TECHNICAL DESCRIPTION

LUT8 and LUT9
Luminescence sensor

Fast and accurate detection
of fluorescent marks.

SICK
Sensor Intelligence.

LUT8 und LUT9 –
Accurately detecting fluorescent materials.

TIMBER INDUSTRY

Timber boards are marked in order to remove knot-holes and other “flaws” by sawing. The luminescence sensor detects fluorescent chalk or ink on many different timber materials. Due to the large possible distance between sensor and object, marks on different timber thicknesses can be reliably detected without mechanically adjusting the sensors. The metal housings of LUT8 and LUT9 meet the requirements for application in harsh industrial environments.

PHARMACEUTICAL INDUSTRY

To detect and confirm the instruction leaflet has been inserted in the package, or that labels are present on the vials, the LUT8 and LUT9 luminescence sensors are able to perform these tasks reliably. A high switching frequency and reliability are prerequisites. These are the very qualities of the LUT8 and LUT9 luminescence sensors.

FOOD AND BEVERAGES INDUSTRIES

With luxury items, it is of particular benefit that the print marks do not impair the high-quality design of labels. The labels and sealing caps can be aligned using invisible, luminescent marks which are only detected under UV light. LUT8 and LUT9 are perfect for an industry in which easy adjustment and commissioning are important.

Detecting fluorescent materials or marks, irrespective of pattern, colour or surface texture, on almost any substrate; the LUT8 and LUT9 luminescence sensors from SICK accomplish these tasks with long scanning distances and ease of operation.

> Control concept

The new, improved control concept simplifies the communication between sensor and user, as the bar graph display clearly visualises the intensity of marks and backgrounds.

> Large scanning distance

Without having to perform a height or distance adjustment, the large scanning distance enables the flexible detection of varying objects and object shapes. The dimensions of the optimised light spot hardly change. Therefore even large working areas and marks positioned close together can be reliably detected.

> IO-Link

IO-Link saves costs by simplifying process control; adjustment the sensor via the central control system enables its use even in difficult-to-access areas.

- Interchangeable lenses enable different scanning distances to be selected without exchanging the sensor
- Filters reliably suppress any background luminescence
- Fibre-optic versions are also available for use where space is restricted

Detecting fluorescent marks: many benefits based on state-of-the-art SICK technology.

Luminescence reference

The luminescence reference serves as a reference for the switching behaviour of the SICK sensors LUT8 and LUT9. To achieve reliable performance of the luminescence sensors in different application areas, the luminescence reference can be used to check and confirm the performance using different signal intensities. The check is a relative measurement between the reference and test material. The bar graph display shows the luminescence intensity – left 30 %, right 200 % related to the reference, and depending on the scanning distance.

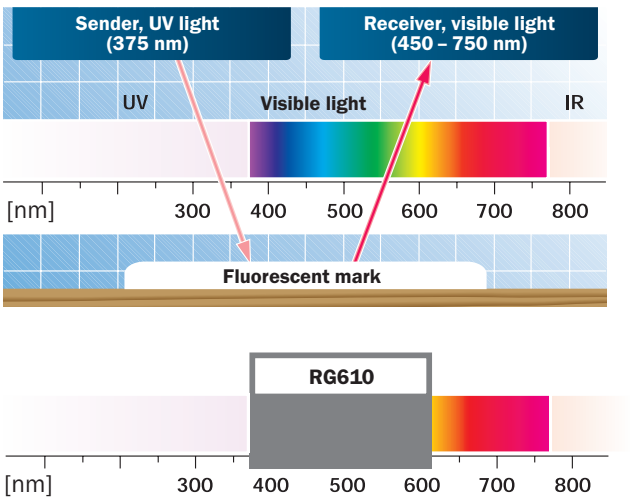
Luminophores

Many suitable and ready-to-use fluorescent marking agents are available on the market. Admixed luminophores are the reason for their bright appearance, i.e. small particles which, in different wavelength spectra and in different strengths, convert UV light to visible light. Luminophores can be admixed to almost all substances. Typical marking agents are lime-based or wax-based chalks, inks, oils, fats, labels and felt-tip pens.

