

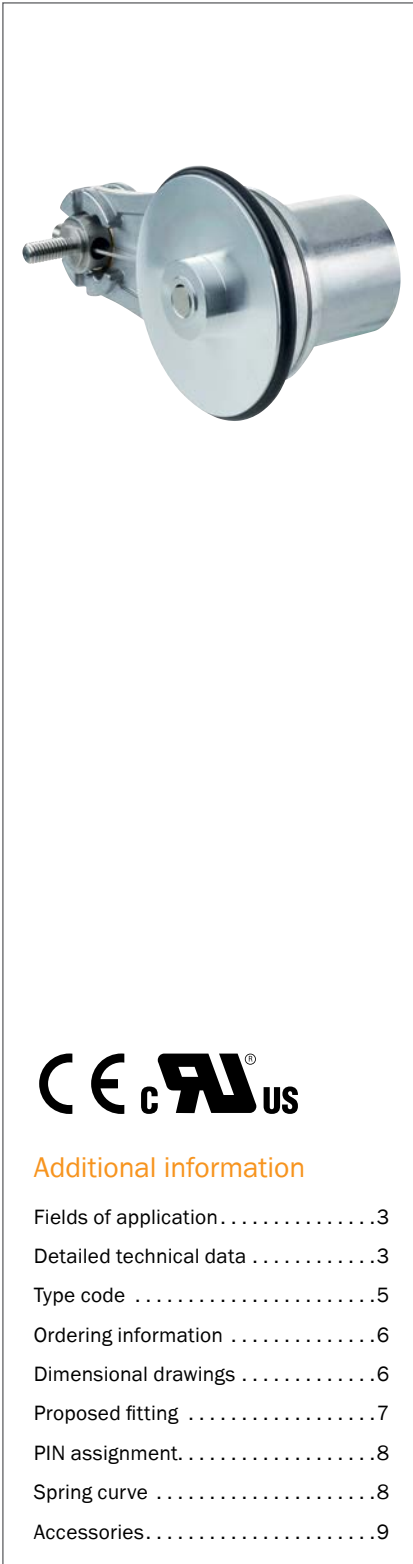
## DBV50 Core

COMPACT MEASURING WHEEL SYSTEM THAT IS HIGHLY FLEXIBLE  
AND EASY TO MOUNT

Measuring wheel encoder

**SICK**  
Sensor Intelligence.

# COMPACT MEASURING WHEEL SYSTEM THAT IS HIGHLY FLEXIBLE AND EASY TO MOUNT



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## Product description

The DBV50 Core measuring wheel encoder is a measuring wheel system for measuring linear movements. It consists of the DBS50 Core incremental encoder, an aluminum measuring wheel with a 200 mm diameter and a spring-loaded arm. The maximum resolution is 0.08 mm per pulse.

The spring arm has a maximum spring travel of 14 mm, a maximum spring force of 21 N and features a convenient

pretension setting for repeatably setting the spring pretension. A spring travel limiter protects the spring from being overloaded.

The encoder can be rotated and mounted on both sides of the spring arm; routing of the cable can be adapted to the application. The measuring wheel system can be delivered with numerous electrical interfaces, facilities for connecting and resolutions.

## At a glance

- Axis distance: 63.5 mm
- Measuring wheel circumference: 200 mm
- Resolution: 0.08 mm per pulse, 12.5 pulses per mm
- Max. spring travel: 14 mm, mechanically limited, max. spring force: 21 N
- Encoder rotation in 30° increments
- The encoder can be mounted on both spring arm sides, wheel support from top and bottom
- Adjustable spring pretension

## Your benefits

- Compact, space-saving measuring wheel system with low installation depth
- Large spring travel and high press-on force to compensate for unevenness in the surface being measured
- Easy and repeatable setting of the spring pretension
- Prevents system failures by limiting the spring travel to protect the spring from being overloaded
- Highly adaptable to various applications thanks to a variety of options for mounting the encoder on the spring arm
- Reliable operation thanks to the reliable encoder with a high radial load
- Numerous electrical interfaces, facilities for connecting and resolutions

→ [www.mysick.com/en/DBV50\\_Core](http://www.mysick.com/en/DBV50_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.



