PRODUCT INFORMATION

TBS

TEMPERATURE MONITORING MADE EASY

Temperature sensors

SICK
Sensor Intelligence.

TEMPERATURE MONITORING MADE EASY

Product description

The TBS temperature switch is easy to use and has a rugged design. It is designed for temperature measurement and monitoring of operating liquids, such as hydraulic oils, coolant lubricants and cleaning liquids in machine building and manufacturing. With up to two binary outputs and one analog output, it can be used in many applications. A large, well legible display and three pushbuttons facilitate setup. The intuitive menu navigation and display use familiar and standardized features and programming. The switching state of the binary outputs is displayed by highly visible LEDs. During installation, the TBS is uniquely flexible due to its two rotation locations. It is possible to rotate the display and the process connection independently of the sensor body, ensuring both clean cable layout and that the display is facing the user. Temperature measurement is done using a Pt1000 element that is located in the tip of the stainless steel probe.

At a glance

- Large display, IO-Link 1.1
- Individually programmable transistor outputs PNP or NPN, optional analog output 4 mA ... 20 mA or 0 V ... 10 V
- Round connector M12 x 1
- Measuring ranges –20 °C ... +120 °C
- Pt1000 element, accuracy class A (IEC 60751)
- Various insertion lengths and connection threads
- Wetted parts made from corrosion-resistant stainless steel 1.4571
- Enclosure rating IP 65 and IP 67

Your benefits

- Quick and safe set-up through superior ease of use
- Compact dimensions and rotatable housing facilitate integration
- Very reliable: splash-proof housing, high-grade materials, rugged design, and field-proven technology
- Very good long-term stability, accuracy and linearity
- Quick response time
- Versatile configuration allows for optimal solutions for specific requirements

Additional information

→ www.sick.com/TBS

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.

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Detailed technical data

Features

Measuring range	–20 °C ... +80 °C –20 °C ... +120 °C (depending on type)
Sensor element	Pt1000, 2-wire, class A according to IEC 60751
Output signals	2 x PNP 1 x PNP + 4 mA ... 20 mA 1 x PNP + 0 V ... 10 V 2 x PNP + 4 mA ... 20 mA 2 x PNP + 0 V ... 10 V 2 x NPN 1 x NPN + 4 mA ... 20 mA 1 x NPN + 0 V ... 10 V 2 x NPN + 4 mA ... 20 mA 2 x NPN + 0 V ... 10 V IO-Link, 1 x PNP + 4 mA ... 20 mA IO-Link, 1 x PNP + 0 V ... 10 V IO-Link, 2 x PNP + 0 V ... 10 V IO-Link, 2x PNP + 4 mA ... 20 mA IO-Link, 1 x PNP + 1 x NPN + 4 mA ... 20 mA IO-Link, 1 x PNP + 1 x NPN + 0 V ... 10 V (depending on type)
Switching output	Transistor
Number	2 or 1 (depending on type)
Function	Normally open/normally closed, window/hysteresis function freely programmable
Switching voltage	Supply voltage [V DC] - 1 V DC
Maximum switching current	≤ 250 mA
Switching delay	0 s ... 50 s, programmable
Setting accuracy of switching outputs	+0.1 °C
Temperature offset	± 3 °C
Scaling of measuring range	Zero value: max. +25 % of span End value: max. –25 % of span
Display	14-segment LED, blue, 4-digits, height 9 mm, Display electronically turnable by 180 °, update: 200 ms
Rotatable housing	Display against housing with electrical connection: 330 ° Housing against process connection: 320 °

Performance

Accuracy of sensor element	≤ ± (0.15 °C + 0.002 |t|) [1]
Accuracy of switching output	≤ ± 0.8 % of span
Display accuracy	≤ ± 0.8 % of span ± 1 digit
Accuracy of analog output	≤ ± 0.5 % of span
Response time t_{50}	≤ 5 s [2]
Response time t_{90}	≤ 10 s [2]

[1] |t| is the absolute value of the temperature in °C.

[2] Depending on sensor configuration, according to IEC 60751.