Seeing fluorescence.

Operating principle:
Luminescence sensors emit modulated UV light with a wavelength of 375 nm, exciting fluorescent substances and reflecting long-wave light in the visible wavelength spectrum (420 to 750 nm approx.). This light is detected by the luminescence sensor and evaluated.

Function of the filters:
The example shows the use of the RG610 filter. Wavelength spectra under 610 nm (purple, blue, green) are suppressed and only visible light > 610 nm (red) reaches the receiver. Spurious background luminescences, which light up green or blue, are therefore suppressed reliably, eg. red mark on white paper.



Bar graph display

The intensity of the fluorescence, whether of the actual mark or of the background, can be easily measured and displayed by the bar graph display. If the intensity changes, the sensor can be readjusted very easily.

Display LED Switching output Q

The output LED signals the successful detection of luminescent marks. The required sensitivity can be adjusted by using the bar graph display.

LUT9

Rotary selection switch

For easy selection of the functions:

- **RUN:** Indication of actual luminescence intensity
- **TEACH:** Selection of the 2-point Teach-in procedure
- **+/–:** Manual fine adjustment of the sensitivity
- **MODE:** Selection between “High resolution”, “Standard”, “High Speed”.
- **TIMER:** Adjustment of the time delay from 0/10/20 ms.

Teach-in button

Accurate 2-point Teach-in procedure for easy setting of the mark and of the background. The bar graph display visualises the “Reliability of detection”.

LUT8

Rotary selection switch

For easy adjustment of sensitivity: Selection of sensitivity across 8 levels from “low” to “high” enables optimum adjustment to suit the application.

IO-Link Saving costs with IO-Link

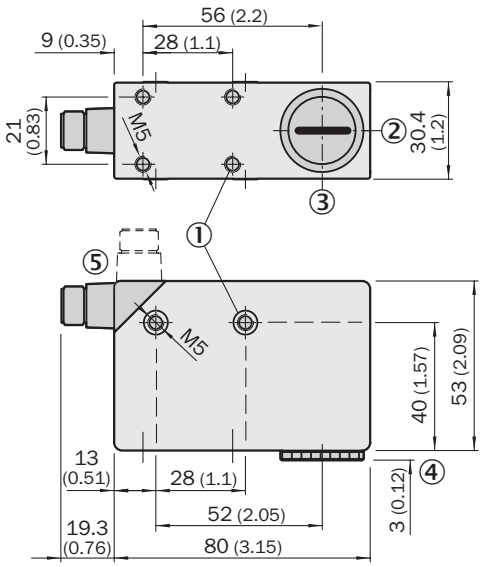
An application-oriented example in order to show how costs can be saved by means of IO-Link: if the luminescent ink is running out, the SICK luminescence sensor “detects” this and feeds the information back directly, via the interface, to the control system.

The process can then be stopped in time, and replacement ink can be topped up. For this, the LUT9 luminescence sensor no longer needs to be directly accessible: the parameters can be continuously monitored.

- Easy sensitivity adjustment across 8 levels
- Visualisation of luminescence intensity by bar graph display
- Scanning distance selectable by using interchangeable lenses
- Additional optical filters, in order to suppress background luminescences
- Fibre-optic cable connection
- Analogue output

Dimensional drawing

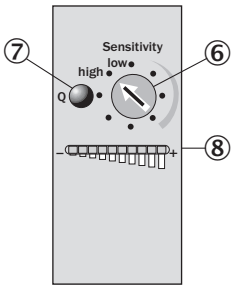
LUT8



① M5, threaded mounting hole, 5.5 mm deep
② Light spot direction
③ Centre of optical axis
④ see dimensional drawings lenses
⑤ Plug M12 (rotatable)

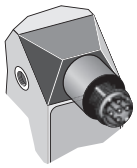
Dimensions in mm (inch)

