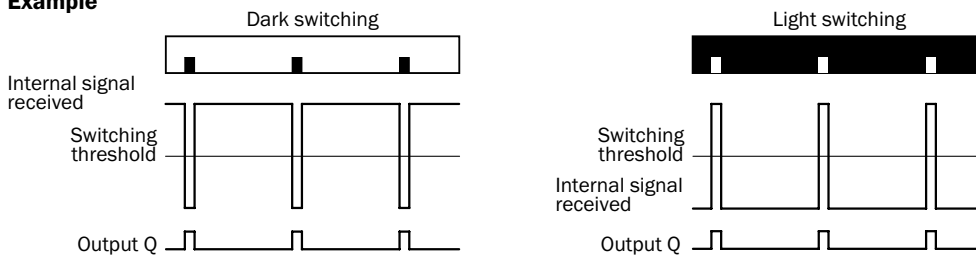


The display lights up during repeat length detection (---).

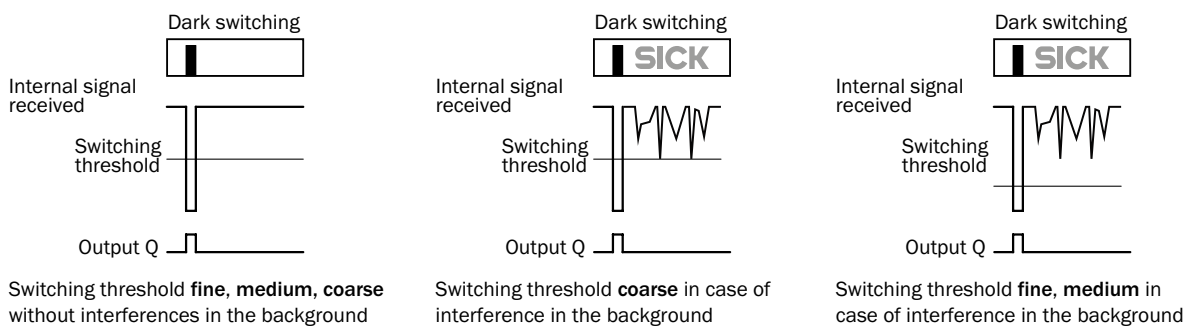


Press the Set pushbutton to end the teach-in process. The Quality of Teach is displayed.

**Example**



**Example: sensitivity adjustment with a fault in the background**



**Switching characteristics**

The optimum emitted light is selected automatically (at RGB variants).

Static teach-in: light/dark setting is defined using teach-in sequence.

Dynamic teach-in: switching output active on mark, if background is longer in the field of view during the teach-in.

If the sensitivity adjustment is coarse, the switching threshold is set in the center between the background and the mark.

If the sensitivity adjustment is medium or fine, the switching threshold is set between the mark and the fault in the background.

If no fault is present, then the switching threshold is also set in the center between the background and the mark.

Keylock (activation and deactivation): Press and hold the “+” pushbutton > 10 s.

The Q-LED (yellow) flashes and the “Err” error message appears on the display.



# CONTRAST AND COLOR DETECTION WITH TWIN-EYE-TECHNOLOGY IN FAMILIAR HOUSING FOR THE VERY BEST SENSOR PERFORMANCE



## Additional information

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## Product description

Outstanding performance for a variety of applications, even with difficult framework conditions: The new KTX Prime with familiar hole pattern, high-precision RGB LED and VISTAL® housing impresses with TwinEye-Technology, color mode, high switching frequency, excellent gray line resolution, 7-segment display and IO-Link. The response time of 10 µs and a jitter of 5 µs ensure accurate detec-

tion of contrast differences, even at high machine speeds. Thanks to various teach-in processes, integrated color mode and variable sensor adjustment, commissioning is more flexible and the processes more stable. The KTX Prime provides additional diagnosis and analysis data via IO-Link. The new KTX Prime - it can easily do more.

## At a glance

- TwinEye-Technology for increased depth of field and sensing distance tolerance
- 50 kHz switching frequency and 5 µs jitter
- Large dynamic range means reliable detection of contrasts on glossy materials
- 7-segment display
- Color mode
- Assembly feedback
- IO-Link and automation functions
- Flexible sensor setting thanks to various sensor parameters

## Your benefits

- 1:1 replacement for existing KT series - assembly compatibility
- TwinEye-Technology for better performance on glossy or jittering materials - less machine downtime and more process stability
- Multi-functional sensor adjustment for individual sensor adjustment
- Excellent contrast resolution and a large dynamic range for good performance on complex materials
- High flexibility thanks to a range of teach-in processes
- Integrated color mode - stable detection even with complex color differences
- Job storage in sensor - flexible process design and format change
- Diagnostics and visualization as well as easy format change via IO-Link

→ [www.sick.com/KTX\\_Prime](http://www.sick.com/KTX_Prime)

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.





## Detailed technical data

### Features

|                                           |                                                                 |
|-------------------------------------------|-----------------------------------------------------------------|
| <b>Dimensions (W x H x D)</b>             | 30 mm x 53 mm x 78.5 mm                                         |
| <b>Sensing distance</b>                   | 13 mm / 25 mm (depending on type)                               |
| <b>Housing design (light emission)</b>    | Rectangular                                                     |
| <b>Sensing distance tolerance</b>         | ± 5 mm / ± 6 mm (depending on type)                             |
| <b>Light source <sup>1)</sup></b>         | LED, RGB                                                        |
| <b>Wave length</b>                        | 470 nm, 525 nm, 625 nm                                          |
| <b>Light emission</b>                     | Short device side / Long side of housing (depending on type)    |
| <b>Light spot size</b>                    |                                                                 |
| Horizontal 13 mm                          | 3.8 mm x 0.9 mm                                                 |
| Horizontal 25 mm                          | 5.3 mm x 1.2 mm                                                 |
| Vertical 13 mm                            | 0.9 mm x 3.8 mm                                                 |
| Vertical 13 mm                            | 1.2 mm x 5.3 mm                                                 |
| Round                                     | Ø 0.9 mm                                                        |
| <b>Light spot direction <sup>2)</sup></b> | Horizontal<br>Vertical<br>Round<br>(depending on type)          |
| <b>Teach-in mode</b>                      | 1-point teach-in, 2-point teach-in, dynamic Teach-in, auto mode |
| <b>Output function</b>                    | Light/dark switching                                            |
| <b>Delay time</b>                         | Adjustable                                                      |

<sup>1)</sup> Average service life: 100,000 h at  $T_U = +25\text{ °C}$ .

<sup>2)</sup> In relation to long side of housing.