Mechanics/electronics

Process connection	Thread G ¼ A according to DIN 3852-E Thread G ½ A according to DIN 3852-E Thread ½'' NPT Thread ¼'' NPT Compression fitting G ½ A according to DIN 3852-E Compression fitting G ¼ A according to DIN 3852-E (depending on type)
Insertion length/diameter of probe	25 mm / 6 mm 50 mm / 6 mm 100 mm / 6 mm 150 mm / 6 mm 250 mm / 6 mm 350 mm / 6 mm (depending on type)
Seal	NBR FPM/FKM Without seal Copper (depending on type)
Wetted parts	Stainless steel 1.4571 (AISI 316Ti)
Maximum process pressure	≤ 150 bar [1]
Housing material	Lower body: stainless steel 1.4301 (AISI 304) Plastic head: PC + ABS Input keypad: TPE-E Display window: PC
Enclosure rating	IP 65 (according to IEC 60529) [2] IP 67 (according to IEC 60529) [2]
Electrical connection	M12 round connector x 1, 4-pin M12 round connector x 1, 5-pin (depending on type)
Maximum ohmic load R_A	≤ 100 kΩ (Switching outputs) < 0.5 kΩ (output signal 4 mA ... 20 mA) > 10 kΩ (output signal 0 V ... 10 V) (depending on type)
Supply voltage	15 V DC ... 35 V DC
Maximum current consumption	45 mA / 70 mA (depending on type)
Total current consumption	320 mA / 570 mA (incl. switching current)
Electrical safety	
Protection class	III
Insolation voltage	500 V DC
Overvoltage protection	40 V DC
Short-circuit protection	Outputs Q_A, Q_1, Q_2 towards M
Reverse polarity protection	L^+ towards M
CE-conformity	2004/108/EC, EN 61326-1 emission (group 1, class B) and interference immunity (industrial application)
RoHS certificate	✔

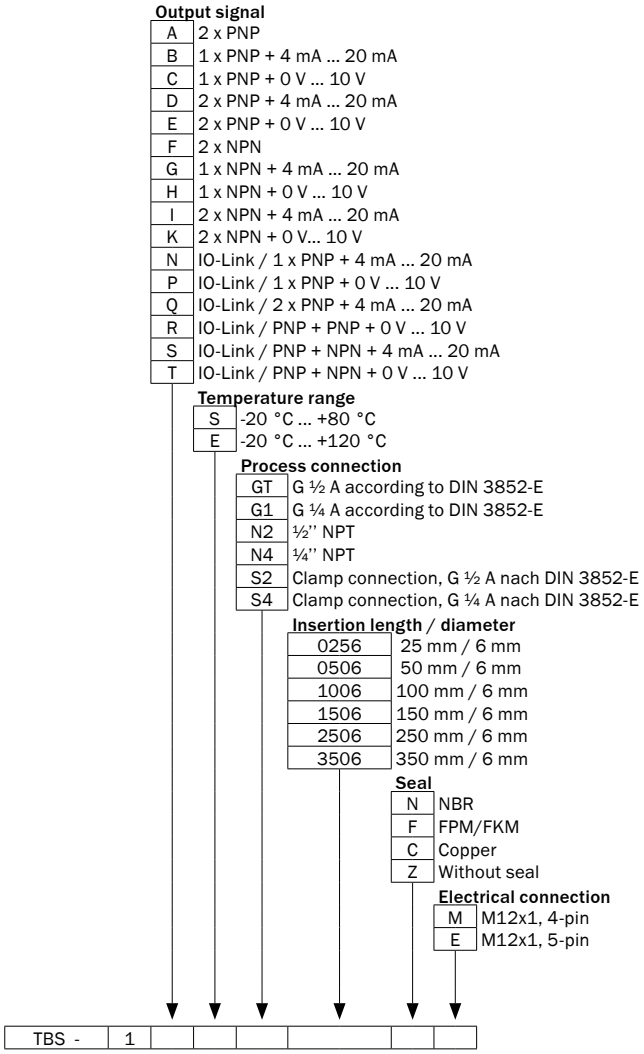
[1] At room temperature and when connected through thread.

[2] The enclosure rating classes specified only apply while the thermometer is connected with female connectors that provide the corresponding enclosure rating.

Ambient data

Ambient temperature	–20 °C ... +80 °C
Storage and transport temperature	–20 °C ... +80 °C
Relative humidity	45 % ... 75 %

Type code



Not all variations of the type code can be combined!

Ordering information

The part numbers below show a selection of our common configurations and represent only a portion of the product portfolio. The type code on page 5 indicates all possible configurations that can be ordered.