## Fields of application

- Measuring of position, speed and distance in applications with linear movements in storage logistics and mechanical engineering.
- Conveyor belts
- Wood industry
- Laser and inkjet printers for labels, packaging and bottles
- Shuttle systems in storage logistics
- Volume measurement and weighing systems
- Packaging machines

## Detailed technical data

### Performance

<b>Resolution pulses / mm</b>	0.05 ... 12.5 (depending on type)
<b>Measuring step (resolution mm / pulses)</b>	20 ... 0.08 (depending on type)
<b>Measuring step deviation</b>	$\pm 18^\circ$ / pulses per revolution respectively $\pm 2.5^\circ$ / pulses per revolution without slippage
<b>Error limits</b>	$\pm 4$ mm/m, based on measuring wheel (wheel + surface)
<b>Duty cycle</b>	$\leq 0.5 \pm 5\%$
<b>Initialization time</b>	< 3 ms

### Electrical data

<b>Electrical interface</b>	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, 3 channel 4.5 V ... 30 V, open Collector NPN, 3 channel
<b>Connection type</b>	Cable, 5- or 8-wire, universal, 0.5 m <sup>1)</sup> Cable, 5- or 8-wire, universal, 1.5 m <sup>1)</sup> Cable, 5- or 8-wire, universal, 3 m <sup>1)</sup> Cable, 5- or 8-wire, universal, 5 m <sup>1)</sup> Cable, 5- or 8-wire, universal, 10 m <sup>1)</sup> Cable, 8-wire with male connector M12, universal <sup>2)</sup> Cable, 8-wire with male connector M23, universal <sup>2)</sup>
<b>Operating power consumption (no load)</b>	$\leq 50$ mA
<b>Power consumption max. without load</b>	$\leq 0.5$ W
<b>Load current max.</b>	$\leq 30$ mA
<b>Maximum output frequency</b>	300 kHz
<b>Reference signal, number</b>	1
<b>Reference signal, position</b>	90°, electric, logically gated with A and B
<b>Reverse polarity protection</b>	
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, 3 channel	✓
4.5 V ... 30 V, open Collector NPN, 3 channel	✓
<b>Short-circuit protection of the outputs</b>	
4.5 V ... 5.5 V, TTL/RS422	✓ <sup>3)</sup>
7 V ... 30 V, TTL/RS422	✓ <sup>3)</sup>

<sup>1)</sup> Number of wires depending on electrical interface: interface A, C, E: 8-wire, interface G, P, R: 5-wire.

<sup>2)</sup> M23 male connector for central mounting

<sup>3)</sup> The short-circuit rating is only given if Us and GND are connected correctly.

<sup>4)</sup> 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 components, average ambient temperature 40°C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

7 V ... 30 V, HTL/Push pull	✓ <sup>3)</sup>
7 V ... 27 V, HTL/push pull, 3 channel	- <sup>3)</sup>
4.5 V ... 5.5 V, open Collector NPN, 3 channel	✓ <sup>3)</sup>
4.5 V ... 30 V, open Collector NPN, 3 channel	✓ <sup>3)</sup>
<b>MTTFd: mean time to dangerous failure</b>	600 years (EN ISO 13849-1) <sup>4)</sup>

<sup>1)</sup> Number of wires depending on electrical interface: interface A, C, E: 8-wire, interface G, P, R: 5-wire.

<sup>2)</sup> M23 male connector for central mounting

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## Mechanical data

<b>Measuring wheel circumference</b>	200 mm
<b>Measuring wheel surface</b>	O ring NBR70 <sup>1)</sup>
<b>Model spring arm</b>	63.5 mm spring arm, encoder on mounting side, single wheel 63.5 mm spring arm, wheel on mounting side, single wheel
<b>Mass</b>	300 g (with cable 1,5 m)
<b>Material, Encoder</b>	
Shaft	Stainless steel
Flange	Aluminum
Housing	Aluminum
Cable	PVC
<b>Material, spring arm mechanics</b>	
Spring element	spring steel
Measuring wheel, spring arm	Aluminum
<b>Start up torque</b>	0.9 Ncm (at 20°C)
<b>Operating torque</b>	0.6 Ncm (at 20°C)
<b>Operating speed</b>	1,500 /min
<b>Maximum operating speed</b>	3,000 /min <sup>2)</sup>
<b>Bearing lifetime</b>	2.0 x 10 <sup>9</sup> revolutions
<b>Full Travel / deflection spring arm</b>	14 mm at 21 N spring path
<b>Recommended preload</b>	15 N upon 10 mm deflection <sup>3)</sup>
<b>Permissible operating range (continuous operation)</b>	± 3 mm
<b>Recommended spring deflection</b>	2 mm ... 13 mm
<b>Lifetime spring element</b>	>1.4 Mio. cycles <sup>4)</sup>
<b>Mounting position relative to the measurement object</b>	Preference from above, from below possible <sup>5)</sup>

<sup>1)</sup> The surface of a measuring wheel is subject to wear. This depends on pressure, acceleration performance in the application, traversing, measuring surface mechanical alignment of the measuring wheel, temperature and environmental conditions. We recommend the nature of the measuring wheel to be checked regularly and replaced if necessary

<sup>2)</sup> No permanent operation. Decreasing signal quality.

<sup>3)</sup> When measured from the top of the measuring surface.

<sup>4)</sup> a cycle corresponding to an up and down movement by ± 3 mm from the position of the recommended preload.

