

THE MULTI-FIT INCREMENTAL ENCODER



Product description

The DBS50 Core incremental encoder features impressively high mechanical flexibility, excellent technical properties, and a number of variations. The DBS50E has a face mount flange with 50 mm diameter and a solid shaft with 8 mm diameter. The housing diameter is extremely compact at 37 mm and thus saves valuable space. The face mount flange offers 2 different mounting hole

patterns and a servo groove for mounting with servo clamps. The encoder has compact dimensions and a universal cable outlet that allows for cables to run in an axial or radial direction. The DBS50 Core incremental encoder is fully compatible with the DDS50E incremental encoder.

At a glance

- Connection with universal cable outlet
- Face mount flange with 8 mm solid shaft
- Face mount flange with 2 mounting hole patterns and servo groove
- Compact housing diameter of 37 mm with compact construction depth, flange diameter 50 mm
- Various electrical interfaces: TTL/RS-422, HTL/Push Pull and Open Collector NPN
- Number of lines from 10 to 2,500 possible
- Temperature range: -20 °C... +85 °C
- Enclosure rating: IP 65

Your benefits

- The universal cable outlet allows for use in tight spaces and for flexible cabling
- Face mount flange with various mounting hole patterns for easy device replacement without adapting the application
- Face mount flange with servo groove makes mounting with servo clamps possible
- The high flexibility of the mechanical interface of the encoder and the available accessories allow for the use of a single design in many applications
- The compact housing diameter saves valuable space
- Long-term and reliable operation thanks to a high enclosure rating, temperature resistance and bearing lifetime



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Fields of application

There are numerous application possibilities for positioning and speed measurement, such as in the textile industry, propulsion

technology, storage and conveyors, packaging machines, printing presses, glass industry, and elevators

Detailed technical data

Performance

Pulses per revolution	10 ... 2,500
Measurement step	90° / electric/pulse
Measurement step deviation	± 18°/pulses per revolution
Error limits	± 54°/pulses per revolution
Duty cycle	≤ 0.5 ± 5%
Initialization time	< 3 ms

Mechanical data

Mechanical design	Solid shaft, face mount flange
Shaft diameter	8 mm x 15.5 m
Mass	170 g (with connecting cable 1.5 m)
Shaft material	Stainless steel
Flange material	Aluminum
Housing material	Aluminum
Cable material	PVC
Start up torque	0.9 Ncm (+20 °C)
Operating torque	0.6 Ncm (+20 °C)
Permissible shaft load, radial/axial	30 N (axial) 50 N (radial)
Operating speed	6,000 / min ¹⁾
Maximum operating speed	8,000 rpm ²⁾
Rotor moment of inertia	0.65 gcm ²
Bearing lifetime	2 x 10 ⁹ revolutions
Max. angular acceleration	≤ 500,000 rad/s ²

¹⁾ Take into account self-heating of 3.3 K per 1,000 revolutions/min when designing the operating temperature range.

²⁾ No continuous operation. Signal quality is degraded.

Electrical data

Electrical interface	4,5 V ... 5,5 V, TTL/RS422 7 V ... 30 V, TTL/RS422 7 V ... 30 V, HTL Push Pull 7 V... 27 V, HTL Push Pull, 3 channel 4.5 V ... 5.5 V, Open Collector NPN 4.5 V ... 30 V, Open Collector NPN
Connection type	Cable, 5 or 8-wire, universal, 0.5 m ²⁾ Cable, 5 or 8-wire, universal, 1.5 m ²⁾ Cable, 5 or 8-wire, universal, 3 m ²⁾ Cable, 5 or 8-wire, universal, 5 m ²⁾ Cable, 5 or 8-wire, universal, 10 m ²⁾ Cable, 8-wire with male connector M12, universal, 0.5 m Cable, 8-wire with male connector M23, universal, 0.5 m ¹⁾
Operating current without load	
4.5 V...5.5 V, TTL/RS422	≤ 50 mA
4.5 V ... 5.5 V, Open Collector NPN	≤ 50 mA
Max. power consumption without load	
7 V ... 30 V, TTL/RS422	< 0.5 W
7 V ... 30 V, HTL Push Pull	< 0.5 W
7 V ... 27 V, HTL Push Pull	< 0.5 W
4.5 V ... 30 V, Open Collector NPN	< 0.5 W
Operating voltage range	4.5 V ... 5.5 V 7 V ... 30 V
Max. load current	
Open Collector	≤ 30 mA
TTL/HTL	≤ 30 mA
Maximum output frequency	300 kHz
Reference signal, number	1
Reference signal, position	90° electric, logically gated with A and B
Reverse polarity protection	
4,5 V ... 5,5 V, TTL/RS422	–
7 V ... 30 V, TTL/RS422	✓
7 V ... 30 V, HTL Push Pull	✓
7 V ... 27 V, HTL Push Pull	✓
4.5 V ... 5.5 V, Open Collector NPN	✓
4.5 V ... 30 V, Open Collector NPN	✓
Short-circuit protection of outputs ³⁾	
4,5 V ... 5,5 V, TTL/RS422	–
7 V ... 30 V, TTL/RS422	✓
7 V ... 30 V, HTL Push Pull	✓
7 V ... 27 V, HTL Push Pull	✓
4.5 V ... 5.5 V, Open Collector NPN	✓
4.5 V ... 30 V, Open Collector NPN	✓
MTTFd: mean time to dangerous failure	600 years (EN ISO 13849-1) ⁴⁾