### Mechanics/electronics

|                                                      |                                                                                                                                                        |
|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Supply voltage <sup>1)</sup></b>                  | 10.8 V DC ... 28.8 V DC                                                                                                                                |
| <b>Ripple <sup>2)</sup></b>                          | ≤ 5 V <sub>pp</sub>                                                                                                                                    |
| <b>Power consumption <sup>3)</sup></b>               | < 100 mA                                                                                                                                               |
| <b>Switching frequency <sup>4)</sup></b>             |                                                                                                                                                        |
| KTX Prime                                            | 50 kHz                                                                                                                                                 |
| KTX Prime High Precision                             | 70 kHz                                                                                                                                                 |
| <b>Response time <sup>5)</sup></b>                   |                                                                                                                                                        |
| KTX Prime                                            | 10 μs                                                                                                                                                  |
| KTX Prime High Precision                             | 3 μs                                                                                                                                                   |
| <b>Jitter</b>                                        |                                                                                                                                                        |
| KTX Prime                                            | 5 μs                                                                                                                                                   |
| KTX Prime High Precision                             | 3 μs                                                                                                                                                   |
| <b>Output type</b>                                   | PUSH/PULL / PNP / NPN (depending on type)                                                                                                              |
| <b>Switching output (voltage)</b>                    | Push/Pull: HIGH = $V_S - 3\text{ V}$ / LOW ≤ 3 V<br>PNP: HIGH = $V_S - 3\text{ V}$ / LOW = 0 V<br>NPN: HIGH = $V_S$ / LOW ≤ 3 V<br>(depending on type) |
| <b>Output current I<sub>max.</sub> <sup>6)</sup></b> | 100 mA                                                                                                                                                 |

|                                    |                                                                                                                              |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| <b>Analog output</b>               | 0 V ... 10 V<br>0 mA ... 20 mA<br>(depending on type)                                                                        |
| <b>Analog input</b>                | 0 V ... 10 V                                                                                                                 |
| <b>Max. resistance at I analog</b> | 400 Ω                                                                                                                        |
| <b>Max. resistance at U analog</b> | 1000 Ω                                                                                                                       |
| <b>Measured value at white 90%</b> |                                                                                                                              |
| I analog output                    | 4.5 mA (= 400 digits)                                                                                                        |
| U analog output                    | 2 V (= 400 digits)                                                                                                           |
| <b>Input, teach-in (ET)</b>        |                                                                                                                              |
| PUSH/PULL, PNP                     | Teach: U = 10 V ... < V <sub>s</sub> ; Run: U < 2 V                                                                          |
| NPN                                | Teach: U < 2 V; Run: U = 10 V ... < V <sub>s</sub>                                                                           |
| <b>Input, blanking input (AT)</b>  |                                                                                                                              |
| PUSH/PULL, PNP                     | Blanked: U = 10 V ... < U <sub>v</sub> ; free-running: U < 2 V                                                               |
| NPN                                | Blanked: U < 2 V; free-running: U = 10 V ... < U <sub>v</sub>                                                                |
| <b>Input, fine/coarse (F/C)</b>    |                                                                                                                              |
| PUSH/PULL, PNP                     | Coarse: U = 10 V ... < U <sub>v</sub> ; fine: U < 2 V                                                                        |
| NPN                                | Coarse: U < 2 V; fine: U = 10 V ... < U <sub>v</sub>                                                                         |
| <b>Input, light/dark (L/D)</b>     |                                                                                                                              |
| PUSH/PULL, PNP                     | Light switching: U < 2 V / dark switching: 10 V ... < U <sub>v</sub>                                                         |
| NPN                                | Light switching: 10 V ... < U <sub>v</sub> / dark switching: U < 2 V                                                         |
| <b>Retention time (ET)</b>         | 25 ms, non-volatile memory                                                                                                   |
| <b>Connection type</b>             | Male connector M12, 4-pin / male connector M12, 5-pin (depending on type)                                                    |
| <b>Protection class</b>            | III                                                                                                                          |
| <b>Circuit protection</b>          | U <sub>v</sub> connections, reverse polarity protected<br>Output Q short-circuit protected<br>Interference pulse suppression |
| <b>Enclosure rating</b>            | IP67                                                                                                                         |
| <b>Weight</b>                      | 94 g                                                                                                                         |
| <b>Housing material</b>            | VISTAL®                                                                                                                      |

<sup>1)</sup> Limit values: DC 12 V (-10 %) ... DC 24 V (+20 %). Operation in short-circuit protected network max. 8 A.

<sup>2)</sup> May not exceed or fall below U, tolerances.

<sup>3)</sup> Without load.

<sup>4)</sup> With light/dark ratio 1:1.

<sup>5)</sup> Signal transit time with resistive load.

<sup>6)</sup> Total current of all Outputs.

## Ambient data

|                                      |                                          |
|--------------------------------------|------------------------------------------|
| <b>Ambient operating temperature</b> | -20 °C ... +60 °C                        |
| <b>Ambient storage temperature</b>   | -25 °C ... +75 °C                        |
| <b>Shock load</b>                    | According to IEC 60068-2-27 (30 g/11 ms) |
| <b>UL File No.</b>                   | E181493                                  |

## Communication interface

|                             |                    |
|-----------------------------|--------------------|
| <b>Fieldbus integration</b> | IO-Link V1.1       |
| <b>Mode</b>                 | COM 2 (38,4 kBaud) |
| <b>Cycle time</b>           | 2.3 ms             |
| <b>Process data length</b>  | 16 Bit             |
| <b>VendorID</b>             | Dez: 26; Hex: 001A |

|                                                                          |                                                                                                                                                                       |
|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Process data structure - standard device</b>                          | Bit 0 = switching signal $Q_{L1}$<br>Bit 1 = empty<br>Bit 2 = quality of run alarm<br>Bit 3 ... 5 = emission color<br>Bit 6 ... 15 = measurement value emission color |
| <b>DeviceID - standard device</b>                                        | Dez: 8388772; Hex: 8000a4                                                                                                                                             |
| <b>Process data structure A - device with Timestamp in standard mode</b> | Bit 0 = switching signal $Q_{L1}$<br>Bit 1 = empty<br>Bit 2 = quality of run alarm<br>Bit 3 ... 5 = emission color<br>Bit 6 ... 15 = measurement value emission color |
| <b>Process data structure B - device with Timestamp in standard mode</b> | Bit 0 = switching signal $Q_{L1}$<br>Bit 1 = switching signal $Q_{L2}$<br>Bit 2 ... 15 = time stamp                                                                   |
| <b>DeviceID - device with Timestamp</b>                                  | Dez: 8388773; Hex: 8000a5                                                                                                                                             |

## Ordering information

### KTX Prime

- **Teach-in mode:** 1-point teach-in, 2-point teach-in, dynamic Teach-in, auto mode
- **Light source:** LED, RGB (Average service life: 100,000 h at  $T_U = +25\text{ °C}$ .)

| Fieldbus, industrial network | Light emission    | Light spot direction | Sensing distance          | Sensing distance tolerance | Switching output | Connection type           | Connection diagram | Type                      | Part no. |
|------------------------------|-------------------|----------------------|---------------------------|----------------------------|------------------|---------------------------|--------------------|---------------------------|----------|
| -                            | Short device side | Vertical             | 13 mm                     | ± 5 mm                     | NPN              | Male connector M12, 4-pin | cd-381             | KTX-WN91142242ZZZZ        | 1078071  |
|                              |                   |                      |                           |                            |                  | Male connector M12, 5-pin | cd-382             | KTX-WN91142252ZZZZ        | 1078067  |
|                              |                   |                      |                           |                            | PNP              | Male connector M12, 4-pin | cd-381             | KTX-WP91142242ZZZZ        | 1078070  |
|                              |                   |                      |                           |                            |                  | Male connector M12, 5-pin | cd-382             | KTX-WP91142252ZZZZ        | 1078066  |
|                              |                   |                      |                           |                            | PNP, NPN         | Male connector M12, 4-pin | cd-381             | KTX-WS91142242ZZZZ        | 1078166  |
|                              |                   |                      |                           |                            | 25 mm            | ± 6 mm                    | NPN                | Male connector M12, 4-pin | cd-381   |
|                              |                   |                      | Male connector M12, 5-pin | cd-382                     |                  |                           |                    | KTX-WN91242252ZZZZ        | 1078075  |
|                              |                   |                      | PNP                       | Male connector M12, 4-pin  |                  |                           | cd-381             | KTX-WP91242242ZZZZ        | 1078077  |
|                              |                   |                      |                           | Male connector M12, 5-pin  |                  |                           | cd-382             | KTX-WP91242252ZZZZ        | 1078074  |

