PRODUCT INFORMATION

KTM
Contrast sensors

Mini, easy, speedy

SICK
Sensor Intelligence.

The KTM contrast sensor detects print marks quickly and reliably

Mini on the outside, fast-paced on the inside: with its fine gray-tone resolution, high detection reliability with shiny media and short response time, the KTM contrast sensor makes the process for packaging items quickly even more reliable.

A good eye for all print marks

Whether on paper, shiny foil or other packaging materials, a SICK contrast sensor is the ideal solution wherever print marks are used to trigger a switching signal.
With 50 years' experience in the field of contrast sensors, SICK has developed into a market leader. The KTM means that the company now offers a particularly space-saving contrast sensor.

Perfect for the packaging industry

The main application for the KTM contrast sensor is print mark control when managing packaging processes, e.g. cutting individual packaging to length from a pre-printed roll.
Another aspect is the positioning or alignment of cans, tubes, labels, and pre-printed forms.
In each case, precise detection of the print mark ensures optimum packaging and printing results.

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Subject to change without notice

Small housing saves space, range of variants enables more tasks to be completed

Easy to integrate thanks to mini housing

With a height of just 31.5 millimeters, the KTM is easy to mount even in restricted spaces.
The rugged metal inserts with internal threads permit a high tightening torque to securely fasten screws.

The sensor‘s high performance enables the housing to be mounted perpendicular to the medium. The intricate process of tilting the sensor to detect shiny materials is only necessary in exceptional cases.

The right version for every application

With both the Core and Prime product families, the KTM contrast sensor covers a multitude of applications and price ranges.

The KTM Core contrast sensor offers a high level of performance for standard applications at a reasonable price – with simple manual adjustment via an integrated potentiometer.
More about this version on page 6.

The high-performance KTM Prime contrast sensor is included in the range for use with more challenging applications. These contrast sensors are characterized by convenient adjustment options and an IO-Link interface. More on page 7.

Faster production and increased packaging efficiency: the KTM with short response time

The high-performance ASIC from SICK in the KTM contrast sensor makes it possible: short response times and a high dynamic range form the basis for precise switching signals – even in challenging conditions.

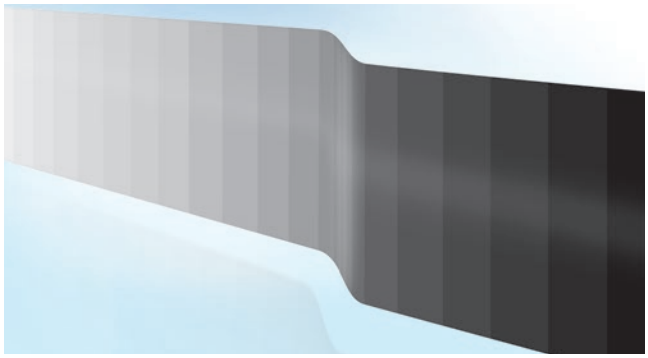
Optimum performance thanks to large dynamic range

Black and white or color, matte or shiny – with the new ASIC in the KTM contrast sensor, print marks are reliably detected on a wide range of materials.
This improved performance is particularly beneficial for shiny materials such as high-gloss foils and for low contrast levels.
For example, the sensors can deal with weaker saturated print marks that arise as a result of scanning or due to the use of low-contrast and pale colors.

High cycle for fast-moving processes

Particularly for processes that involve very high throughput speeds in packaging machinery and the graphics industry, a contrast sensor is used to transmit the required switch signals rapidly and precisely.
With a response time of 35 µs, the KTM is the ideal solution in this respect.
It can quickly and reliably detect the signal variation when the contrast mark has been passed, therefore ensuring high positioning accuracy even at high throughput speeds.

Optimum machine availability thanks to reliable detection of print and contrast marks



KTM detects subtle shades

With the KTM contrast sensor, even processes demonstrating minimum differences in brightness between print or contrast marks and the background can be accomplished in a reliable manner.
In addition to differentiating between black and white, this sensor can also take a range of shades into account.
Its fine resolution of 20 gray tones guarantees that even minimum levels of contrast are detected.
This extends the application range of the mini contrast sensor to also include challenging applications.

Performance at an affordable price: the KTM Core for standard applications

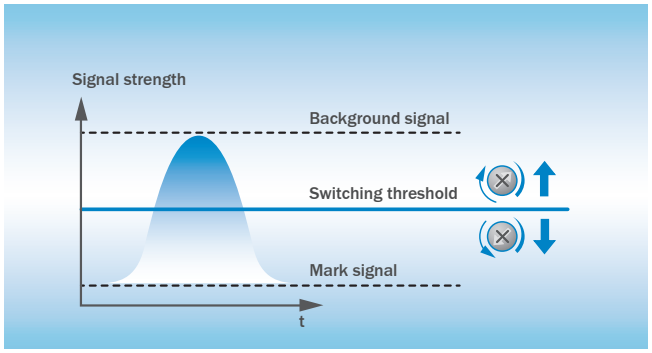
Simple manual adjustment via an integrated potentiometer and universal lighting via a white LED are the key features that characterize the Core versions of the KTM contrast sensor.