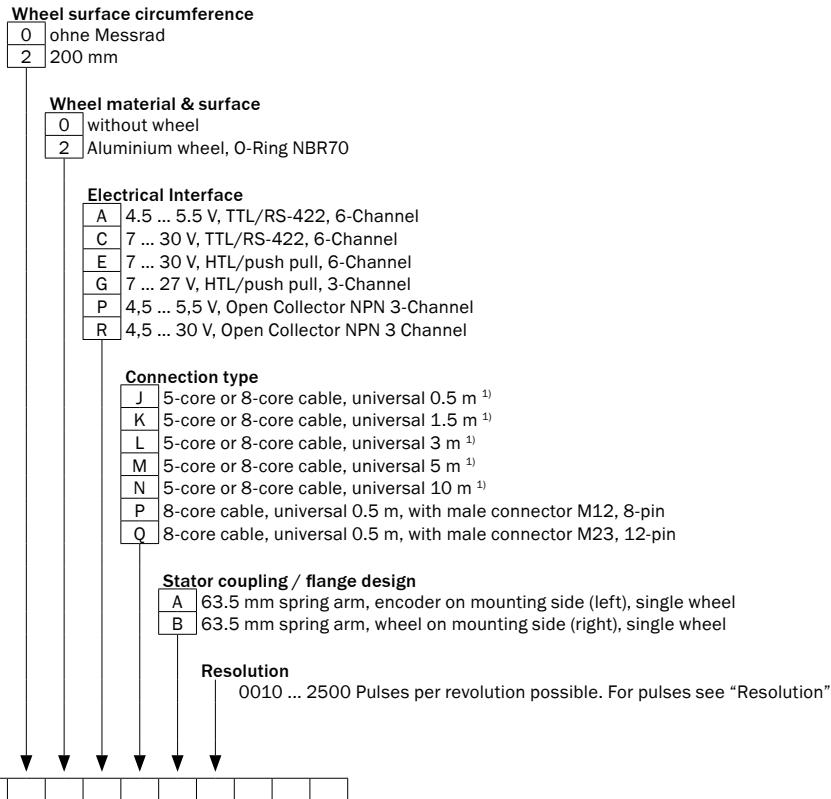
<sup>5)</sup> When mounted from below the encoder weight must be considered during the spring preload.

## Ambient data

<b>EMC</b>	According to EN 61000-6-2 and EN 61000-6-3 (class A)
<b>Enclosure rating</b>	IP 65
<b>Permissible relative humidity</b>	90 % (condensation of the optical scanning not permitted)
<b>Working temperature range</b>	

4.5 V ... 5.5 V TTL/RS422	-20 °C ... +85 °C (-35 °C ... +95 °C on request)
7 V ... 30 V TTL/RS422	-20 °C ... +85 °C (-35 °C ... +95 °C on request)
7 V ... 30 V HTL/Push pull	-20 °C ... +85 °C (-35 °C ... +95 °C on 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 on request)
4.5 V ... 30 V open Collector NPN	-20 °C ... +85 °C (-35 °C ... +95 °C on request)
<b>Storage temperature range</b>	-40 °C ... +100 °C, without package