| Fieldbus, industrial network | Light emission            | Light spot direction      | Sensing distance   | Sensing distance tolerance | Switching output | Connection type           | Connection diagram        | Type               | Part no.           |         |
|------------------------------|---------------------------|---------------------------|--------------------|----------------------------|------------------|---------------------------|---------------------------|--------------------|--------------------|---------|
| -                            | Short device side         | Horizontal                | 13 mm              | ± 5 mm                     | NPN              | Male connector M12, 4-pin | cd-381                    | KTX-WN92142242ZZZZ | 1078073            |         |
|                              |                           |                           |                    |                            |                  | Male connector M12, 5-pin | cd-382                    | KTX-WN92142252ZZZZ | 1078069            |         |
|                              |                           |                           |                    |                            | PNP              | Male connector M12, 4-pin | cd-381                    | KTX-WP92142242ZZZZ | 1078072            |         |
|                              |                           |                           |                    |                            |                  | Male connector M12, 5-pin | cd-382                    | KTX-WP92142252ZZZZ | 1078068            |         |
|                              |                           |                           | 25 mm              | ± 6 mm                     | PNP              | Male connector M12, 4-pin | cd-381                    | KTX-WP92242242ZZZZ | 1078079            |         |
|                              |                           |                           |                    |                            |                  | Male connector M12, 5-pin | cd-382                    | KTX-WP92242252ZZZZ | 1078076            |         |
|                              |                           | Round                     | 13 mm              | ± 5 mm                     | NPN              | Male connector M12, 5-pin | cd-382                    | KTX-WN94142252ZZZZ | 1078153            |         |
|                              |                           |                           |                    |                            |                  | PUSH/PULL                 | Male connector M12, 5-pin | cd-382             | KTX-WB94142252ZZZZ | 1078094 |
|                              |                           | Long side of housing      | Vertical           | 13 mm                      | ± 5 mm           | NPN                       | Male connector M12, 4-pin | cd-381             | KTX-WN91141242ZZZZ | 1078102 |
|                              |                           |                           |                    |                            |                  |                           | Male connector M12, 5-pin | cd-382             | KTX-WN91141252ZZZZ | 1078098 |
|                              |                           |                           |                    |                            |                  | PNP                       | Male connector M12, 4-pin | cd-381             | KTX-WP91141242ZZZZ | 1078101 |
|                              |                           |                           |                    |                            |                  |                           | Male connector M12, 5-pin | cd-382             | KTX-WP91141252ZZZZ | 1078097 |
|                              | 25 mm                     |                           |                    | ± 6 mm                     | PNP, NPN         | Male connector M12, 4-pin | cd-381                    | KTX-WS91141242ZZZZ | 1078167            |         |
|                              |                           |                           |                    |                            |                  | NPN                       | Male connector M12, 4-pin | cd-381             | KTX-WN91241242ZZZZ | 1078107 |
|                              | Male connector M12, 5-pin | cd-382                    | KTX-WN91241252ZZZZ | 1078105                    |                  |                           |                           |                    |                    |         |
|                              | PNP                       | Male connector M12, 4-pin | cd-381             | KTX-WP91241242ZZZZ         | 1078106          |                           |                           |                    |                    |         |
|                              |                           | Male connector M12, 5-pin | cd-382             | KTX-WP91241252ZZZZ         | 1078104          |                           |                           |                    |                    |         |

| Fieldbus, industrial network | Light emission       | Light spot direction | Sensing distance          | Sensing distance tolerance | Switching output          | Connection type           | Connection diagram        | Type               | Part no.           |
|------------------------------|----------------------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---------------------------|--------------------|--------------------|
| -                            | Long side of housing | Horizontal           | 13 mm                     | ± 5 mm                     | NPN                       | Male connector M12, 5-pin | cd-382                    | KTX-WN92141252ZZZZ | 1078100            |
|                              |                      |                      |                           |                            | PNP                       | Male connector M12, 4-pin | cd-381                    | KTX-WP92141242ZZZZ | 1078103            |
|                              |                      |                      | Male connector M12, 5-pin | cd-382                     |                           | KTX-WP92141252ZZZZ        | 1078099                   |                    |                    |
|                              |                      |                      | PNP                       | Male connector M12, 4-pin  | cd-381                    | KTX-WP92241242ZZZZ        | 1078108                   |                    |                    |
|                              |                      | Round                | 13 mm                     | ± 5 mm                     | PUSH/PULL                 | Male connector M12, 5-pin | cd-382                    | KTX-WB94141252ZZZZ | 1078095            |
| IO-Link                      | Short device side    | Vertical             | 13 mm                     | ± 5 mm                     | PUSH/PULL                 | Male connector M12, 5-pin | cd-387                    | KTX-WB9114225AZZZZ | 1078080            |
|                              |                      |                      | 25 mm                     | ± 6 mm                     | PUSH/PULL                 | Male connector M12, 5-pin | cd-387                    | KTX-WB9124225AZZZZ | 1078083            |
|                              |                      | Horizontal           | 13 mm                     | ± 5 mm                     | PNP                       | Male connector M12, 5-pin | cd-387                    | KTX-WP9214225AZZZZ | 1078081            |
|                              |                      |                      |                           |                            | PUSH/PULL                 | Male connector M12, 5-pin | cd-387                    | KTX-WB9214225AZZZZ | 1078082            |
|                              |                      | 25 mm                | ± 6 mm                    | PUSH/PULL                  | Male connector M12, 5-pin | cd-387                    | KTX-WB9224225AZZZZ        | 1078084            |                    |
|                              |                      | Long side of housing | Vertical                  | 13 mm                      | ± 5 mm                    | PUSH/PULL                 | Male connector M12, 5-pin | cd-387             | KTX-WB9114125AZZZZ |
|                              | Horizontal           |                      | 13 mm                     | ± 5 mm                     | PUSH/PULL                 | Male connector M12, 5-pin | cd-387                    | KTX-WB9214125AZZZZ | 1081722            |
|                              | IO-Link + Timestamp  | Short device side    | Vertical                  | 13 mm                      | ± 5 mm                    | PUSH/PULL                 | Male connector M12, 5-pin | cd-387             | KTX-WB9114225AA90Z |