White light for print marks of all colors

A white LED is used as a universal emitted light for the KTM Core contrast sensor.
If the contrast levels are high enough, a wide range of marks can be detected on the same background using the same switching threshold. This can generally be done by making one single setting.
The Core versions are sufficient for suitable applications and offer a high level of switching reliability at excellent value for money.

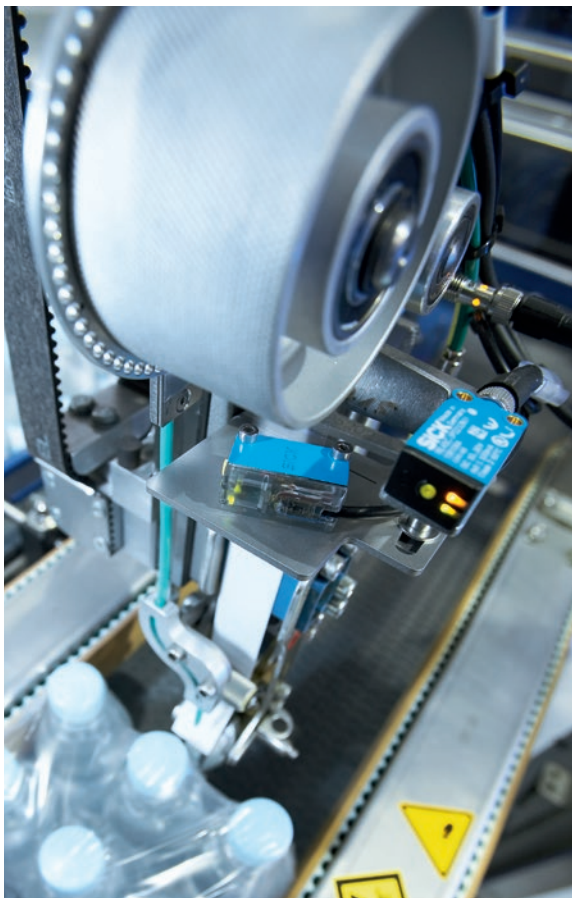
Simple adjustment of the switching threshold using a potentiometer

When changing products or formats, the switching threshold of the Core versions can be adjusted directly at the housing – quickly and simply, without the need for tools.



Versions of the KTM Core product family

- KTM Core KTMxxx91
  Manual adjustment of the switching threshold for when it has to be fast.
- KTM Core KTMxxx11
  Adjustment of the switching threshold using a screwdriver.



High-performance and convenient: the KTM Prime contrast sensor

The Prime versions combine high detection reliability thanks to 3-color LED technology and high productivity thanks to remote-control teach-in, which can also be carried out while production is underway.

RGB LED for more challenging applications

Particularly for high-gloss materials and those with low levels of contrast, the Prime versions of the KTM offer high detection reliability.
This is because the sensor has red, green, and blue emitted light LEDs and carries out a fully-automatic check during teach-in to determine which LED generates the highest contrast value for the current process. Without making any other settings, the sensor therefore always works using the optimum emitted light.
For this reason, the RGB LED is particularly suitable for any number of color combinations between marks and backgrounds.

Versions of the KTM Prime product family

- KTM Prime KTM-xxxx81x
  M8 plug, 4-pin. PNP or NPN.
- KTM Prime KTM-xxxxA1x
  M8 plug, 4-pin. With IO-Link. PNP or NPN.
- KTM Prime KTM-xxxx82x
  M12 cable, 4-pin. PNP or NPN.

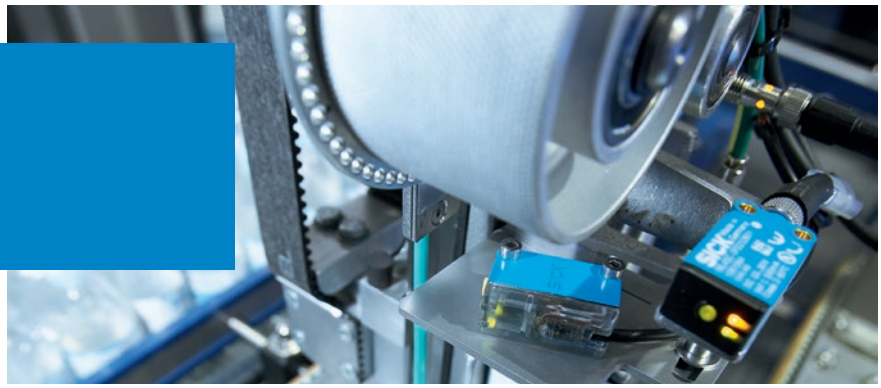
Teach-in with optimum efficiency

In addition to the intuitive and simple static teach-in function, all KTM Prime sensors have a further two teach-in features.
„Dynamic teach-in“ enables teach-in to take place during ongoing operation so that the material flow does not need to be interrupted. Pressing the pushbutton again moves the threshold closer to the mark.
The advantage of this is that the switching threshold does not have to constantly be re-adapted even when the background changes. Dynamic teach-in also supports remote adjustment from the operator panel.