- **Electrical connection:** M12 round connector x 1, 4-pin

Measuring range	Output signal	Process connection	Seal	Insertion length/ diameter of probe	Type	Part no.
–20 °C ... +80 °C	2 x PNP	Thread G ¼ A, according to DIN 3852-E	NBR	50 mm / 6 mm	TBS-1ASG10506NM	6048661
	1 x PNP, 1 x 4 mA ... 20 mA	Thread G ¼ A, according to DIN 3852-E	NBR	50 mm / 6 mm	TBS-1BSG10506NM	6048669
	2 x PNP	Thread G ¼ A, according to DIN 3852-E	NBR	100 mm / 6 mm	TBS-1ASG11006NM	6048662
	1 x PNP, 1 x 4 mA ... 20 mA	Thread G ¼ A, according to DIN 3852-E	NBR	100 mm / 6 mm	TBS-1BSG11006NM	6048670

Measuring range	Output signal	Process connection	Seal	Insertion length/ diameter of probe	Type	Part no.
–20 °C ... +80 °C	2 x PNP	Thread G ¼ A, according to DIN 3852-E	NBR	150 mm / 6 mm	TBS-1ASG11506NM	6048663
	1 x PNP, 1 x 4 mA ... 20 mA	Thread G ¼ A, according to DIN 3852-E	NBR	150 mm / 6 mm	TBS-1BSG11506NM	6048671
	2 x PNP	Thread G ¼ A, according to DIN 3852-E	NBR	250 mm / 6 mm	TBS-1ASG12506NM	6048664
	1 x PNP, 1 x 4 mA ... 20 mA	Thread G ¼ A, according to DIN 3852-E	NBR	250 mm / 6 mm	TBS-1BSG12506NM	6048672
		Thread G ½ A, according to DIN 3852-E	FPM/FKM	25 mm / 6 mm	TBS-1BSGT0256FM	6056932
	2 x PNP	Thread G ½ A, according to DIN 3852-E	NBR	50 mm / 6 mm	TBS-1ASGT0506NM	6048665
	1 x PNP, 1 x 4 mA ... 20 mA	Thread G ½ A, according to DIN 3852-E	NBR	50 mm / 6 mm	TBS-1BSGT0506NM	6048673
	2 x PNP	Thread G ½ A, according to DIN 3852-E	NBR	100 mm / 6 mm	TBS-1ASGT1006NM	6048666
	1 x PNP, 1 x 4 mA ... 20 mA	Thread G ½ A, according to DIN 3852-E	NBR	100 mm / 6 mm	TBS-1BSGT1006NM	6048674
	2 x PNP	Thread G ½ A, according to DIN 3852-E	NBR	150 mm / 6 mm	TBS-1ASGT1506NM	6048667
	1 x PNP, 1 x 4 mA ... 20 mA	Thread G ½ A, according to DIN 3852-E	NBR	150 mm / 6 mm	TBS-1BSGT1506NM	6048675
	2 x PNP	Thread G ½ A, according to DIN 3852-E	NBR	250 mm / 6 mm	TBS-1ASGT2506NM	6048668
	1 x PNP, 1 x 4 mA ... 20 mA	Thread G ½ A, according to DIN 3852-E	NBR	250 mm / 6 mm	TBS-1BSGT2506NM	6048676
	1 x PNP, 1 x 0 V ... 10 V	Thread G ½ A, according to DIN 3852-E	NBR	250 mm / 6 mm	TBS-1CSGT2506NM	6049994
	1 x NPN, 1 x 4 mA ... 20 mA	Thread G ½ A, according to DIN 3852-E	NBR	250 mm / 6 mm	TBS-1GSGT2506NM	6050931
	1 x NPN, 1 x 0 V ... 10 V	Thread G ½ A, according to DIN 3852-E	NBR	250 mm / 6 mm	TBS-1HSGT2506NM	6053480
–20 °C ... +120 °C	1 x PNP, 1 x 4 mA ... 20 mA	Compression fitting G ½ A, according to DIN 3852-E	Copper	150 mm / 6 mm	TBS-1GES21506CM	6062202
	2 x PNP	Compression fitting G ¼ A, according to DIN 3852-E	Copper	150 mm / 6 mm	TBS-1AES41506CM	6061827