Type code



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

Resolution

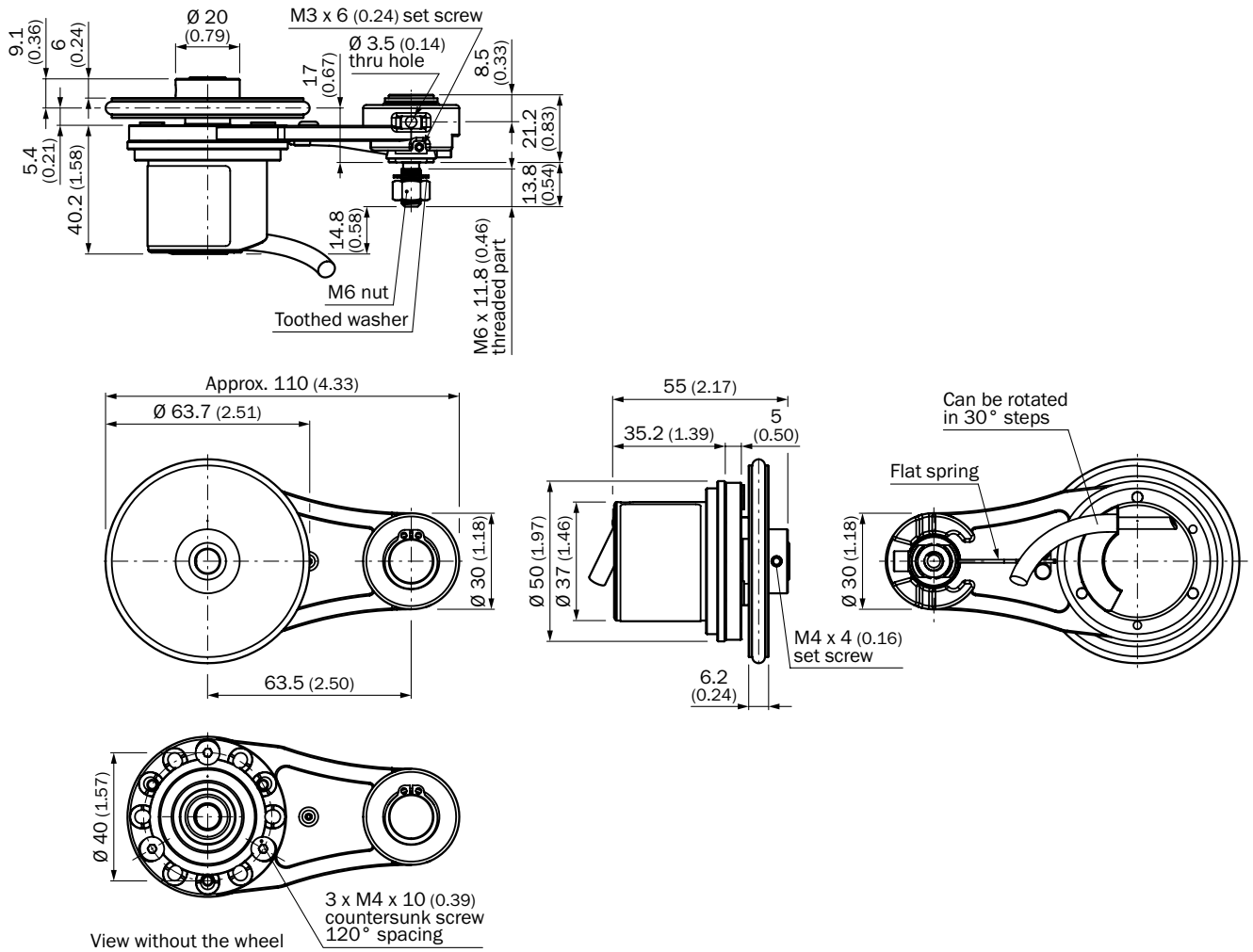
Pulses per revolution	Measurement step (mm/Pulses)	Resolution (Pulses/mm)
0010	20,00	0.05
0020	10,00	0.01
0050	4,00	0.25
0100	2,00	0,50
0200	1,00	1,00
0400	0,50	2,00
0500	0,40	2,50
1000	0,20	5,00
2000	0,10	10,00
2500	0,08	12,50