Change formats quickly and easily using IO-Link

With the Prime versions, format changes can be dealt with quickly and easily by retrieving the parameter settings of jobs that have already been completed from the controller‘s memory.
Further advantages of IO-Link include visualization of the signal quality and the output of quality characteristics to perform an advanced diagnosis.

Mini, easy, speedy



IO-Link

Additional information

Detailed technical data 9
Ordering information 10
Dimensional drawings 11
Adjustments 11
Connection type and diagram 12
Sensing distance 12
Setting the switching threshold 13
Accessories 15

Product description

Improved performance for universal use in the packaging industry: The KTM contrast sensor from SICK stands out thanks to its high grayscale resolution integrated in a small, established housing. The optimized OES4 ASIC technology and a response time of 35 µs ensure reliable and accurate detection of contrast differences even on shiny materials. The various teach-in methods mean greater flexibility during commissioning. The integrated IO-Link can be used to access the parameter settings. This speeds up and simplifies format changes. The KTM reliably detects marks even in conditions with weak contrast ratios and is ideal for use in a wide range of applications.

At a glance

- Established mini housing
- High grayscale resolution
- Increased dynamic range means reliable detection of contrasts on shiny materials
- Static and dynamic teach-in in one variant
- Switching frequency 15 kHz (type-dependent)
- KTM Core for standard applications
- KTM Prime with IO-Link function

Your benefits

- Mini housing makes use in tight spaces possible
- Three-color LED technology allows a reliable process, with contrast marks detected even in conditions with weak contrast ratios
- Good contrast resolution and an increased dynamic range ensure good performance on shiny materials, thus increasing the range of applications in the industry
- High flexibility during commissioning thanks to various teach-in methods
- Extended diagnostics, visualization, and quick and simple format changes by downloading the parameter settings via IO-Link

→ **www.mysick.com/en/KTM**
For more information, just 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

Dimensions (L x W x H)	12 mm x 31.5 mm x 21 mm
Sensing distance	12.5 mm
Sensing distance tolerance	± 3 mm
Max. web speed tech-in (dynamic) [1]	1 m/s

[1] At a mark size of 4 mm.

Mechanics/electronics

Supply voltage V_S [1]	DC 12 V ... 24 V
Ripple [2]	≤ 5 V_{pp}
Power consumption [3]	< 50 mA
Switching output	PNP: HIGH = V_S– ≤ 2 V / LOW approx. 0 V NPN: HIGH = approx. V_S / LOW ≤ 2 V
Output current $I_{max.}$ [4]	100 mA
Input, teach-in (ET)	PNP: Teach: U = 10.8 V ... < V_S Run: U < 2 V or open NPN: Teach: U < 2 V Run: > V_S - 2 V or open
Retention time (ET)	28 ms, non-volatile memory
Protection class	III
Circuit protection	V_S connections reverse-polarity protected Output Q short-circuit protected Interference suppression
Enclosure rating	IP 67
Weight	
Connector M8, 4-pin	Approx. 20 g
Cable with connector M12, 4-pin	Approx. 70 g
Housing material	ABS (plastic)

[1] Extreme values: 12 V (- 10 %) ... 24 V (+ 20 %). Operation in short-circuit protected network max. 8 A.

[2] May not exceed or fall short of V_S tolerances.

[3] Without load.

[4] At supply voltage > 24 V, Imax = 30 mA. Imax is consumption count of all Qn.

Ambient data

Ambient temperature	Operation: –10 °C ... +55 °C Storage: –20 °C ... +75 °C
Shock load	According to IEC 60068
UL File-No.	UL No. NRKH.E348498

Specific data

Light source [1]	Light spot direction [3]	Light spot size	Switching frequency [4]	Response time [5]	Type	Ordering information
LED white	–	2 mm x 2 mm	10 kHz	50 µs	KTM Core	10
LED red, green, blue [2]	Vertical	1.5 mm x 6.5 mm	15 kHz	35 µs	KTM Prime	10
LED white	–	2 mm x 2 mm	15 kHz	35 µs		

[1] Average service life of 100,000 h at T_A = +25 °C .
[2] Wave length: 470 nm, 525 nm, 625 nm.
[3] In relation to long side of housing.
[4] With light/dark ratio 1:1.
[5] Signal transit time with resistive load.