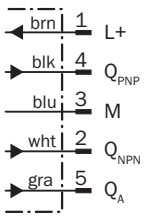
Adjustments possible



⑥ Rotary selection switch
⑦ Output indicator
⑧ Bar graph display

Connection type M12, 5-pin





General technical data

Switching frequency [1]		2.5 kHz
Response time [2]		200 µs
Light source [3]/light type		UV LED, wavelength 375 nm
Switching output		PNP/NPN
Supply voltage V_S [4]		12 ... 30 V DC
Current consumption [5]		< 100 mA
Ripple [6]		Max. 5 V_{SS}
Output current I_A		100 mA
Analogue output [7]		0 ... 13 mA
Connection type		Plug, M12, 5-pin
VDE protection class [8]		⧈
Enclosure rating		IP 67
Ambient temperature	Operation	–10 ... +55 °C
	Storage	–25 ... +75 °C
Circuit protection [9]		A, B, C
Housing material		Zinc die-cast
Weight		Approx. 400 g

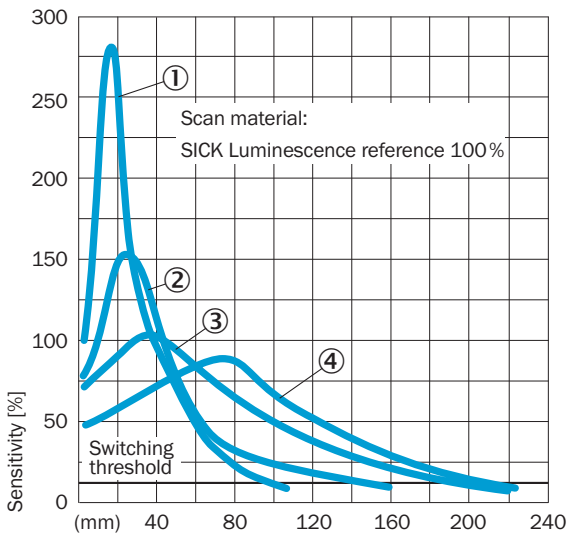
1) With light/dark ratio 1:1
2) Signal transit time with resistive load
3) Average service life 100,000 h at T_A = +25 °C
4) Limit values
5) Without load
6) May not exceed or fall short of V_S tolerances
7) Nominal load 500 Ω
8) Reference voltage 50 V DC
9) A = V_S connections reverse-polarity protected
B = Outputs short-circuit protected
C = Interference pulse suppression

Type-specific data incl. order information

Type	Order no.	Scanning distance	Working area	Light spot [1]	Receiving range [2]
LUT8U-11101	1046711	10 mm	0 ... 20 mm	2 x 6 mm	450 ... 750 nm
LUT8U-11201	1047042	20 mm	10 ... 40 mm	3 x 9 mm	450 ... 750 nm
LUT8U-11301	1047043	50 mm	20 ... 70 mm	5 x 15 mm	450 ... 750 nm
LUT8U-11401	1047044	90 mm	30 ... 110 mm	12 x 12 mm	450 ... 750 nm
LUT8U-11311	1047045	50 mm	20 ... 70 mm	5 x 15 mm	570 ... 750 nm
LUT8U-11321	1047046	50 mm	20 ... 70 mm	5 x 15 mm	610 ... 750 nm
LUT8U-11331	1047047	50 mm	20 ... 70 mm	5 x 15 mm	670 ... 750 nm
LUT8U-11701	1047048	50 mm	20 ... 70 mm	3 mm	450 ... 750 nm

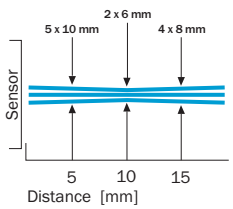
1) At scanning distance
2) 450 ... 750 nm: Standard filtration

Scanning distance

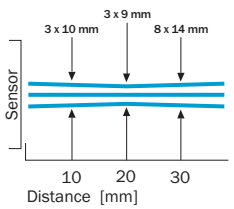


① Scanning distance 10 mm
② Scanning distance 20 mm
③ Scanning distance 50 mm
④ Scanning distance 90 mm