Ordering information

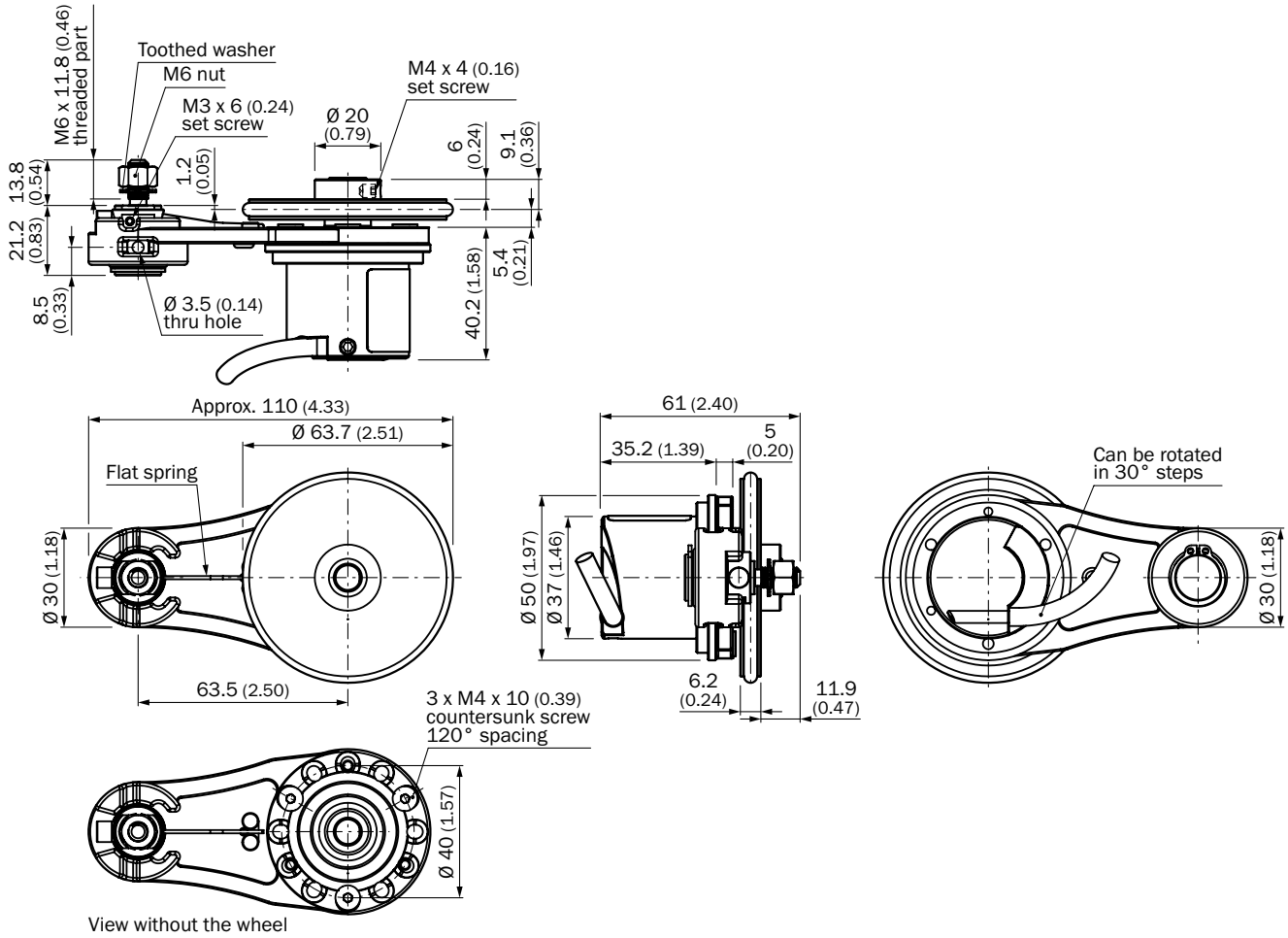
Electrical interface	Voltage area	Connection type	Resolution pulses / mm	Type	Part no.
HTL/Push pull	7 V ... 30 V	Cable, cable, 8-wire, universal, 0.5 m	0.1	DBV50E-22EKA0020	1079599
		Cable, cable, 8-wire, universal, 1.5 m	10	DBV50E-22EKA2000	1079595
TTL/RS422	4.5 V ... 5.5 V	Cable, cable, 8-wire, universal, 1.5 m	0.1	DBV50E-22AJA1000	1079593
				DBV50E-22AKA0020	1079598
	7 V ... 30 V	Cable, cable, 8-wire, universal, 1.5 m	10	DBV50E-22CKA0020	1079600
				DBV50E-22AKA2000	1079594
Open Collector NPN, 3 channel	4.5 V ... 30 V	Cable, Cable, 5-wire, universal, 1.5 m	0.1	DBV50E-22RKA0020	1079601
			10	DBV50E-22RKA2000	1079597

Dimensional drawings (Dimensions in mm (inch))

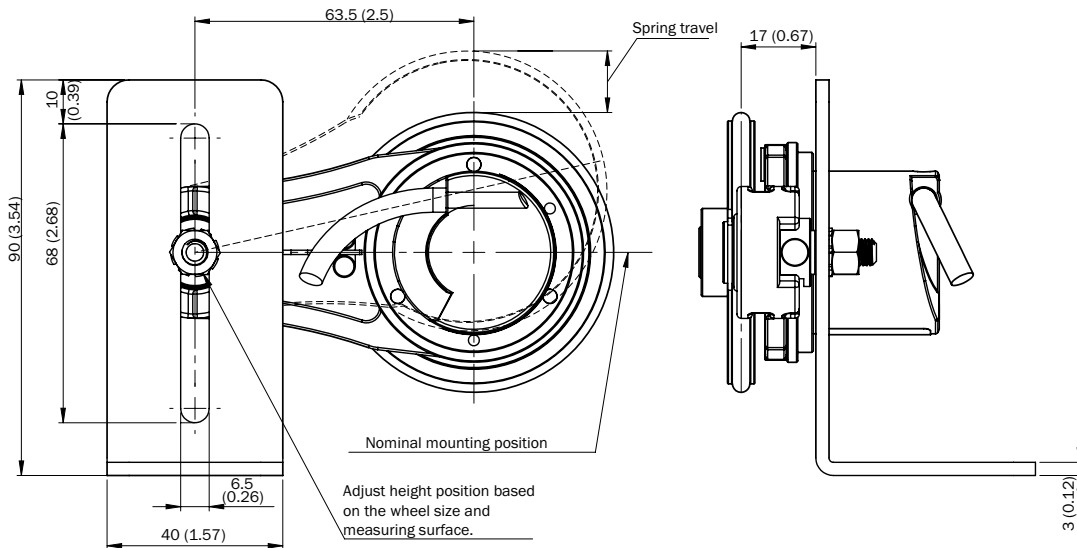
63.5 mm spring arm, encoder on mounting side (left), single wheel