Ordering information

KTM Core

- **Light spot direction:** –
- **Light spot size:** 2 mm x 2 mm
- **Switching frequency:** 10 kHz
- **Response time:** 50 µs

Adjustment	Connection type	Switching output	Light source	Type	Part no.
Potentiometer, screwdriver	Connector M8, 4-pin	PNP/NPN	LED white	KTM-MB31111P	1062202
Potentiometer, manual	Connector M8, 4-pin	PNP/NPN	LED white	KTM-MB31191P	1062203

KTM Prime

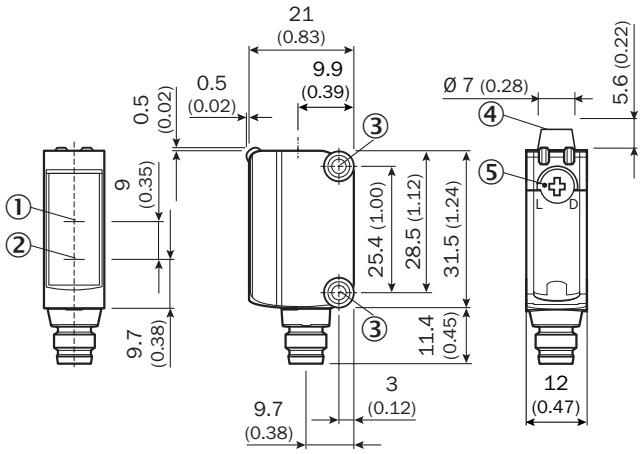
- **Light spot direction:** vertical
- **Light spot size:** 1.5 mm x 6.5 mm
- **Switching frequency:** 15 kHz
- **Response time:** 35 µs

Adjustment	Connection type	Switching output	Light source	Type	Part no.
2-point teach-in static/dynamic + proximity to mark	Connector M8, 4-pin	PNP	LED red, green, blue	KTM-WP11181P	1062199
		NPN	LED red, green, blue	KTM-WN11181P	1062200
		PNP, IO-Link	LED red, green, blue	KTM-WP117A1P	1061770
		NPN, IO-Link	LED red, green, blue	KTM-WN117A1P	1061787
	Cable with connector M12, 4-pin	PNP	LED red, green, blue	KTM-WP11182P	1062201
		NPN	LED red, green, blue	KTM-WN11182P	1062150
	Connector M8, 4-pin	PNP	LED white	KTM-MP31181P	1065756

Dimensional drawings

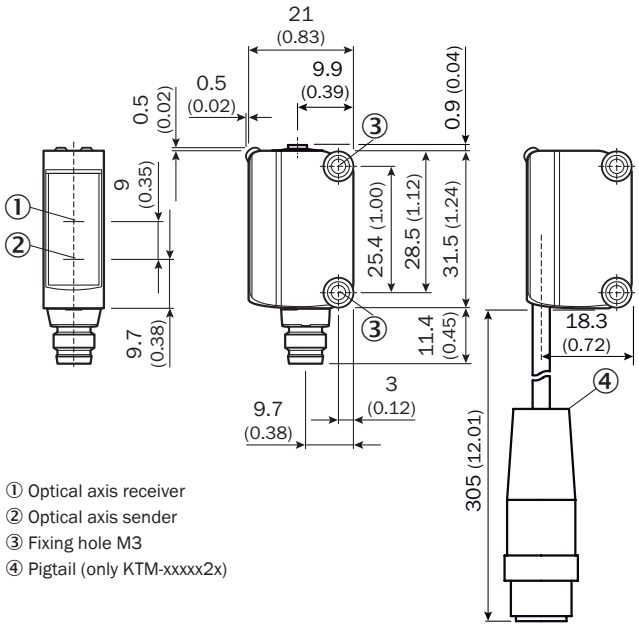
dimensions in mm (inch)

KTM Core



① Optical axis receiver
② Optical axis sender
③ Fixing hole M3
④ Poti manual (only KTM-xxxx91x)
⑤ Light/ dark rotary switch
L= light switching
D= dark switching

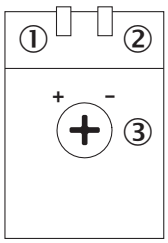
KTM Prime



① Optical axis receiver
② Optical axis sender
③ Fixing hole M3
④ Pigtail (only KTM-xxxxx2x)

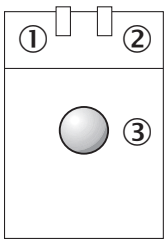
Adjustments

KTM Core



① Status indicator LED, yellow: Status switching output Q (dark switching)
② Status indicator LED green: power on
③ Switching threshold adjustment

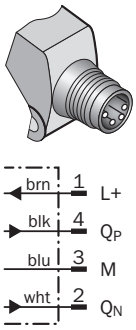
KTM Prime



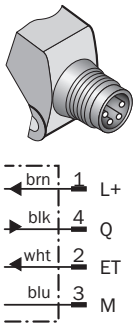
① Status indicator LED, yellow: Status switching output Q
② Status indicator LED green: power on
③ Teach-in button