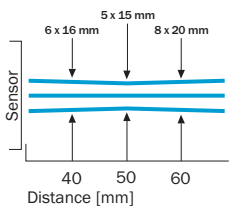
Scanning distance 10 mm



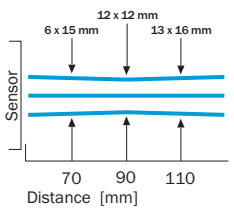
Scanning distance 20 mm



Scanning distance 50 mm



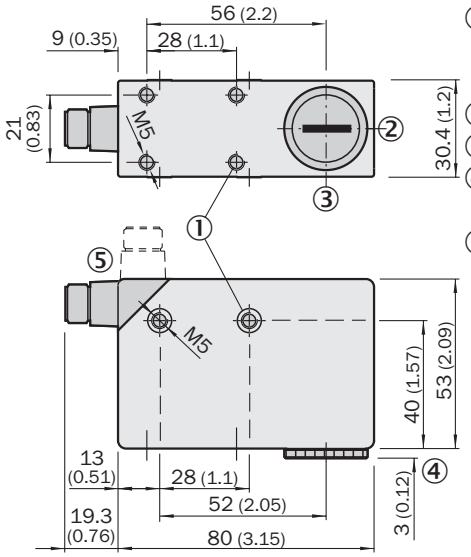
Scanning distance 90 mm



- Simple Teach-in
- Scanning distance up to 250 mm
- Visualisation of luminescence intensity by bar graph display
- 3 modes for optimum adaptation to the application
- Additional optical filters, in order to suppress background luminescences
- Fibre-optic cable connection
- Analogue output

Dimensional drawing

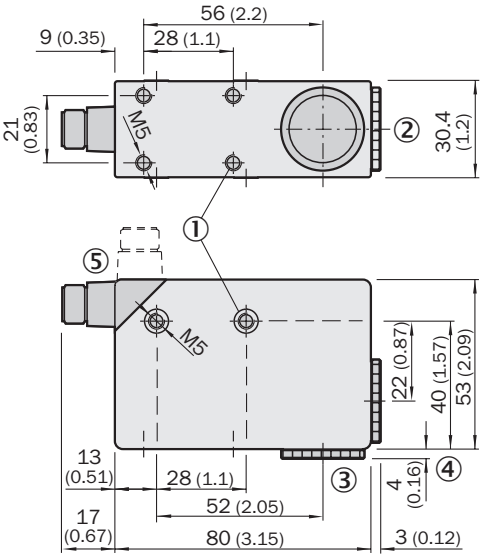
LUT9x – x1xxx



① M5, threaded mounting hole, 5.5 mm deep
② Light spot direction
③ Centre of optical axis
④ see dimensional drawings lenses
⑤ Plug M12 (rotatable)

Dimensions in mm (inch)

LUT9x – x2xxx

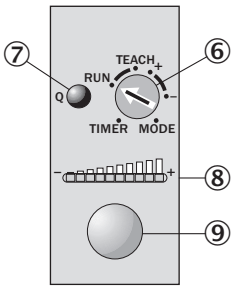


① M5, threaded mounting hole, 5.5 mm deep
② Lens (light emission), interchangeable for Pos. 3
③ Blind screw connection, interchangeable for Pos. 2
④ see dimensional drawings lenses
⑤ Plug M12 (rotatable)

Dimensions in mm (inch)

Adjustments possible

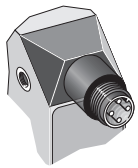
LUT9x – xxxxx

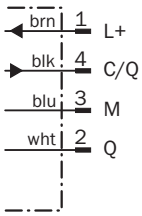


⑥ Rotary selection switch
⑦ Output indicator
⑧ Bar graph display
⑨ Teach-in button