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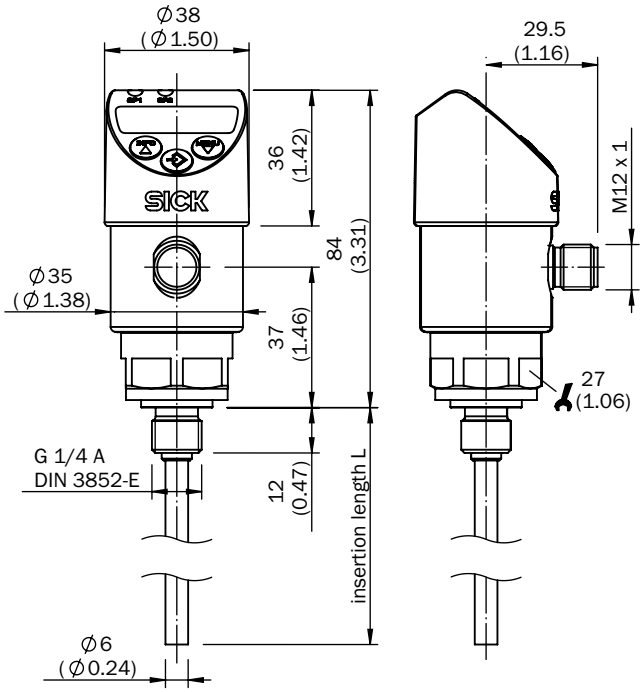
- **Measuring range:** –20 °C ... +80 °C
- **Electrical connection:** round connector M12 x 1, 5-pin

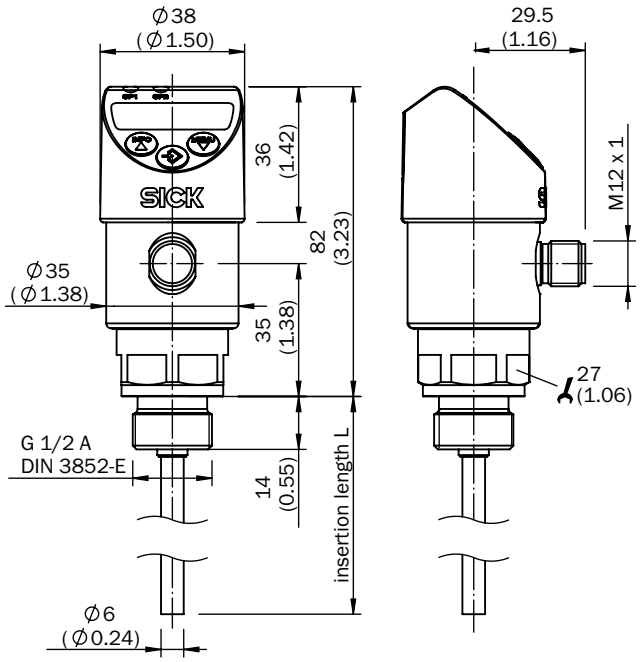
Output signal	Process connection	Seal	Insertion length/diameter of probe	Type	Part no.
2 x PNP, 1 x 4 mA ... 20 mA	Thread G ¼ A, according to DIN 3852-E	NBR	50 mm / 6 mm	TBS-1DSG10506NE	6048677
2 x PNP, 1 x 4 mA ... 20 mA, 1 x IO-Link	Thread G ¼ A, according to DIN 3852-E	NBR	50 mm / 6 mm	TBS-1QSG10506NE	6061429
2 x PNP, 1 x 4 mA ... 20 mA	Thread G ¼ A, according to DIN 3852-E	NBR	100 mm / 6 mm	TBS-1DSG11006NE	6048678
			150 mm / 6 mm	TBS-1DSG11506NE	6048679
2 x PNP, 1 x 4 mA ... 20 mA, 1 x IO-Link	Thread G ¼ A, according to DIN 3852-E	NBR	150 mm / 6 mm	TBS-1QSG11506NE	6061430
2 x PNP, 1 x 4 mA ... 20 mA	Thread G ¼ A, according to DIN 3852-E	NBR	250 mm / 6 mm	TBS-1DSG12506NE	6048680
2 x PNP, 1 x 4 mA ... 20 mA, 1 x IO-Link	Thread G ¼ A, according to DIN 3852-E	NBR	250 mm / 6 mm	TBS-1QSG12506NE	6061431
2 x PNP, 1 x 4 mA ... 20 mA	Thread G ½ A, according to DIN 3852-E	NBR	50 mm / 6 mm	TBS-1DSGT0506NE	6048681
			100 mm / 6 mm	TBS-1DSGT1006NE	6048682
			150 mm / 6 mm	TBS-1DSGT1506NE	6048683
			250 mm / 6 mm	TBS-1DSGT2506NE	6048684
2 x PNP, 1 x 0 V ... 10 V	Thread G ½ A, according to DIN 3852-E	NBR	250 mm / 6 mm	TBS-1ESGT2506NE	6049988
2 x NPN, 1 x 0 V ... 10 V	Thread G ½ A, according to DIN 3852-E	NBR	250 mm / 6 mm	TBS-1KSGT2506NE	TBS-1KS-GT2506NE
	Thread ½'' NPT	Without seal	250 mm / 6 mm	TBS-1KSN22506ZE	6050077
	Thread ¼'' NPT	Without seal	250 mm / 6 mm	TBS-1KSN42506ZE	6049565
		FPM/FKM	250 mm / 6 mm	TBS-1KSN42506FE	TBS-1KSN-42506FE