¹⁾ M23 male connector for central mounting.

²⁾ Number of wires depending on electrical interface: Interface A, C, E: 8-wire; Interface G, P, R: 5-wire.

³⁾ Short-circuit protection is only guaranteed when Us and GND are connected correctly.

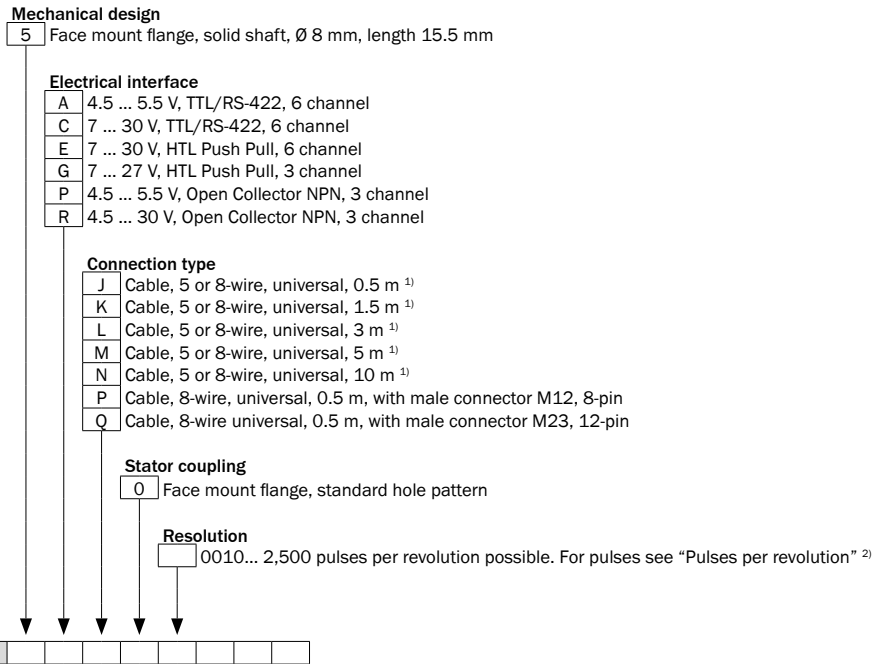
⁴⁾ This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of devices, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.



Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-3 (class A)
Enclosure rating	IP 65
Permissible relative humidity	90% (condensation of optical surfaces not permitted)
Operating temperature range	
4,5 V ... 5,5 V, TTL/RS422	-20 °C ... +85 °C (-35 °C ... +95 °C upon request)
7 V ... 30 V, TTL/RS422	-20 °C ... +85 °C (-35 °C ... +95 °C upon request)
7 V ... 30 V, HTL Push Pull	-20 °C ... +85 °C (-35 °C ... +95 °C upon request)
7 V ... 27 V, HTL Push Pull	-20 °C ... +70 °C
4.5 V ... 5.5 V, Open Collector NPN	-20 °C ... +85 °C (-35 °C ... +95 °C upon request)
4.5 V ... 30 V, Open Collector NPN	-20 °C ... +85 °C (-35 °C ... +95 °C upon request)
Storage temperature range	-40 °C ... +100 °C, without packaging
Resistance to shocks	100 g/6 ms (EN 60068-2-27)
Resistance to vibrations	20 g, 10 Hz ... 2,000 Hz (EN 60068-2-6)

Type code



¹⁾ Number of wires depending on electrical interface: Interface A, C, E: 8-wire; Interface G, P, R: 5-wire.

²⁾ Other pulse on request.