Connection type and diagram

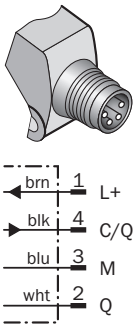
KTM-CORE
Connector M8, 4-pin



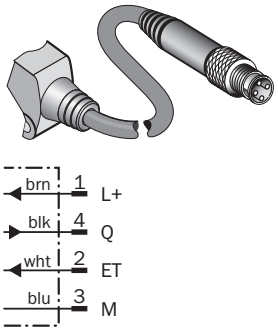
KTM-xxxxx81x
Connector M8, 4-pin



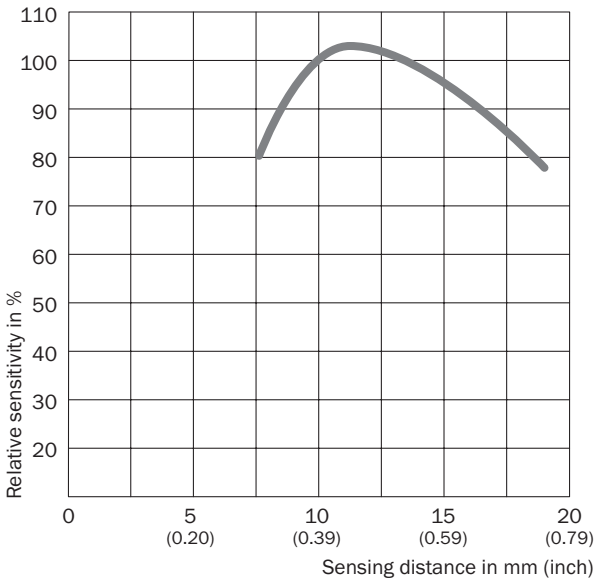
KTM-xxxxxA1x IO-Link
Connector M8, 4-pin



KTM-xxxxx82x
Cable with connector M12, 4-pin



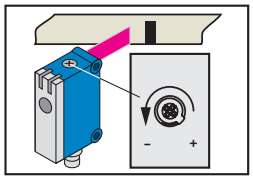
Sensing distance



Setting the switching threshold via potentiometer

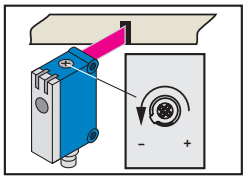
For example dark switching

1. Position background



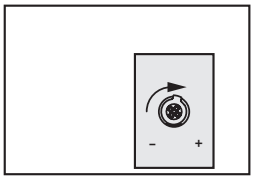
Start at "+" (right-hinged).
Turn potentiometer in direction "-" until the yellow LED goes out.

2. Position mark



Yellow LED lights up.
Continue to turn the potentiometer in direction „–“ until the yellow LED goes out again.

3. Set switching threshold



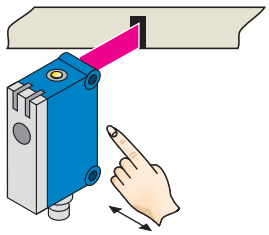
Turn between positions 1 and 2, to ensure that the switching threshold is optimally set.

Switching characteristics
The switching threshold is set in the center between the background and the mark.
Light switching: yellow LED ≠ switching output Q
Dark switching: yellow LED = switching output Q

Light/dark switching selectable by means of rotary switch
KTM-MB31111P: potentiometer can be adjusted with a screwdriver
KTM-MB31191P: potentiometer can be adjusted with a screwdriver or by hand

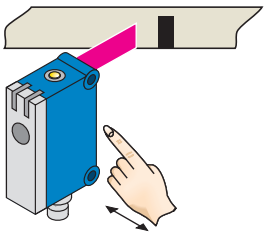
Setting the switching threshold via teach-in (static 2-point teach-in)

1. Position mark



Press and hold teach-in button > 1 < 3 s.
Yellow LED flashes slowly.

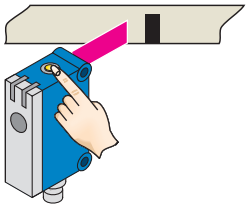
2. Position background



Press and hold teach-in button < 3 s.
Yellow LED goes out.

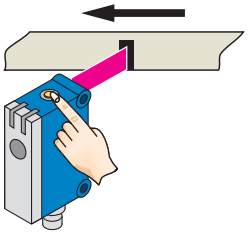
Setting the switching threshold via teach-in (dynamic)

1. Position background

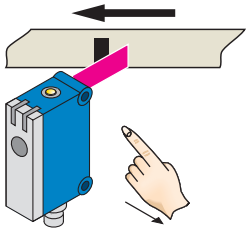


Press the teach-in button and keep it pressed. LED flashing slowly.

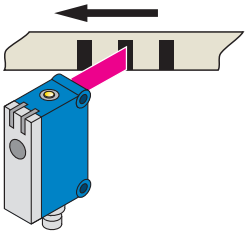
2. Move at least the mark and background using the light spot.



Keep the teach-in button > 3 < 30 s pressed.