Connection type M12, 4-pin

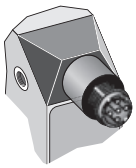
LUT9x – Pxxxx
LUT9x – Nxxxx

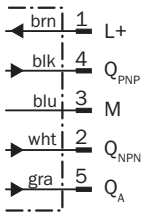




Connection type M12, 5-pin

LUT9x – 1xxxx





General technical data		
Switching frequency [1]		Adjustable 500 Hz, 2.5 kHz, 6.5 kHz
Response time [2]		1,000 µs, 200 µs, 75 µs
Light source [3]/light type		UV LED, wavelength 375 nm
Switching output		PNP/NPN
Supply voltage V_S [4]		12 ... 30 V DC
Current consumption [5]		< 100 mA
Ripple [6]		Max. 5 V_{PP}
Output current I_A		100 mA
Analogue output [7]		0 ... 13 mA
Connection type		Plug, M12, 5-pin
VDE protection class [8]		⧈
Enclosure rating		IP 67
Ambient temperature	Operation	–10 ... +55 °C
	Storage	–25 ... +75 °C
Circuit protection [9]		A, B, C
Housing material		Zinc die-cast
Weight		Approx. 400 g

1) With light/dark ratio 1:1
2) Signal transit time with resistive load
3) Average service life 100,000 h at T_A = +25 °C
4) Limit values
5) Without load
6) May not exceed or fall short of V_S tolerances
7) Nominal load 500 Ω
8) Reference voltage 50 V DC
9) A = V_S connections reverse-polarity protected
B = Outputs short-circuit protected
C = Interference pulse suppression

Preselection table according to adjustment/light emission aperture

	Adjustment	Light emission aperture	Connection type
LUT9x – x1xx6	Teach-in with manual fine adjustment	long side	Plug, M12, 5-pin
LUT9U – x2xx6	Teach-in with manual fine adjustment	long or short side	Plug, M12, 5-pin
LUT9U – x1xxL	IO-Link	long side	Plug, M12, 4-pin

Type-specific data incl. order information

LUT9x – x1xx6 | Teach-in with manual fine adjustment | long side | Plug, M12, 5-pin

Type	Order no.	Scanning distance	Working area	Light spot [1]	Receiving range [4]	Switching output
LUT9U-11106	1047049	10 mm	0 ... 20 mm	2 x 6 mm	450 ... 750 nm	PNP/NPN
LUT9U-11206	1047050	20 mm	10 ... 40 mm	3 x 9 mm	450 ... 750 nm	PNP/NPN
LUT9U-11306	1046712	50 mm	20 ... 70 mm	5 x 15 mm	450 ... 750 nm	PNP/NPN
LUT9U-11406	1047051	90 mm	30 ... 110 mm	12 x 12 mm	450 ... 750 nm	PNP/NPN
LUT9U-11316	1047052	50 mm	20 ... 70 mm	5 x 15 mm	570 ... 750 nm	PNP/NPN
LUT9U-11326	1047053	50 mm	20 ... 70 mm	5 x 15 mm	610 ... 750 nm	PNP/NPN
LUT9U-11336	1047054	50 mm	20 ... 70 mm	5 x 15 mm	670 ... 750 nm	PNP/NPN
LUT9U-11606 [2]	1047414	150 mm	50 ... 250 mm	5 x 12 mm	450 ... 750 nm	PNP/NPN
LUT9B-11626 [2] [3]	1047056	150 mm	50 ... 250 mm	5 x 12 mm	610 ... 750 nm	PNP/NPN

1) At scanning distance
2) Lens change not possible
3) Light source 480 nm
4) 450 ... 750 nm = Standard filtration

LUT9U – x2xx6 | Teach-in with manual fine adjustment | long or short side | Plug, M12, 5-pin

Type	Order no.	Scanning distance	Working area	Light spot [1]	Receiving range	Switching output
LUT9U-12206	1046749	20 mm	8 ... 30 mm	3 x 9 mm	450 ... 750 nm	PNP/NPN
LUT9U-12306	1047055	50 mm	8 ... 30 mm	5 x 15 mm	450 ... 750 nm	PNP/NPN