Pulses per revolution ¹⁾

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	E
	0010
	0020
	0050
	0100
	0120
	0125
	0200
	0250
	0256
	0300
	0360
	0400
	0500
	0512
	0600
	1000
	1024
	1200
	2000
	2048
	2500

¹⁾ Additional available upon request.

Ordering information

Solid shaft, face mount flange

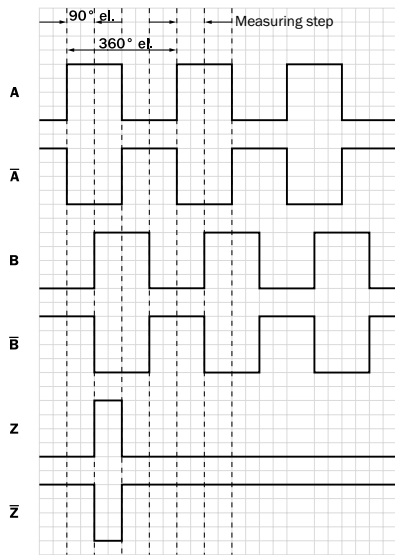
- **Shaft diameter:** 8 mm

Electrical interface	Voltage range	Connection type	Range of pulses per revolution	Type	Part no.
TTL/RS422	4.5 V ... 5.5 V	Cable, 8-wire universal, 0.5 m	100	DBS50E-S5AJ00100	1061259
			360	DBS50E-S5AJ00360	1061260
			400	DBS50E-S5AJ00400	1061261
			500	DBS50E-S5AJ00500	1061262
			1,000	DBS50E-S5AJ01000	1061263
			1,024	DBS50E-S5AJ01024	1060870
			2,048	DBS50E-S5AJ02048	1061085
			2,500	DBS50E-S5AJ02500	1061086
		Cable, 8-wire, universal, 1.5 m	100	DBS50E-S5AK00100	1060685
			360	DBS50E-S5AK00360	1060686
			400	DBS50E-S5AK00400	1060687
			500	DBS50E-S5AK00500	1060688
			1,000	DBS50E-S5AK01000	1060145
			1,024	DBS50E-S5AK01024	1060689
	2,048		DBS50E-S5AK02048	1057446	
	Cable, 8-wire with male connector M12, universal, 0.5 m	500	DBS50E-S5AP00500	1066755	
		2,000	DBS50E-S5AP02000	1064388	
	7 V ... 30 V	Cable, 8-wire, universal, 1.5 m	1,000	DBS50E-S5CK01000	1066828
			2,048	DBS50E-S5CK02048	1059902
			2,500	DBS50E-S5CK02500	1061172
	HTL/Push Pull	7 V ... 30 V	Cable, 8-wire universal, 0.5 m	100	DBS50E-S5EJ00100
360				DBS50E-S5EJ00360	1061265
400				DBS50E-S5EJ00400	1061266
500				DBS50E-S5EJ00500	1061267
1,000				DBS50E-S5EJ01000	1061268
1,024				DBS50E-S5EJ01024	1061269
2,000				DBS50E-S5EK02000	1062698
Cable, 8-wire, universal, 1.5 m			100	DBS50E-S5EK00100	1060690
			360	DBS50E-S5EK00360	1060691
			400	DBS50E-S5EK00400	1060692
			500	DBS50E-S5EK00500	1060693
			1,000	DBS50E-S5EK01000	1060694
			1,024	DBS50E-S5EK01024	1060695
			2,048	DBS50E-S5EK02048	1059903
2,500		DBS50E-S5EK02500	1061230		
Cable, 8-wire with male connector M12, universal 0.5 m		100	DBS50E-S5EP00100	1067000	
		360	DBS50E-S5EP00360	1066061	
		1,000	DBS50E-S5EP01000	1062886	
		1,024	DBS50E-S5EP01024	1068207	
		2,000	DBS50E-S5EP02000	1066174	