Dimensional drawings (Dimensions in mm (inch))

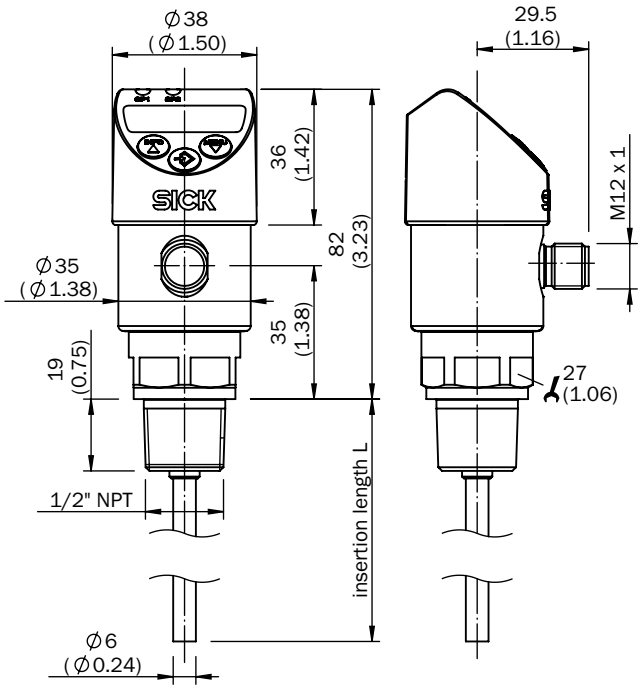
TBS with connection G ¼ A according to DIN 3852-E



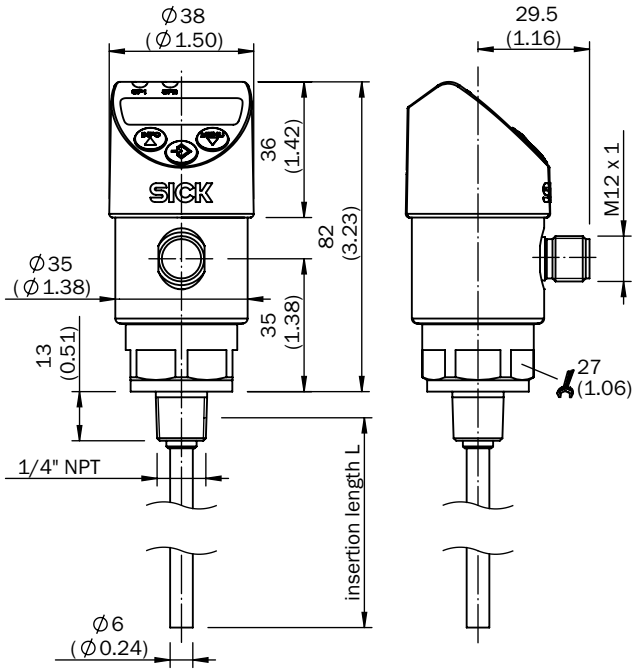
TBS with connection G ½ A according to DIN 3852-E