KTX Prime Analog

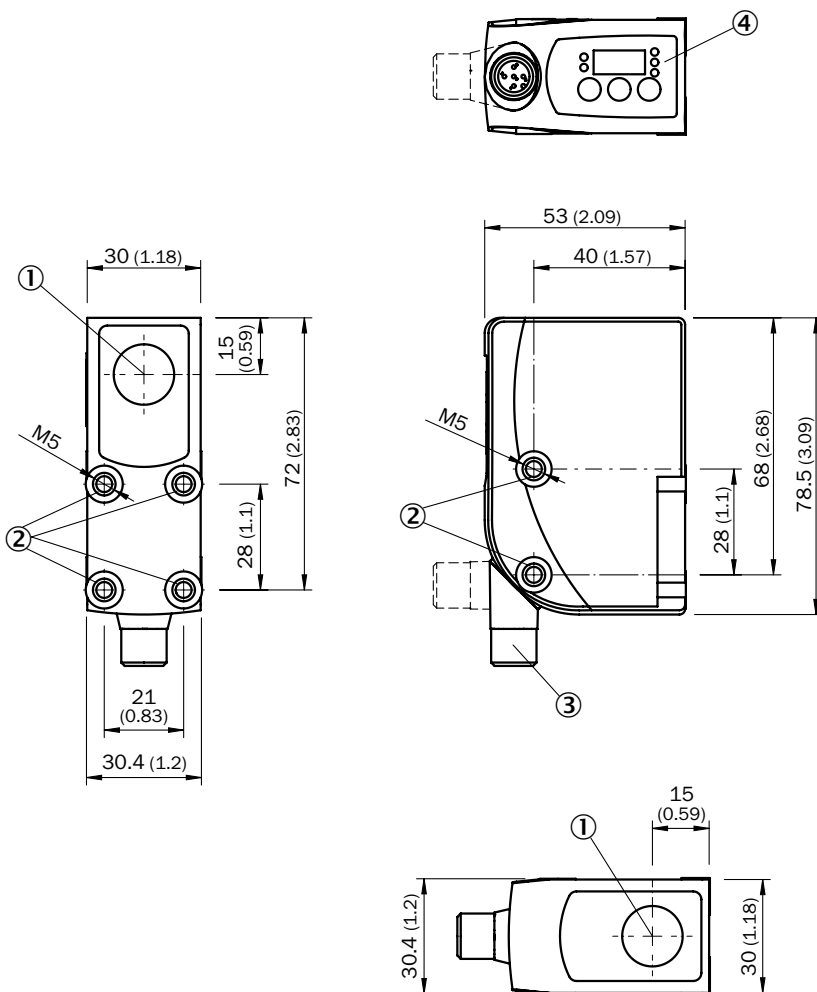
- **Fieldbus, industrial network:** -
- **Light source:** LED, RGB (Average service life: 100,000 h at T<sub>U</sub> = +25 °C.)
- **Sensing distance tolerance:** ± 5 mm (13 mm sensing distance), ± 6 mm (25 mm sensing distance)

| Teach-in mode                                                   | Light emission       | Light spot direction | Sensing distance | Switching output | Analog output             | Analog input              | Connection type           | Connection diagram        | Type               | Part no.           |         |
|-----------------------------------------------------------------|----------------------|----------------------|------------------|------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------|--------------------|---------|
| 1-point teach-in, 2-point teach-in, dynamic Teach-in, auto mode | Short device side    | Vertical             | 13 mm            | NPN              | 0 mA ... 20 mA            | -                         | Male connector M12, 4-pin | cd-383                    | KTX-WN9114224IZZZZ | 1078088            |         |
|                                                                 |                      |                      |                  |                  | 0 V ... 10 V              | -                         | Male connector M12, 5-pin | cd-385                    | KTX-WN9114225UZZZZ | 1218271            |         |
|                                                                 |                      |                      | PNP              | 0 mA ... 20 mA   | -                         | Male connector M12, 4-pin | cd-383                    | KTX-WP9114224IZZZZ        | 1078087            |                    |         |
|                                                                 |                      |                      |                  | 0 V ... 10 V     | -                         | Male connector M12, 5-pin | cd-385                    | KTX-WP9114225UZZZZ        | 1078090            |                    |         |
|                                                                 |                      |                      | PUSH/PULL        | 0 V ... 10 V     | -                         | Male connector M12, 4-pin | cd-384                    | KTX-WB9114224UZZZZ        | 1084195            |                    |         |
|                                                                 |                      |                      |                  | 0 V ... 10 V     | -                         | Male connector M12, 5-pin | cd-385                    | KTX-WB9114225UZZZZ        | 1078091            |                    |         |
|                                                                 |                      | 25 mm                | PUSH/PULL        | 0 V ... 10 V     | -                         | Male connector M12, 5-pin | cd-385                    | KTX-WB9124225UZZZZ        | 1078093            |                    |         |
|                                                                 |                      | Horizontal           | 13 mm            | PUSH/PULL        | 0 V ... 10 V              | -                         | Male connector M12, 5-pin | cd-385                    | KTX-WB9214225UZZZZ | 1078092            |         |
|                                                                 |                      |                      | Round            | 13 mm            | NPN                       | 0 mA ... 20 mA            | -                         | Male connector M12, 4-pin | cd-383             | KTX-WN9414224IZZZZ | 1078089 |
|                                                                 |                      | Long side of housing | Vertical         | 13 mm            | PNP                       | 0 mA ... 20 mA            | -                         | Male connector M12, 4-pin | cd-383             | KTX-WP9114124IZZZZ | 1078109 |
|                                                                 |                      |                      |                  |                  |                           | 0 V ... 10 V              | -                         | Male connector M12, 5-pin | cd-385             | KTX-WP9114125UZZZZ | 1078110 |
|                                                                 |                      |                      |                  | PUSH/PULL        | 0 V ... 10 V              | -                         | Male connector M12, 4-pin | cd-384                    | KTX-WB9114124UZZZZ | 1084196            |         |
| 0 V ... 10 V                                                    | -                    |                      |                  |                  | Male connector M12, 5-pin | cd-385                    | KTX-WB9114125UZZZZ        | 1078111                   |                    |                    |         |
| 25 mm                                                           | PUSH/PULL            |                      |                  | 0 V ... 10 V     | -                         | Male connector M12, 5-pin | cd-385                    | KTX-WB9124125UZZZZ        | 1078113            |                    |         |
| Horizontal                                                      | 13 mm                |                      |                  | PUSH/PULL        | 0 V ... 10 V              | -                         | Male connector M12, 5-pin | cd-385                    | KTX-WB9214125UZZZZ | 1078112            |         |
| -                                                               | Short device side    | Vertical             | 13 mm            | PUSH/PULL        | 0 V ... 10 V              | 0 V ... 10 V              | Male connector M12, 5-pin | cd-386                    | KTX-WB91142259ZZZZ | 1078096            |         |
|                                                                 | Long side of housing | Vertical             | 13 mm            | PUSH/PULL        | 0 V ... 10 V              | 0 V ... 10 V              | Male connector M12, 5-pin | cd-386                    | KTX-WB91141259ZZZZ | 1079090            |         |

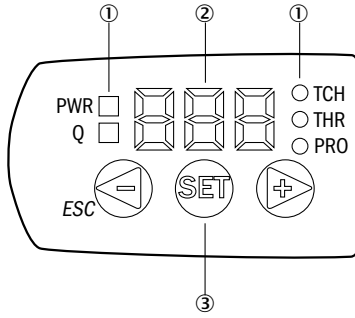
**KTX Prime High Precision**

- **Teach-in mode:** 1-point teach-in, 2-point teach-in, dynamic Teach-in, auto mode
- **Light spot direction:** vertical
- **Light source:** LED, RGB (Average service life: 100,000 h at  $T_U = +25\text{ °C}$ .)

| Fieldbus, industrial network | Light emission       | Sensing distance | Sensing distance tolerance | Switching output | Connection type           | Connection diagram | Type               | Part no. |
|------------------------------|----------------------|------------------|----------------------------|------------------|---------------------------|--------------------|--------------------|----------|
|                              | Short device side    | 13 mm            | $\pm 5\text{ mm}$          | NPN              | Male connector M12, 5-pin | cd-382             | KTX-WN91142252ZZZZ | 1081724  |
|                              |                      |                  |                            | PNP              | Male connector M12, 5-pin | cd-382             | KTX-WP91142252ZZZZ | 1081723  |
|                              | Long side of housing | 13 mm            | $\pm 5\text{ mm}$          | NPN              | Male connector M12, 5-pin | cd-382             | KTX-WN91141252ZZZZ | 1081726  |
|                              |                      |                  |                            | PNP              | Male connector M12, 5-pin | cd-382             | KTX-WP91141252ZZZZ | 1081725  |
| IO-Link                      | Short device side    | 13 mm            | $\pm 5\text{ mm}$          | PUSH/PULL        | Male connector M12, 5-pin | cd-387             | KTX-WB9114225AZZZZ | 1081727  |
|                              | Long side of housing | 13 mm            | $\pm 5\text{ mm}$          | PUSH/PULL        | Male connector M12, 5-pin | cd-387             | KTX-WB9114125AZZZZ | 1081728  |