Interfaces

Signal outputs for electrical interfaces TTL and HTL



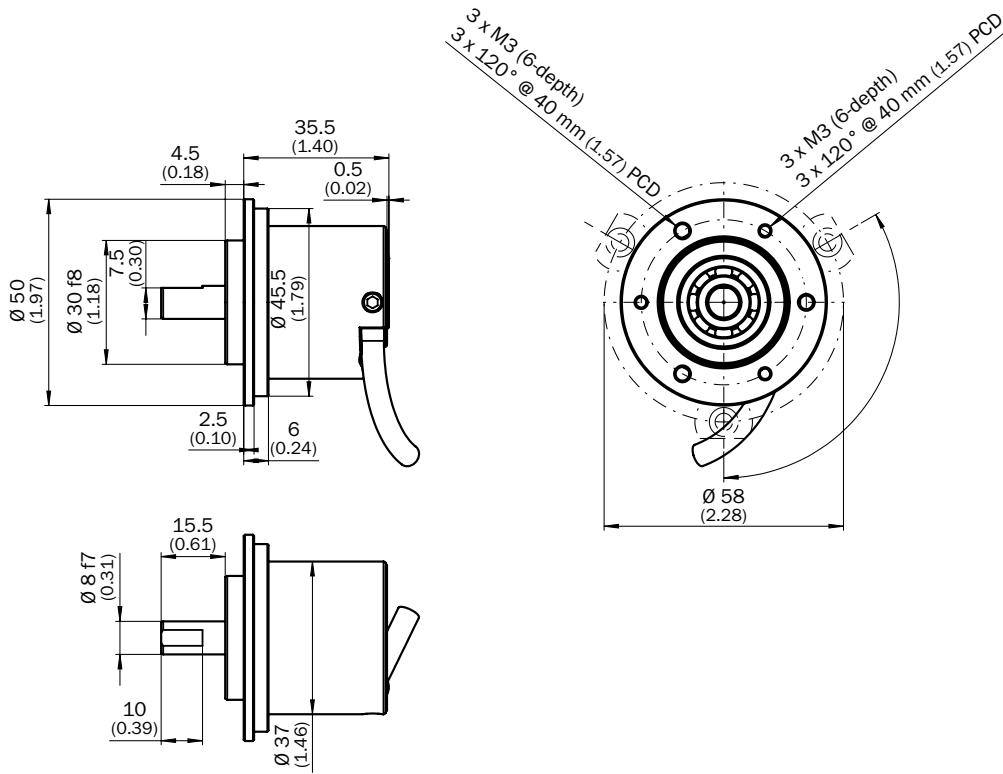
Supply voltage	Output
4.5 V ... 5.5 V	TTL/RS422
7 V ... 30 V	TTL/RS422
7 V ... 30 V	HTL Push Pull
7 V ... 27 V	HTL Push Pull, 3 channel
4.5 V ... 5.5 V	Open Collector NPN
4.5 V ... 30 V	Open Collector NPN

CW with view on the encoder shaft in direction "A", compare dimensional drawing.

Interfaces G, P, R only for channels A, B, Z.

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Dimensional drawings (dimensions in mm)

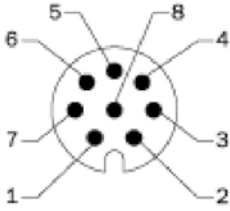


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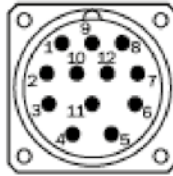
PIN assignment

8-core cable

View of M12 device connector on cable



View of M23 device connector on cable



Wire color	Pin 8-pole for M12	Pin 12-pole for M23	Signal HTL/ OC 3-channel	Signal TTL/HTL 6-channel	Explanation
brown	1	6	Not connected	A-	Signal wire
white	2	5	A	A	Signal wire
black	3	1	Not connected	B-	Signal wire
pink	4	8	B	B	Signal wire
Yellow	5	4	Not connected	Z-	Signal wire
purple	6	3	Z	Z	Signal wire
blue	7	10	GND	GND	Ground connection of the encoder
Red	8	12	+Us	+Us	Supply voltage
-	-	9	Not connected	Not connected	Not connected
-	-	2	Not connected	Not connected	Not connected
-	-	11	Not connected	Not connected	Not connected
-	-	7	Not connected	Not connected	Not connected
Shield	Shield	Shield	Shield	Shield	Shield (connected with housing on the encoder side)

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Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 30 mm including mounting kit for face mount flange	BEF-WF-30	2066391

Other mounting accessories

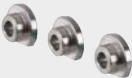
Measuring wheels and measuring wheel systems

Figure	Brief description	Type	Part no.
	Measuring wheel with O-ring (NBR70) for 8 mm solid shaft, circumference 200 mm	BEF-MR008020R	2055223
	Measuring wheel with O-ring (NBR70) for 8 mm solid shaft, circumference 300 mm	BEF-MR008030R	2055635
	O-ring for measuring wheels (circumference 200 mm)	BEF-OR-053-040	2064061
	O-ring for measuring wheels (circumference 300 mm)	BEF-OR-083-050	2064076