63.5 mm spring arm, wheel on mounting side (right), single wheel

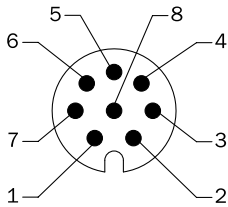


Proposed fitting

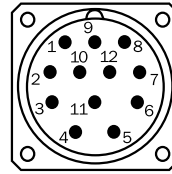


### PIN assignment

View of the plug-in face M12 connector



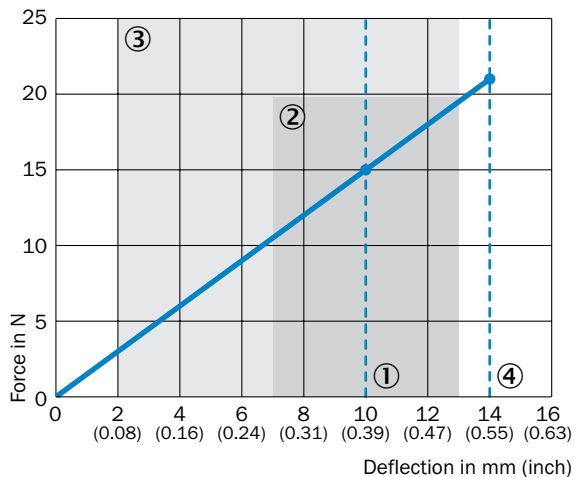
View of the M23 male connector plug-in face



Colour of wires	Male connector M12, 8-pin	Connector M23, 12-pin			Explanation
Brown	1	6	N. C.	A-	Signal wire
White	2	5	A	A	Signal wire
Black	3	1	N. C.	B-	Signal wire
Pink	4	8	B	B	Signal wire
Yellow	5	4	N. C.	Z-	Signal wire
Purple	6	3	Z	Z	Signal wire
Blue	7	10	GND	GND	Ground connection
Red	8	12	U <sub>s</sub>	U <sub>s</sub>	Supply voltage
-	-	9	N. C.	N. C.	Not assigned
-	-	2	N. C.	N. C.	Not assigned
-	-	11	N. C.	N. C.	Not assigned
-	-	7	N. C.	N. C.	Not assigned
Screen	Screen	Screen	Screen	Screen	Screen connected with encoder housing

### Spring curve

Force deflection chart with working range



- ① Proposed Pre-tension: 10 mm
- ② Allowed operating travel (continuous operation) +/- 3 mm
- ③ Proposed spring deflection: 2 - 13 mm
- ④ Maximum spring travel: 14 mm



## Accessories

### Mounting systems

#### Flanges

#### Flange plates

Brief description	Type	Part no.
Adapter flange for modular measuring wheel system	BEF-AP-MRS	2084969

#### Mounting brackets and mounting plates

#### Mounting brackets

Brief description	Type	Part no.
Mounting bracket for encoder with spigot 36 mm, mounting kit included	BEF-WF-MRS	2084709

#### Other mounting accessories




#### Measuring wheels and measuring wheel systems

Brief description	Type	Part no.
O-ring for measuring wheels (circumference 200 mm) with O-ring	BEF-OR-053-040	2064061





### Connection systems

#### 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 x 2 x 0.25 mm <sup>2</sup> , Ø 7.0 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 x 2 x 0.25 mm <sup>2</sup> + 2 x 0.5 mm <sup>2</sup> + 1 x 0.14 mm <sup>2</sup> , Ø 7.8 mm	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
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: incremental, suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm <sup>2</sup> + 2 x 0.5 mm <sup>2</sup> + 1 x 0.14 mm <sup>2</sup> , Ø 7.8 mm	1,5 m	DOL-2312-G1M5MA3	2029212
		3 m	DOL-2312-G03M-MA3	2029213
		5 m	DOL-2312-G05M-MA3	2029214
		10 m	DOL-2312-G10MMA3	2029215
		20 m	DOL-2312-G20M-MA3	2029216
		30 m	DOL-2312-G30M-MA3	2029217




## Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 8-pin, straight, A coded, incremental, SSI, 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, HIPERFACE®, SSI, incremental, 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, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: -40 °C ... +125 °C	DOS-2312-G02	2077057
	Head A: M23 female connector, 12-pin, angled, HIPERFACE®, SSI, incremental, shielded, for cable diameter 4.2 mm ... 6.6 mm Head B: - Operating temperature: -20 °C ... +130 °C	DOS-2312-W01	2072580

## Cables (ready to assemble)

Figure	Brief description	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 <sup>2</sup> , Ø 5.6 mm	LTG-2308-MWENC	6027529
	Head A: cable Head B: cable Cable: PUR, shielded, 4 x 2 x 0.25 mm <sup>2</sup> + 2 x 0.5 mm <sup>2</sup> + 1 x 0.14 mm <sup>2</sup> , 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 <sup>2</sup> + 2 x 0.5 mm <sup>2</sup> + 2 x 0.14 mm <sup>2</sup> , 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 <sup>2</sup> + 2 x 0.5 mm <sup>2</sup> + 2 x 0.14 mm <sup>2</sup> , Ø 7.8 mm	LTG-2612-MW	6028516