**Dimensional drawings** (Dimensions in mm (inch))


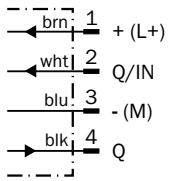
Adjustments



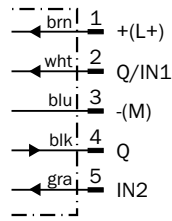
- ① LED status indicator
- ② Display
- ③ Control panel

Connection type and diagram

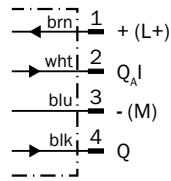
Cd-381



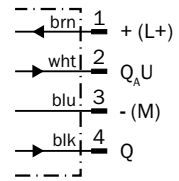
Cd-382



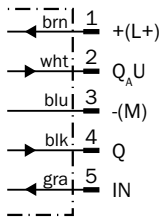
Cd-383



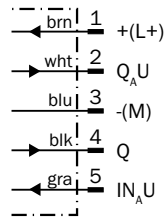
Cd-384



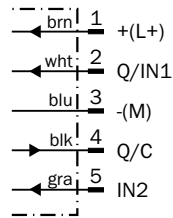
Cd-385



Cd-386



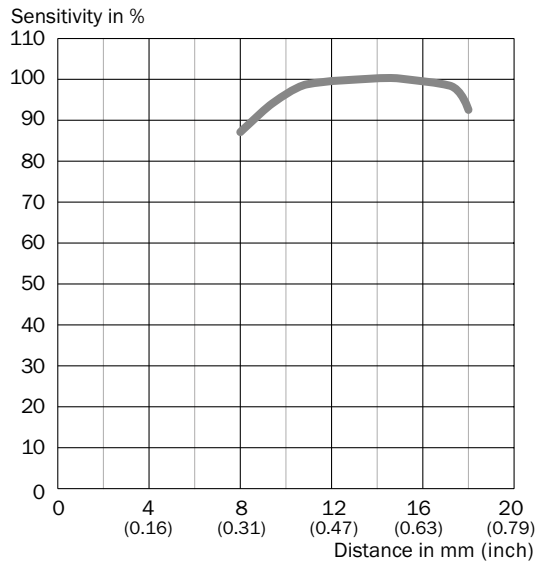
Cd-387



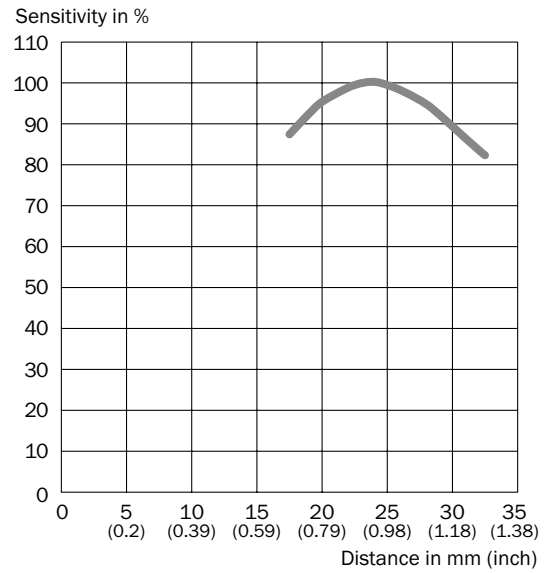


### Sensing distance

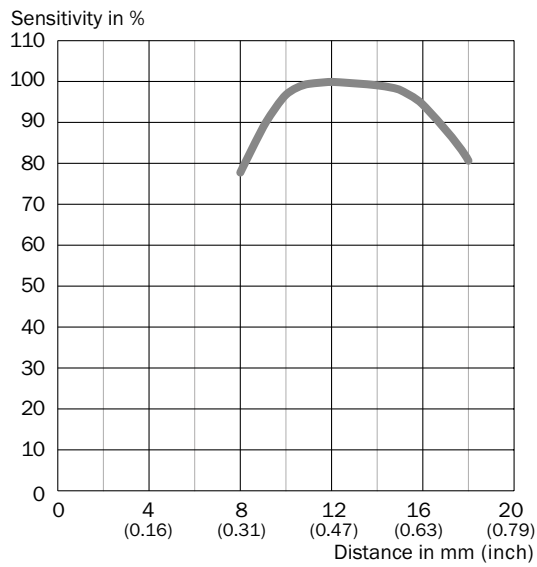
Sensing distance 13 mm,  
light spot direction horizontal/vertical



Sensing distance 25 mm,  
light spot direction horizontal/vertical



Sensing distance 13 mm,  
light spot direction round

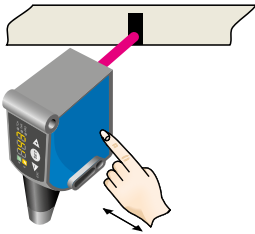


## Setting the switching threshold

KTS/KTX Prime - Setting the switching threshold (2-point teach-in)

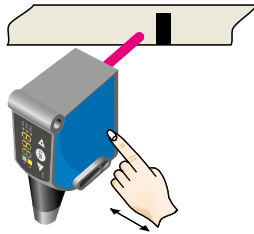
Suitable for manual positioning of the object to be detected, e.g. marks and background.

### 1. Position mark



When setting the contrasts to be detected, "1st" flashes. Press set button.

### 2. Position background

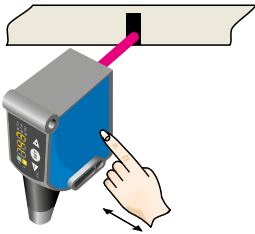


When setting the contrasts to be detected, "2nd" flashes. Press set button. The Quality of Teach is displayed.

KTS/KTX Prime - Setting the switching threshold (color mode)

Suitable for teaching in color properties.

### 1. Position mark/color property

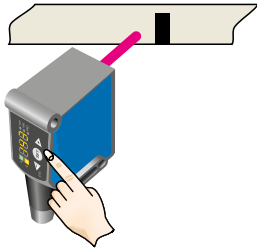


When detecting the contrast or color to be detected, "1st" flashes. Press set button. The Quality of Teach-in is displayed.

**KTS/KTX Prime - Setting the switching threshold (dynamic Teach-in)**

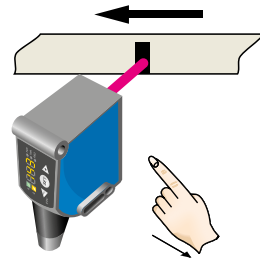
Suitable for teaching in moving objects.

**1. Position background**

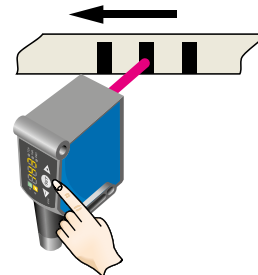


Press the Set pushbutton to start the teach-in process.