Modular measuring wheel system



Brief description	Type	Part no.
Measuring wheel system, desired mounting position: left, for DBS50E-S5	BEF-MRS-08-1	2071956
Measuring wheel system, desired mounting position: right, for DBS50E-S5	BEF-MRS-08-2	2071953

Servo clamps

Figure	Brief description	Type	Part no.
	Servo clamps, small, for servo flanges (clamps, eccentric fastener), 3 pcs., without mounting material	BEF-WK-RESOL	2039082

Shaft adaptation




Shaft couplings

Figure	Brief description	Type	Part no.
	Bar coupling, shaft diameter 6 mm / 8 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0608-S	5314179
	Bar coupling, shaft diameter 8 mm / 8 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle $\pm 3^\circ$; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0808-S	5314177
	Bar coupling, shaft diameter 8 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular $\pm 3^\circ$; torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0810-S	5314178
	Double-loop coupling, shaft diameter 8 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular $\pm 10^\circ$; max. speed 3,000 rpm, -30°C to $+80^\circ\text{C}$, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0810-D	5326704

Connectivity

Plug connectors and cables

Connecting cables with female connector


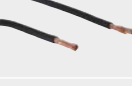
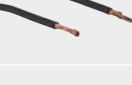
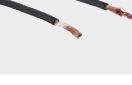
Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, $4 \times 2 \times 0.25 \text{ mm}^2$, $\varnothing 7.0 \text{ mm}$	2 m	DOL-1208-G02MAC1	6032866
		5 m	DOL-1208-G05MAC1	6032867
		10 m	DOL-1208-G10MAC1	6032868
		20 m	DOL-1208-G20MAC1	6032869
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: incremental, PUR, shielded, $4 \times 2 \times 0.25 \text{ mm}^2 + 2 \times 0.5 \text{ mm}^2 + 1 \times 0.14 \text{ mm}^2$, $\varnothing 7.8 \text{ mm}$ ¹⁾	2 m	DOL-2312-G02MLA3	2030682
		7 m	DOL-2312-G07MLA3	2030685
		10 m	DOL-2312-G10MLA3	2030688
		15 m	DOL-2312-G15MLA3	2030692
		20 m	DOL-2312-G20MLA3	2030695
		25 m	DOL-2312-G25MLA3	2030699
		30 m	DOL-2312-G30MLA3	2030702
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: incremental, suitable for drag chain, PUR, shielded, $4 \times 2 \times 0.25 \text{ mm}^2 + 2 \times 0.5 \text{ mm}^2 + 1 \times 0.14 \text{ mm}^2$, $\varnothing 7.8 \text{ mm}$ ¹⁾	1.5 m	DOL-2312-G1M5MA3	2029212
		3 m	DOL-2312-G03MMA3	2029213
		5 m	DOL-2312-G05MMA3	2029214
		10 m	DOL-2312-G10MMA3	2029215
		20 m	DOL-2312-G20MMA3	2029216
		30 m	DOL-2312-G30MMA3	2029217

¹⁾ Warning! Only in combination with electrical interfaces A, C, E and P.



Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 8-pin, straight, A encoded, shielded, for cable diameter 4 mm ... 8 mm Head B: - Operating temperature: -40 °C ... +85 °C	DOS-1208-GA01	6045001
	Head A: female connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: -20 °C ... +130 °C	DOS-2312-G	6027538
	Head A: female connector, M23, 12-pin, angled, shielded, for cable diameter 4.2 mm ... 6.6 mm Head B: - Operating temperature: -20 °C ... +130 °C	DOS-2312-W01	2072580
	Head A: female connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: -40 °C ... +125 °C	DOS-2312-G02	2077057

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm ² , Ø 5.6 mm	By the meter	LTG-2308-MWENC	6027529
	Head A: cable Head B: cable Cable: PUR, shielded, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 1 x 0.14 mm ² , Ø 7.5 mm		LTG-2411-MW	6027530
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² , Ø 7.8 mm		LTG-2512-MW	6027531
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, UV and saltwater resistant, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² , Ø 7.8 mm		LTG-2612-MW	6028516

Male connector (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: male connector, M12, 8-pin, straight, A encoded, shielded, for cable diameter 4 mm ... 8 mm Head B: - Operating temperature: -40 °C ... +85 °C	STE-1208-GA01	6044892
	Head A: male connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: Operating temperature: -20 °C ... +130 °C	STE-2312-G	6027537
	Head A: male connector, M23, 12-pin, straight, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: -40 °C ... +125 °C	STE-2312-G01	2077273

→ For additional accessories, please see page K-668 onwards

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