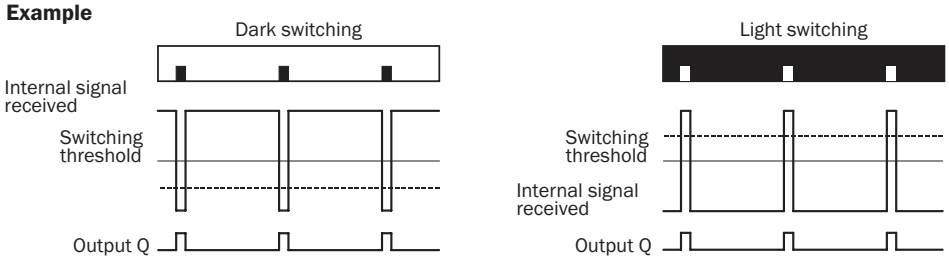


Release the teach-in button.



Yellow LED will illuminate, when emitted light is on the mark.

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.

If the button is pressed again within 10 s of the teach (> 20 ms < 10 s),
the switching threshold is placed 25 % below the mark (dotted line in Figure).
Teach-in can also be performed using an external control signal (only dynamic teach-in).

Keylock activation and deactivation: hold down teach-in button > 30 s.

Teach-in failure: yellow LED indicator and the transmitted light of the sensor flashing quickly.
For dynamic teach-in with ET signal (5 Hz) via switching output Q.

Recommended accessories

Mounting brackets/plates

Mounting brackets

Figure	Material	Description	Model name	Part no.
	Stainless steel	Mounting bracket for wall mounting	BEF-W100-A	5311520
	Steel, zinc coated	Mounting bracket for floor mounting	BEF-W100-B	5311521

Mounting plates

Figure	Material	Description	Model name	Part no.
	Stainless steel	Adapter plate KT3 to KTM	BEF-AP-KTMS01	2068786

Plug connectors and cables

Connecting cable (female connector-open)

Figure	Connection type head A	Connector material	Locking nut material	Connecting cable	Model name	Part no.
	Female connector, M8, 4-pin, straight	PVC	Stainless steel (V4A/1.4404/316L)	2 m, 4-pole	DOL-0804-G02M	6009870
				5 m, 4-pole	DOL-0804-G05M	6009872
				10 m, 4-pole	DOL-0804-G10M	6010754
	Female connector, M8, 4-pin, angled	PVC	Stainless steel (V4A/1.4404/316L)	2 m, 4-pole	DOL-0804-W02M	6009871
				5 m, 4-pole	DOL-0804-W05M	6009873
				10 m, 4-pole	DOL-0804-W10M	6010755
	Female connector, M12, 4-pin, straight	TPU	CuZn	2 m, 4-pole	DOL-1204-G02M	6009382
				5 m, 4-pole	DOL-1204-G05M	6009866
				10 m, 4-pole	DOL-1204-G10M	6010543
				15 m, 4-pole	DOL-1204-G15M	6010753
	Female connector, M12, 4-pin, angled	TPU	CuZn	2 m, 4-pole	DOL-1204-W02M	6009383
				5 m, 4-pole	DOL-1204-W05M	6009867
				10 m, 4-pole	DOL-1204-W10M	6010541

Female connector (ready to assemble)

Figure	Connection type head A	Connector material	Locking nut material	Model name	Part no.
	Female connector, M8, 4-pin, straight	PBT	CuZn	DOS-0804-G	6009974
	Female connector, M8, 4-pin, angled	PBT	CuZn	DOS-0804-W	6009975
	Female connector, M12, 4-pin, straight	PBT	CuZn	DOS-1204-G	6007302
	Female connector, M12, 4-pin, angled	PBT	CuZn	DOS-1204-W	6007303

Terminal and alignment brackets

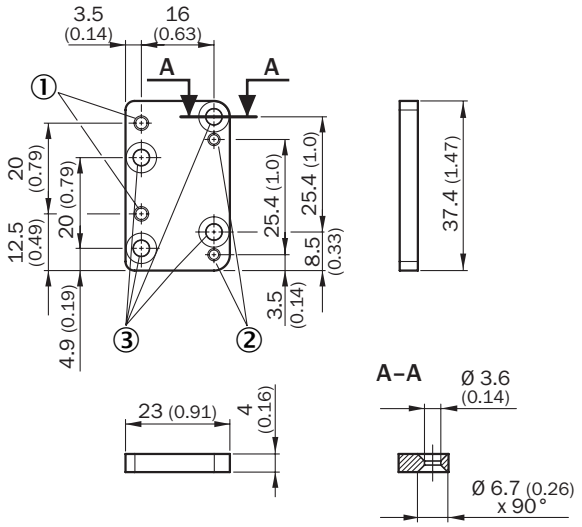
Universal bar clamp systems

Figure	Material	Description	Model name	Part no.
	Steel, zinc coated	Universal clamp bracket for rod mounting	BEF-KHS-KH1	2022726
		Plate L for universal clamp bracket	BEF-KHS-N08	2023057
	Zinc plated steel (sheet), Diecast zinc (clamp)	Plate N08 for universal clamp bracket	BEF-KHS-N08	2051607
	Stainless steel 1.4571 (sheet), Stainless steel 1.4408 (clamp)	Plate N08N for universal clamp bracket	BEF-KHS-N08N	2051616
	Steel, zinc coated	Mounting bar, straight, 200 mm	BEF-MS12G-A	4056054
		Mounting bar, straight, 300 mm	BEF-MS12G-B	4056055
		Mounting bar, L-shaped, 150 mm x 150 mm	BEF-MS12L-A	4056052
		Mounting bar, L-shaped, 250 x 250 mm	BEF-MS12L-B	4056053