**2. Move at least the mark and background using the light spot**

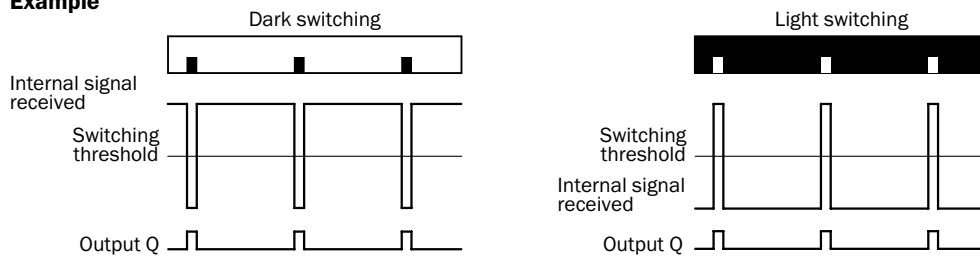


The display lights up during repeat length detection (---).

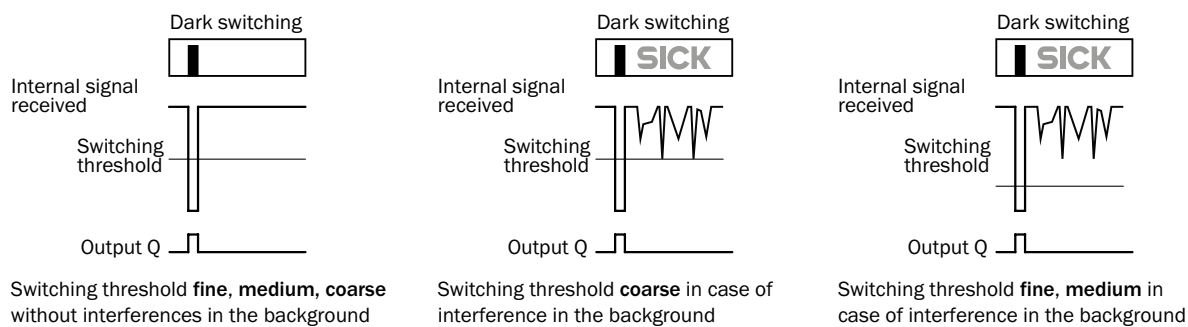


Press the Set pushbutton to end the teach-in process. The Quality of Teach is displayed.

**Example**



**Example: sensitivity adjustment with a fault in the background**



**Switching characteristics**

The optimum emitted light is selected automatically (at RGB variants).

Static teach-in: light/dark setting is defined using teach-in sequence.

Dynamic teach-in: switching output active on mark, if background is longer in the field of view during the teach-in.

If the sensitivity adjustment is coarse, the switching threshold is set in the center between the background and the mark.

If the sensitivity adjustment is medium or fine, the switching threshold is set between the mark and the fault in the background.

If no fault is present, then the switching threshold is also set in the center between the background and the mark.

Keylock (activation and deactivation): Press and hold the “+” pushbutton > 10 s.

The Q-LED (yellow) flashes and the “Err” error message appears on the display.

Accessories KTS/KTX

Mounting systems


Universal bar clamp systems

| Figure                                                                            | Material           | Description                                    | Type        | Part no. | KTS Core | KTS Prime | KTX Prime |
|-----------------------------------------------------------------------------------|--------------------|------------------------------------------------|-------------|----------|----------|-----------|-----------|
|  | Steel, zinc coated | Plate G for universal clamp bracket            | BEF-KHS-G01 | 2022464  | -        | -         | ●         |
|  |                    | Plate K for universal clamp bracket            | BEF-KHS-K01 | 2022718  | ●        | ●         | ●         |
|  |                    | Universal clamp bracket for rod mounting       | BEF-KHS-KH1 | 2022726  | ●        | ●         | ●         |
|  |                    | Mounting bar, straight, 200 mm, steel          | BEF-MS12G-A | 4056054  | ●        | ●         | ●         |
|  |                    | Mounting bar, straight, 300 mm, steel          | BEF-MS12G-B | 4056055  | ●        | ●         | ●         |
|  |                    | Mounting bar, L-shaped, 150 mm x 150 mm, steel | BEF-MS12L-A | 4056052  | ●        | ●         | ●         |
|  |                    | Mounting bar, L-shaped, 250 x 250 mm, steel    | BEF-MS12L-B | 4056053  | ●        | ●         | ●         |


Connection systems

Modules and gateways



Cloning module


| Figure                                                                              | Brief description                                                                                                                                                                | Type                              | Part no. | KTS Core | KTS Prime | KTX Prime |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|----------|----------|-----------|-----------|
|  | IO-Link version V1.1, Port class 2, PIN 2, 4, 5 galvanically connected, Supply voltage 18 V DC ... 32 V DC (limit values, operation in short-circuit protected network max. 8 A) | IOLP2ZZ-M3201 (SICK Memory Stick) | 1064290  | -        | ●         | ●         |

Connection modules

| Figure                                                                              | Brief description                                                               | Type                           | Part no. | KTS Core | KTS Prime | KTX Prime |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|--------------------------------|----------|----------|-----------|-----------|
|  | IO-Link V1.1 Class A port, USB2.0 port, optional external power supply 24V / 1A | IOLA2US-01101 (SiLink2 Master) | 1061790  | -        | ●         | ●         |

Fieldbus modules



| Figure                                                                              | Brief description                                                                                                   | Type                              | Part no. | KTS Core | KTS Prime | KTX Prime |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----------------------------------|----------|----------|-----------|-----------|
|  | EtherCAT IO-Link Master, IO-Link V1.1, power supply via 7/8" cable 24 V / 8 A, fieldbus connection via M12 cable    | IOLG2EC-03208R01 (IO-Link Master) | 6053254  | -        | ●         | ●         |
|  | EtherNet/IP IO-Link Master, IO-Link V1.1, power supply via 7/8" cable 24 V / 8 A, fieldbus connection via M12-cable | IOLG2EI-03208R01 (IO-Link Master) | 6053255  | -        | ●         | ●         |

| Figure                                                                            | Brief description                                                                                                              | Type                              | Part no. | KTS Core | KTS Prime | KTX Prime |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|----------|----------|-----------|-----------|
|  | PROFINET IO-Link Master, IO-Link V1.1, Class A port, power supply via 7/8" cable 24 V / 8 A, fieldbus connection via M12 cable | IOLG2PN-03208R01 (IO-Link Master) | 6053253  | -        | ●         | ●         |

Plug connectors and cables





Connecting cables with female connector M12, 4-pin, PVC, chemical resistant

- **Cable material:** PVC
- **Connector material:** TPU
- **Locking nut material:** CuZn, nickel-plated brass

| Figure                                                                            | Connection type head A                             | Connection type head B | Connecting cable             | Type          | Part no. | KTS Core | KTS Prime | KTX Prime |
|-----------------------------------------------------------------------------------|----------------------------------------------------|------------------------|------------------------------|---------------|----------|----------|-----------|-----------|
|  | Female connector, M12, 4-pin, straight, unshielded | Cable, Flying leads    | 2 m, 4-wire, unshielded, PVC | DOL-1204-G02M | 6009382  | ●        | ●         | ●         |
|                                                                                   |                                                    |                        | 5 m, 4-wire, unshielded, PVC | DOL-1204-G05M | 6009866  | ●        | ●         | ●         |
|  | Female connector, M12, 4-pin, angled, unshielded   | Cable, Flying leads    | 2 m, 4-wire, unshielded, PVC | DOL-1204-W02M | 6009383  | ●        | ●         | ●         |
|                                                                                   |                                                    |                        | 5 m, 4-wire, unshielded, PVC | DOL-1204-W05M | 6009867  | ●        | ●         | ●         |