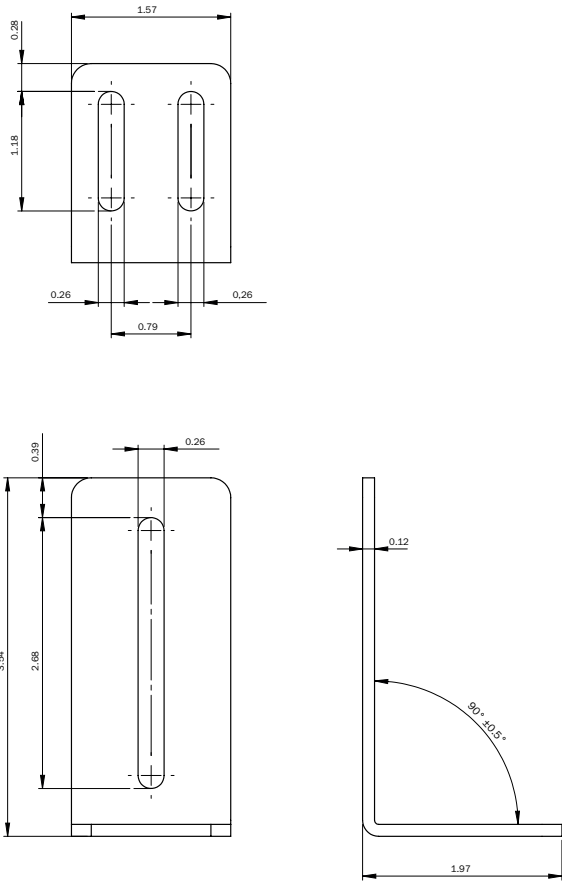
## Male connectors (ready to assemble)

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

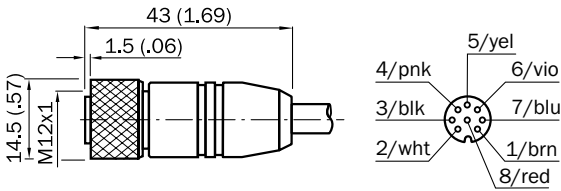
Dimensional drawings for accessories (Dimensions in mm (inch))

Mounting brackets and mounting plates

BEF-WF-MRS

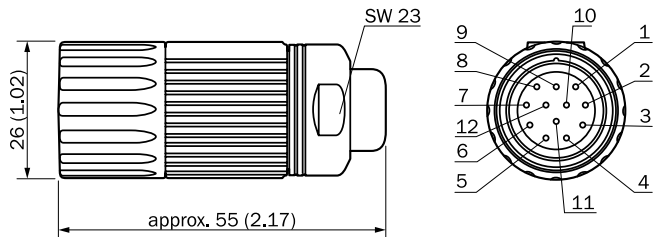


- DOL-1208-G02MAC1
- DOL-1208-G05MAC1
- DOL-1208-G10MAC1
- DOL-1208-G20MAC1



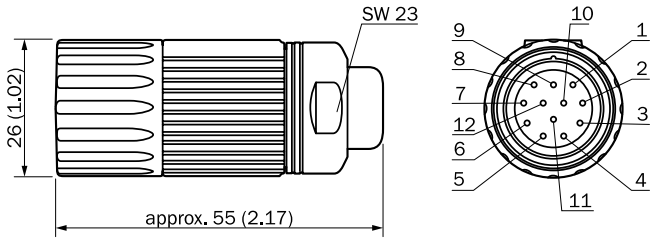
All dimensions in mm (inch)

DOL-2312-GxxMLA3



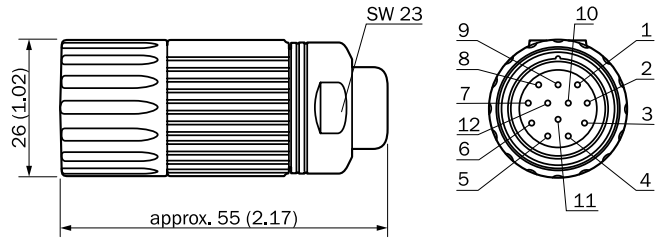
- ① Black
- ② Gray
- ③ Purple
- ④ Yellow
- ⑤ White
- ⑥ Brown
- ⑧ Pink
- ⑨ Screen
- ⑩ Blue
- ⑪ Green
- ⑫ Red

DOL-2312-GxxMMA3



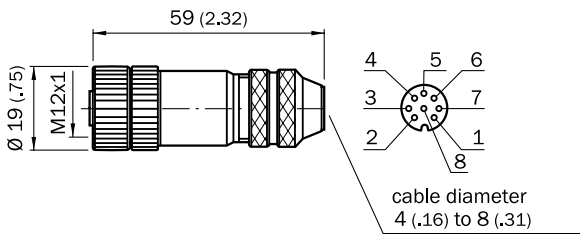
- ① Black
- ② Gray
- ③ Purple
- ④ Yellow
- ⑤ White
- ⑥ Brown
- ⑧ Pink
- ⑨ Screen
- ⑩ Blue
- ⑪ Green
- ⑫ Red