Dimensional drawings Mounting brackets/plates

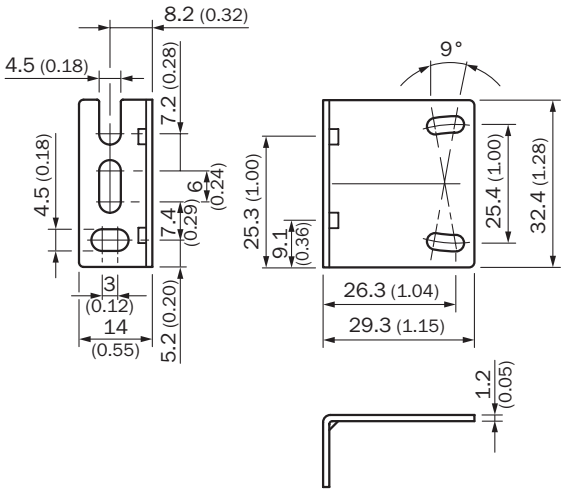
dimensions in mm (inch)

BEF-AP-KTMS01

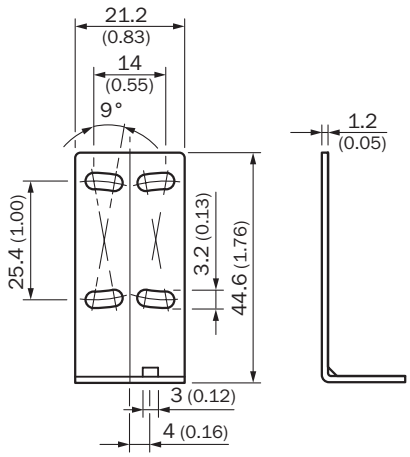


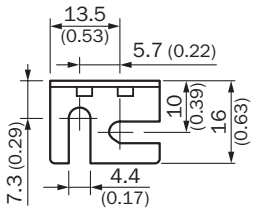
① Threaded mounting hole M3
② Threaded mounting hole M2.5
③ Fixing hole M3

BEF-W100-A



BEF-W100-B

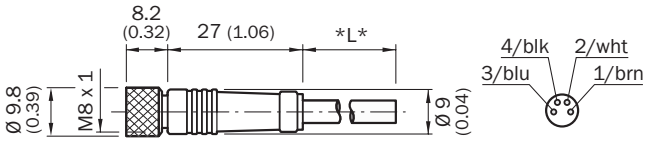




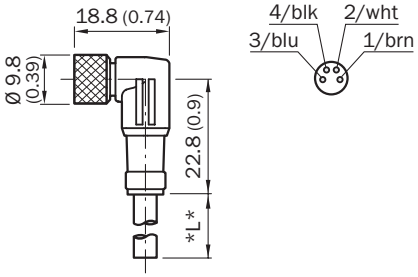
Dimensional drawings Plug connectors and cables

dimensions in mm (inch)

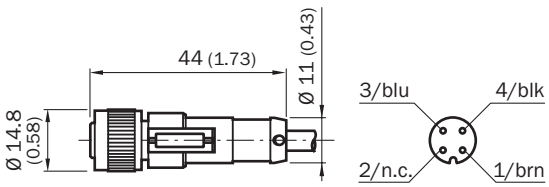
DOL-0804-G02M
DOL-0804-G05M
DOL-0804-G10M



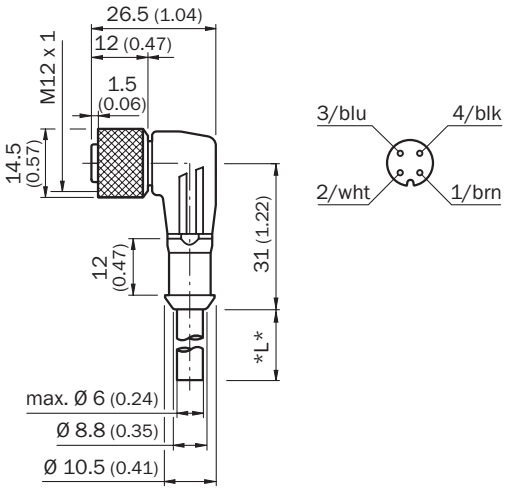
DOL-0804-W02M
DOL-0804-W05M
DOL-0804-W10M