TBS with connection ¼'' NPT



TBS with connection ½'' NPT



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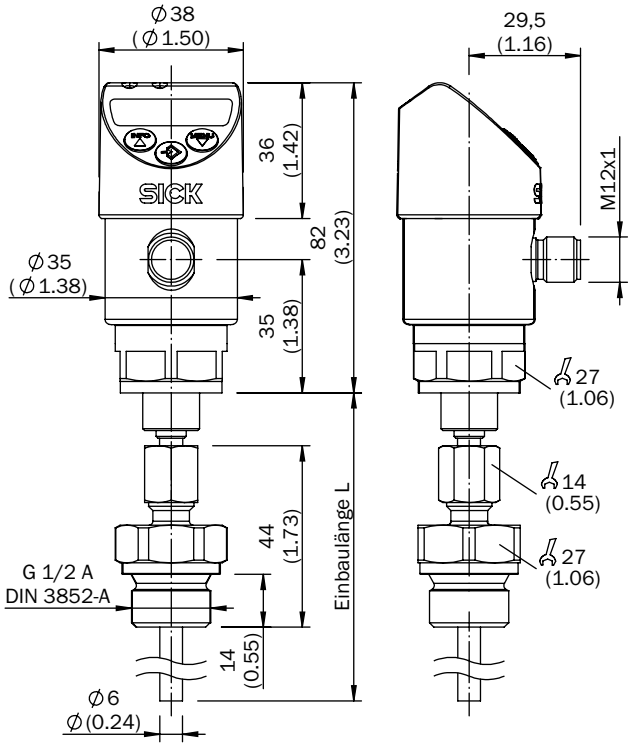
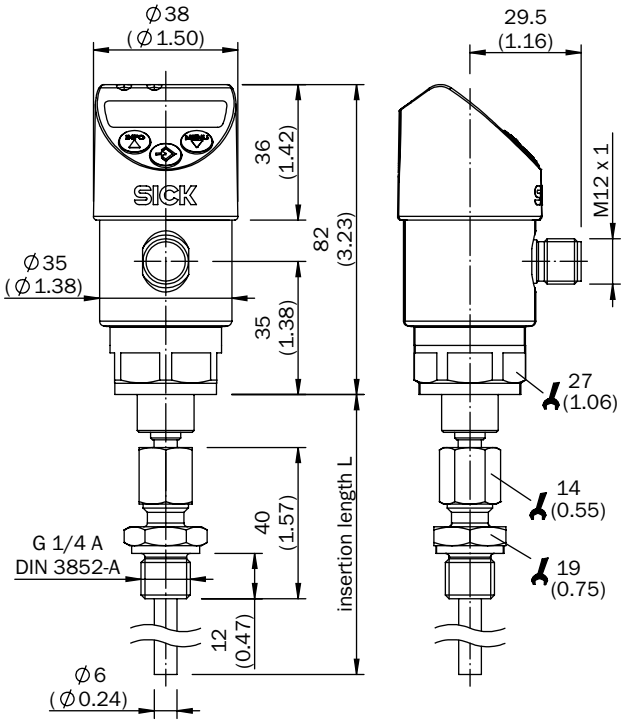
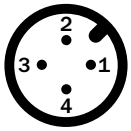
Compression fitting G ½ A



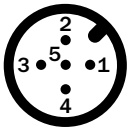
Compression fitting G ¼ A



Connection type and diagram



① L+
② Q_A/Q_2, type-dependent
③ M
④ Q1



① L+
② Q_2
③ M
④ Q1
⑤ Q_A

Recommended accessories

Connection systems

Plug connectors and cables

Connecting cables with female connector

	Brief description	Cable length	Type	Part no.
 Illustration may differ	Head A: female connector, M12, 4-pin, straight Head B: cable Cable: PVC, unshielded, Ø 5 mm	2 m	DOL-1204-G02M	6009382
	Head A: female connector, M12, 4-pin, straight Head B: cable Cable: drag chain use, PUR, halogen-free, unshielded, 4.7 mm	2 m	DOL-1204-G02MC	6025900
 Illustration may differ	Head A: female connector, M12, 4-pin, straight Head B: cable Cable: PVC, unshielded, Ø 5 mm	5 m	DOL-1204-G05M	6009866
	Head A: female connector, M12, 4-pin, straight Head B: cable Cable: drag chain use, PUR, halogen-free, unshielded, Ø 4.7 mm	5 m	DOL-1204-G05MC	6025901
 Illustration may differ	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: PVC, unshielded, Ø 5.7 mm	2 m	DOL-1205-G02M	6008899
	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: drag chain use, PUR, halogen-free, unshielded, Ø 5 mm	2 m	DOL-1205-G02MC	6025906
 Illustration may differ	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: PVC, unshielded, Ø 5.7 mm	5 m	DOL-1205-G05M	6009868
	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: drag chain use, PUR, halogen-free, unshielded, Ø 5 mm	5 m	DOL-1205-G05MC	6025907

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SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 7,400 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, we are always close to our customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in various industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

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For us, that is "Sensor Intelligence."

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