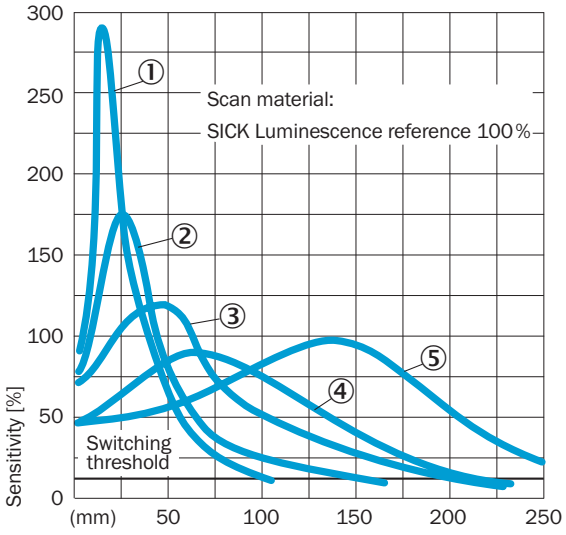
1) At scanning distance
2) 450 ... 750 nm = Standard filtration

LUT9U – x1xxL | IO-Link | long side | Plug, M12, 4-pin

Type	Order no.	Scanning distance	Working area	Light spot [1]	Receiving range	Switching output
LUT9U-P120L	1046188	20 mm	8 ... 30 mm	3 x 9 mm	450 ... 750 nm	PNP
LUT9U-N120L	1046189	20 mm	8 ... 30 mm	3 x 9 mm	450 ... 750 nm	NPN
LUT9U-P130L	1045606	50 mm	8 ... 30 mm	5 x 15 mm	450 ... 750 nm	PNP
LUT9U-N130L	1046190	50 mm	8 ... 30 mm	5 x 15 mm	450 ... 750 nm	NPN

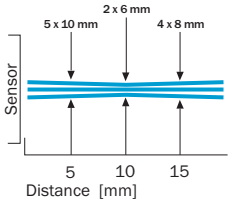
1) At scanning distance
2) 450 ... 750 nm = Standard filtration

Scanning distance

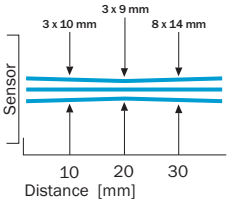


① Scanning distance 10 mm
② Scanning distance 20 mm
③ Scanning distance 50 mm
④ Scanning distance 90 mm
⑤ Scanning distance 150 mm

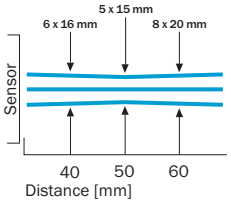
Scanning distance 10 mm



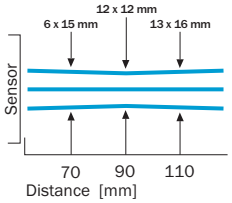
Scanning distance 20 mm



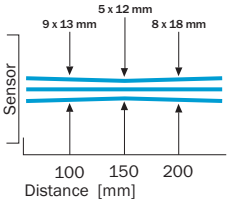
Scanning distance 50 mm



Scanning distance 90 mm

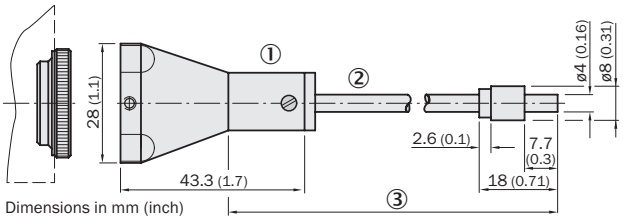


Scanning distance 150 mm



Fibre-optic cable

Type	Order no.	Description
LLVS8-500	2017098	500 mm length
LLVS8-1000	2017099	1000 mm length

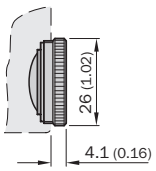


Dimensions in mm (inch)

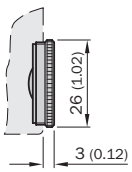
① Adapter
② Fibre-optic cable LLVS8, min. bend radius R_{min} = 40 mm
③ Cable length

Special accessories

Type	Order no.	Description
Lens TW = 10 mm	2016348	for LUT3, LUT8, LUT9
Lens TW = 20 mm	2016349	for LUT3, LUT8, LUT9
Lens TW = 50 mm	2016350	for LUT3, LUT8, LUT9