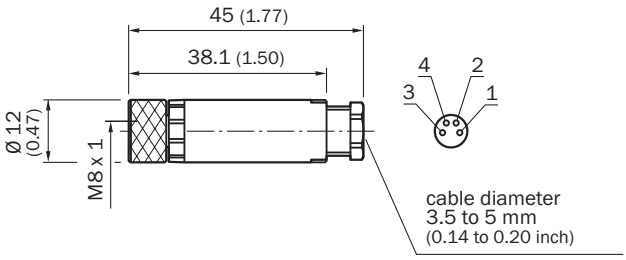
DOL-1204-G02M
DOL-1204-G05M
DOL-1204-G10M
DOL-1204-G15M



DOL-1204-W02M
DOL-1204-W05M
DOL-1204-W10M



DOS-0804-G



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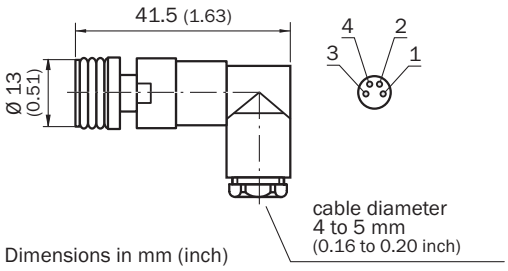
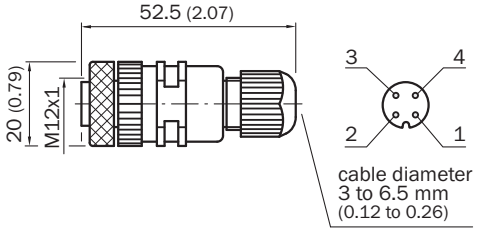


DOS-1204-G



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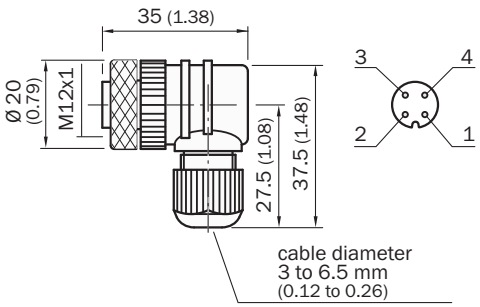
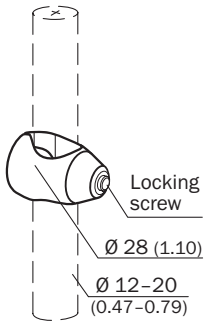


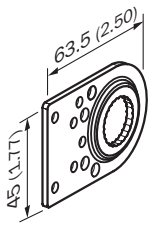
Dimensional drawings Terminal and alignment brackets

dimensions in mm (inch)

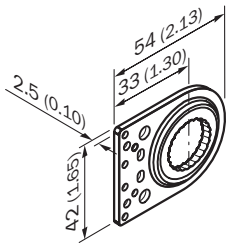
BEF-KHS-KH1



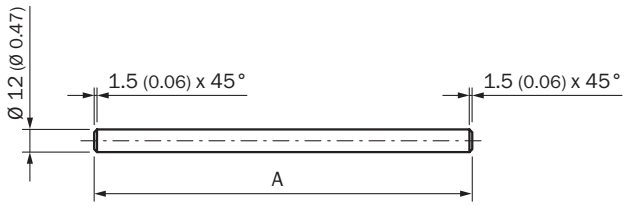
BEF-KHS-N08



BEF-KHS-N08
BEF-KHS-N08N

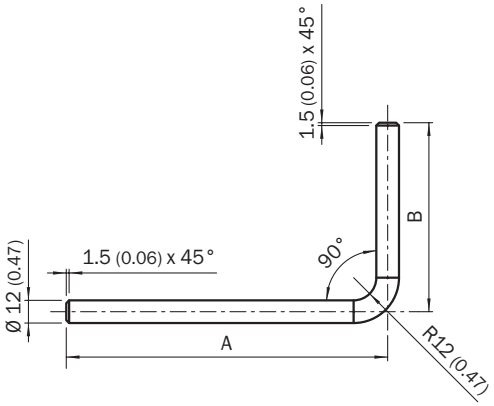


BEF-MS12G-A
BEF-MS12G-B



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

Notes

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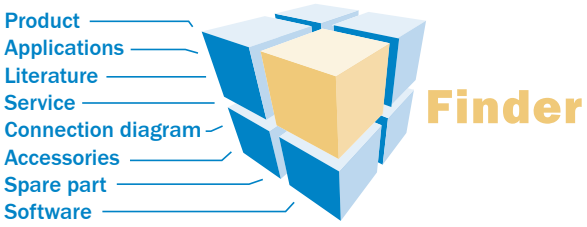

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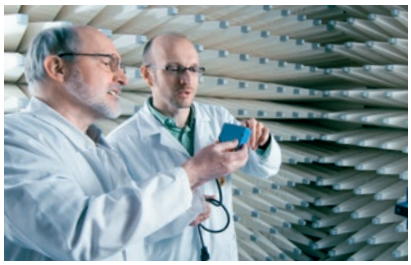
SICK at a glance



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