DOL-2312-G1M5MA3

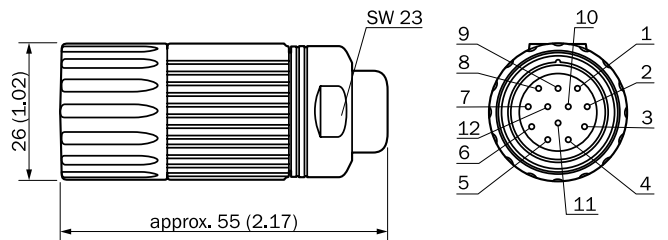


- ① Black
- ② Gray
- ③ Purple
- ④ Yellow
- ⑤ White
- ⑥ Brown
- ⑧ Pink
- ⑨ Screen
- ⑩ Blue
- ⑪ Green
- ⑫ Red

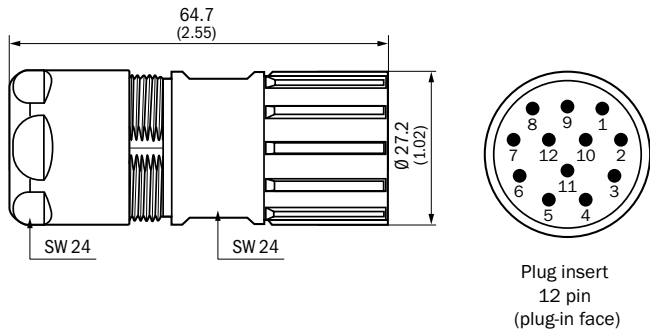
DOS-1208-GA01



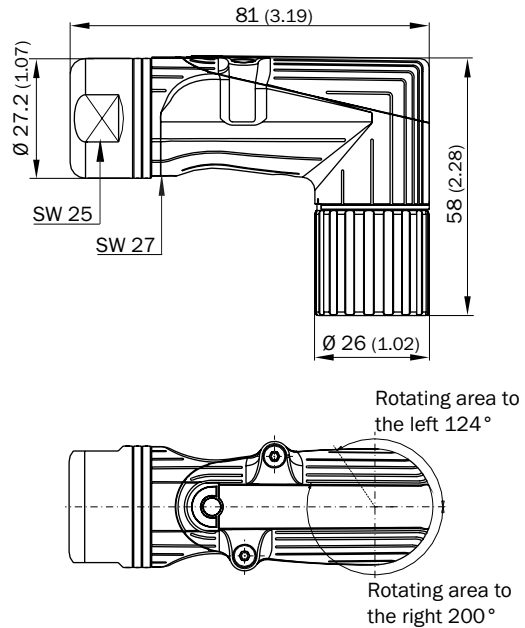
DOS-2312-G



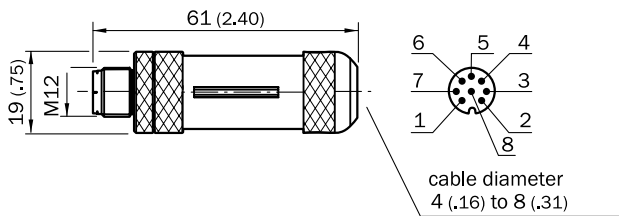
DOS-2312-G02



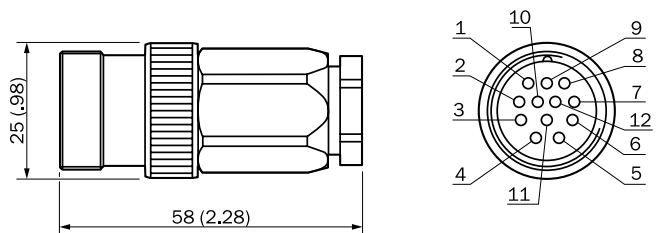
DOS-2312-W01



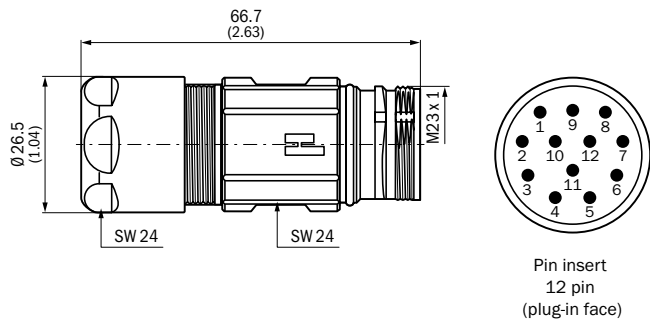
STE-1208-GA01



STE-2312-G



STE-2312-G01





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