Connecting cables with female connector M12, 5-pin, PVC, chemical resistant

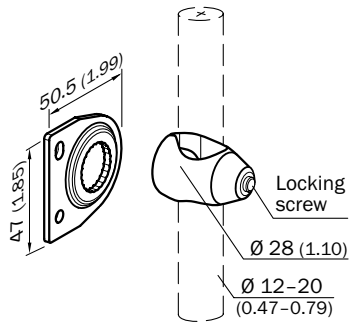
- **Cable material:** PVC
- **Connector material:** TPU
- **Locking nut material:** CuZn, nickel-plated brass

| Figure                                                                              | Connection type head A                             | Connection type head B | Connecting cable             | Type          | Part no. | KTS Core | KTS Prime | KTX Prime |
|-------------------------------------------------------------------------------------|----------------------------------------------------|------------------------|------------------------------|---------------|----------|----------|-----------|-----------|
|  | Female connector, M12, 5-pin, straight, unshielded | Cable, Flying leads    | 2 m, 5-wire, unshielded, PVC | DOL-1205-G02M | 6008899  | ●        | ●         | ●         |
|  |                                                    |                        | 5 m, 5-wire, unshielded, PVC | DOL-1205-G05M | 6009868  | ●        | ●         | ●         |
|  | Female connector, M12, 5-pin, angled, unshielded   | Cable, Flying leads    | 2 m, 5-wire, unshielded, PVC | DOL-1205-W02M | 6008900  | ●        | ●         | ●         |
|  |                                                    |                        | 5 m, 5-wire, unshielded, PVC | DOL-1205-W05M | 6009869  | ●        | ●         | ●         |

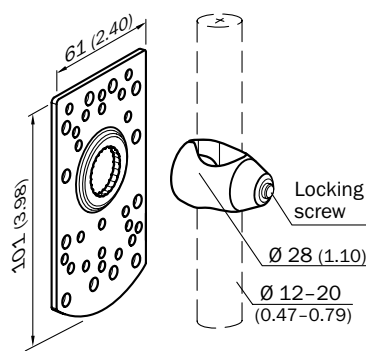
Dimensional drawings

Mounting systems

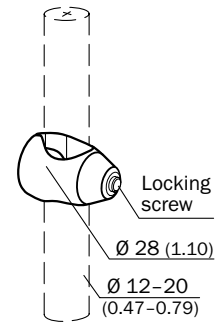
BEF-KHS-G01



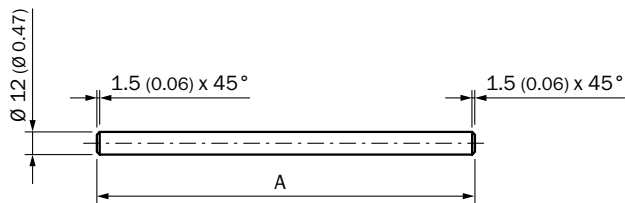
BEF-KHS-K01



BEF-KHS-KH1

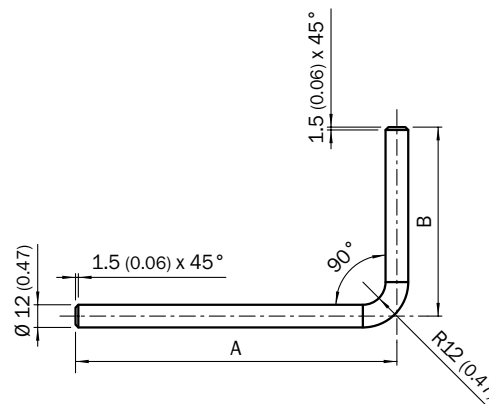


BEF-MS12G-A  
BEF-MS12G-B



BEF-MS12G-(N)A: A = 200 mm  
BEF-MS12G-(N)B: A = 300 mm

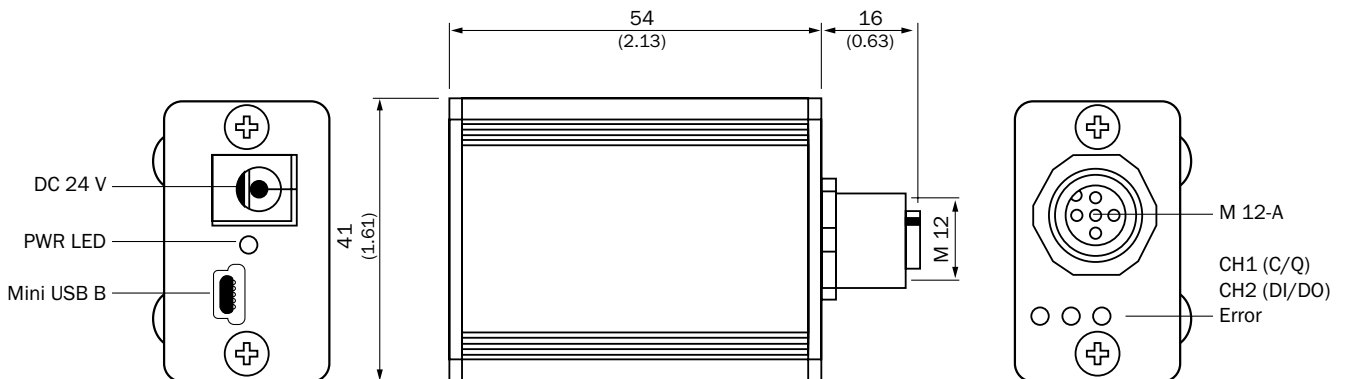
BEF-MS12L-A  
BEF-MS12L-B



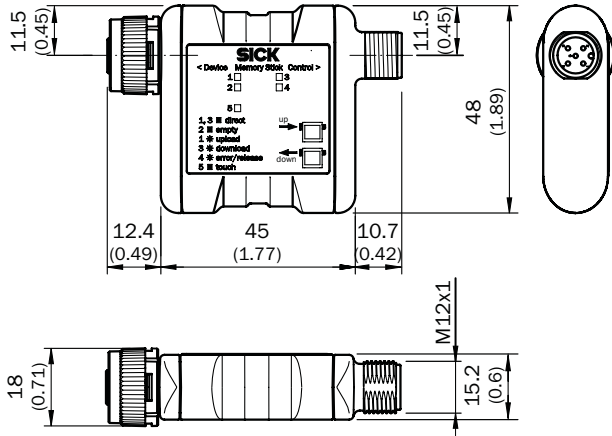
BEF-MS12L-(N)A: A = 200 mm, B = 150 mm  
BEF-MS12L-(N)B: A = 250 mm, B = 250 mm