Dimensions in mm (inch)
TW = 10 mm

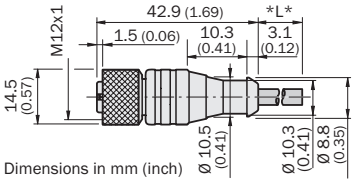


Dimensions in mm (inch)
TW = 20/50 mm

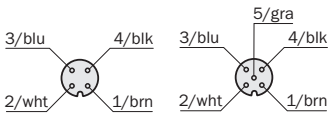
Type	Order no.	Description
Fat-based chalk	1004460	red fluorescent
Lime-based chalk	1002959	red fluorescent
Luminescence reference	8008840	

Cables and connectors

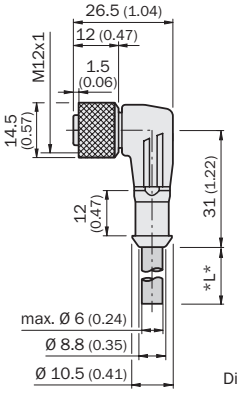
Type	Order no.	Description
DOL-1204-G02M	6009382	Female connector, M12, 4-pin, straight, cable length 2 m
DOL-1204-G05M	6009866	Female connector, M12, 4-pin, straight, cable length 5 m
DOL-1204-G10M	6010543	Female connector, M12, 4-pin, straight, cable length 10 m
DOL-1204-G15M	6010753	Female connector, M12, 4-pin, straight, cable length 15 m
DOL-1205-G02M	6008899	Female connector, M12, 5-pin, straight, cable length 2 m
DOL-1205-G05M	6009868	Female connector, M12, 5-pin, straight, cable length 5 m
DOL-1205-G10M	6010544	Female connector, M12, 5-pin, straight, cable length 10 m



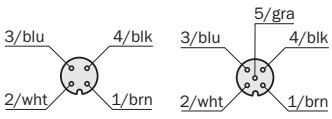
Dimensions in mm (inch)



Type	Order no.	Description
DOL-1204-W02M	6009383	Female connector, M12, 4-pin, angled, cable length 2 m
DOL-1204-W05M	6009867	Female connector, M12, 4-pin, angled, cable length 5 m
DOL-1204-W10M	6010541	Female connector, M12, 4-pin, angled, cable length 10 m
DOL-1205-W02M	6008900	Female connector, M12, 5-pin, angled, cable length 2 m
DOL-1205-W05M	6009869	Female connector, M12, 5-pin, angled, cable length 5 m
DOL-1205-W10M	6010542	Female connector, M12, 5-pin, angled, cable length 10 m



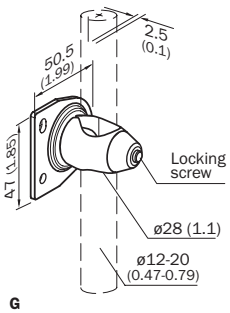
Dimensions in mm (inch)



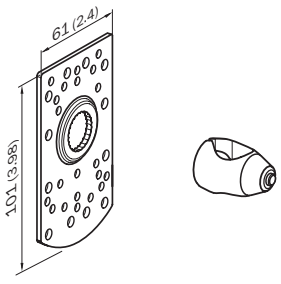
Mounting systems

Universal bar clamps for sensors and reflectors

Mounting plate	Type	Order no.	for device/reflector type
G	BEF-KHS-G01	2022464	W24, W24 Exi, WTA24, KT5, KT10, CS1, CS3, LUT3, LUT8, LUT9
K	BEF-KHS-K01	2022718	W11, W12-2, W12L-2, W14, W18-2, W23, W24-2, W27-2, W30, W32, W34, W36, KT2, KT5, KT10, CS, LUT3, DS60, PL20A, PL30A, PL40A, PL50A, PL80A, P250, C110, LUT8, LUT9
	BEF-KHS-KH1	2022726	Clamp rod mounting without mounting plate and mounting kit



G



K

Dimensions in mm (inch)

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