Connection systems

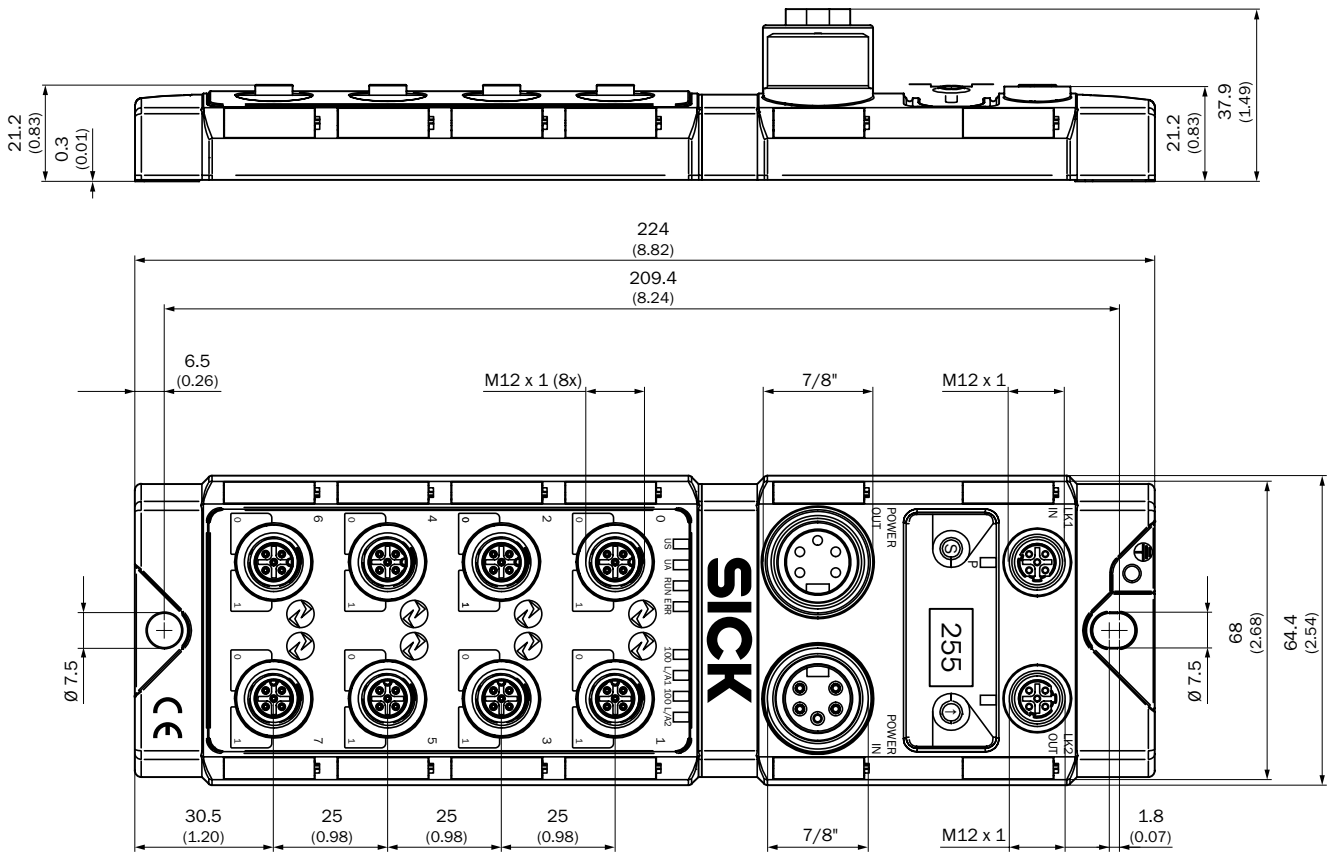
IOLA2US-01101 (SiLink2 Master)



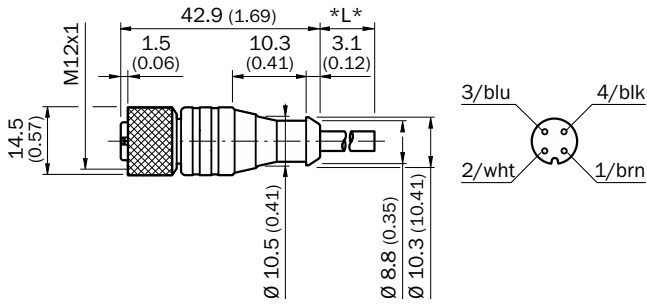
IOLP2ZZ-M3201 (SICK Memory Stick)



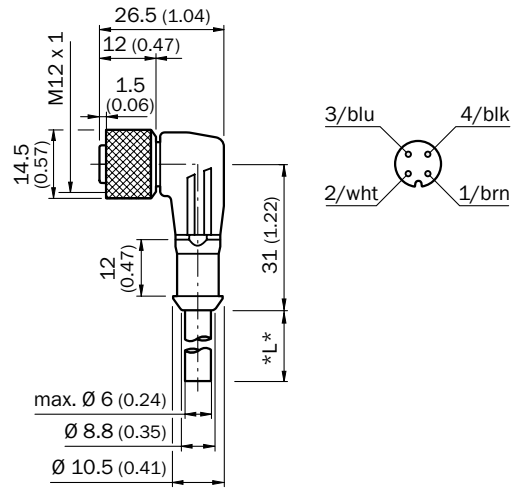
IOLG2EC-03208R01, IOLG2EI-03208R01, IOLG2PN-03208R01 (IO-Link Master)



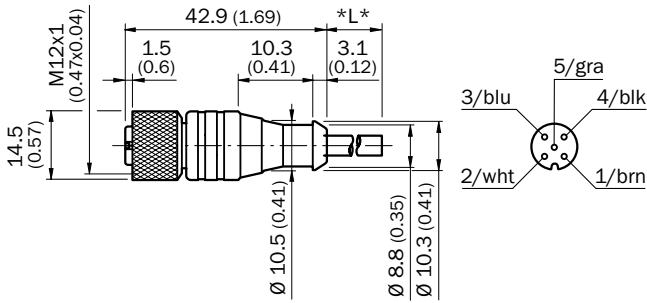
DOL-1204-G02M  
DOL-1204-G05M



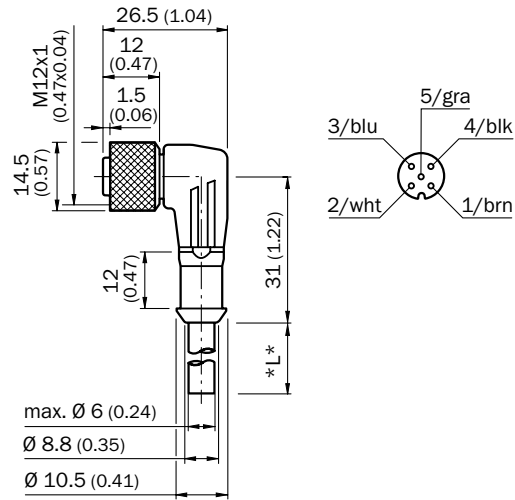
DOL-1204-W02M  
DOL-1204-W05M



DOL-1205-G02M  
DOL-1205-G05M



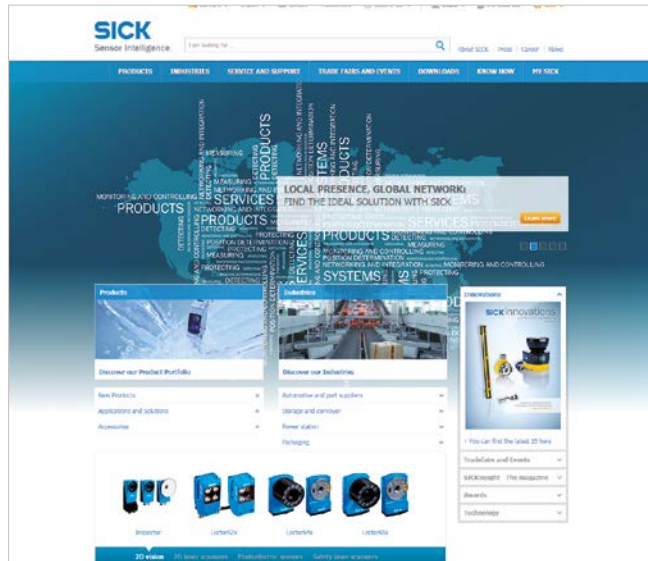
DOL-1205-W02M  
DOL-1205-W05M





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