



## DFS60 INOX

HIGH RESOLUTION INCREMENTAL ENCODER – RESISTANT AND PROGRAMMABLE

Incremental encoders

**SICK**  
Sensor Intelligence.

# PROGRAMMABLE STAINLESS STEEL ENCODER WITH HIGH RESOLUTION



## Product description

The DFS60 Inox is a high-resolution incremental encoder with a diameter of 60 mm in a stainless-steel design. It offers a large range of mechanical and electrical interfaces and can also be programmed by the customer if desired. The rugged mechanical design, the wide temperature range, and the IP 67

enclosure rating make the DFS60 Inox the ideal encoder for applications in harsh ambient conditions. The wide range of programming options for the electrical parameters is unique on the market. This includes the output signal level, the number of pulses per revolution, and the zero pulse width.

## At a glance

- Housing, flange and shaft made from stainless steel
- Face mount, servo, or square flange
- with solid shaft and blind hollow shaft
- Enclosure rating: IP 67
- High resolution: up to 65,536 pulses
- Connection: radial cable outlet or M12 male connector
- Electrical interfaces: TTL/RS-422, HTL/push-pull, SinCos 1 V<sub>pp</sub>
- Can be optionally programmed by the user: output voltage, number of pulses, zero pulse position and width

## Your benefits

- High resistance to environmental influences due to stainless-steel housing
- IP 67 enclosure rating and shaft sealing ring for optimum tightness
- Simple mounting thanks to compact dimensions, even with limited installation space
- The wide range of mechanical interfaces allows an optimal match between the encoder and the application-specific installation situation
- High resolution up to 16 bits enables applications with demanding requirements for measurement accuracy
- Reduces storage costs and downtimes since customers can program the encoder themselves with programming devices PGT-08-S and PGT-10-Pro
- Programmable zero pulse position simplifies installation



## Additional information

Fields of application . . . . .	3
Detailed technical data . . . . .	3
Type code . . . . .	6
Ordering information . . . . .	7
Dimensional drawings . . . . .	9
PIN assignment . . . . .	13
Maximum revolution range . . . . .	13
Electrical Interfaces . . . . .	14
Accessories . . . . .	16

→ [www.sick.com/DFS60\\_Inox](http://www.sick.com/DFS60_Inox)

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

- Applications with high resistance requirements against aggressive substances such as cleaning agents or salt
- Particularly suitable for use in the food and drink industry, for packaging machines, in medical technology, and in outdoor applications in ports or offshore plants

## Detailed technical data

### Performance

<b>Pulses per revolution</b>	HTL/TTL	1 ... 65,536 <sup>1)</sup>
	Sin/Cos 1.0 V <sub>PP</sub>	1,024
<b>Measuring step</b>	90° / electric/pulses per revolution	
<b>Measuring step deviation at non binary number of lines</b>	Pulses 1 ... 99	± 0.04°
	Pulses 100 ... 10,000	± 0.008°
	Pulses > 10,000	± 0.002°
<b>Measuring step deviation at binary number of lines</b>	Pulses 1 ... 64	± 0.03°
	Pulses 128 ... 8,192	± 0.008°
	Pulses 16,384 ... 65,536	± 0.0015°
<b>Error limits</b>	± 0.03°	

<sup>1)</sup> See maximum revolution range.

### Electrical data

<b>Electrical interface</b>	4.5 V ... 5.5 V, TTL/RS422	
	10 V ... 32 V, TTL/RS422	
	10 V ... 32 V, HTL/Push pull	
	4.5 V ... 5.5 V, Sin/Cos 1.0 V <sub>PP</sub>	
	4.5 V ... 32 V, TTL/RS422, 0-SET	
	4.5 V ... 32 V, HTL/Push pull, 0-SET	
	4.5 V ... 32 V, TTL/HTL programmable	
	4.5 V ... 32 V, TTL/HTL programmable, 0-SET	
<b>Initialisation time after power on</b>	4.5 V ... 5.5 V, TTL/RS422	40 ms
	10 V ... 32 V, TTL/RS422	40 ms
	10 V ... 32 V, HTL/Push pull	40 ms
	4.5 V ... 5.5 V, Sin/Cos 1.0 V <sub>PP</sub>	40 ms
	4.5 V ... 32 V, TTL/RS422, 0-SET	30 ms
	4.5 V ... 32 V, HTL/Push pull, 0-SET	30 ms
	4.5 V ... 32 V, TTL/HTL programmable	32 ms <sup>1)</sup> 30 ms
	4.5 V ... 32 V, TTL/HTL programmable, 0-SET	32 ms <sup>1)</sup> 30 ms

<sup>1)</sup> With mechanical zero pulse width.

<sup>2)</sup> Only with devices with M12 connector in connection with electrical interfaces M, V and W.

<sup>3)</sup> Short-circuit opposite to another channel, US or GND permissible for maximum 30 s.

<sup>4)</sup> Short-circuit opposite to another channel or GND permissible for maximum 30 s.

<sup>5)</sup> Programming TTL with ≥ 5,5 V: short-circuit opposite to another channel or GND permissible for maximum 30 s.

<sup>6)</sup> Programming HTL or TTL with < 5,5 V: short-circuit opposite to another channel, US or GND permissible for maximum 30 s.

<sup>7)</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.

<b>0-SET function</b>	H-active (L = 0 - 3 V, H = 4.0 - Us V) <sup>2)</sup>
<b>Connection type</b>	Male connector M12, 8-pin, radial Cable, 8-wire, radial, 1.5 m Cable, 8-wire, radial, 3 m Cable, 8-wire, radial, 5 m Cable, 8-wire, radial, 10 m Male Connector M12, 12-pin, radial Cable, 12-wire, radial, 1.5 m Cable, 12-wire, radial, 3 m Cable, 12-wire, radial, 5 m Cable, 12-wire, radial, 10 m
<b>Operating power consumption (no load)</b>	40 mA
<b>Power consumption max. without load</b>	
4.5 V ... 5.5 V, TTL/RS422	0.5 W
10 V ... 32 V, TTL/RS422	0.5 W
10 V ... 32 V, HTL/Push pull	0.5 W
4.5 V ... 32 V, TTL/RS422, 0-SET	0.7 W
4.5 V ... 32 V, HTL/Push pull, 0-SET	0.7 W
4.5 V ... 32 V, TTL/HTL programmable	0.7 W
4.5 V ... 32 V, TTL/HTL programmable, 0-SET	0.7 W
<b>Load resistance</b>	≥ 120 Ω
<b>Load current max.</b>	≤ 30 mA
<b>Maximum output frequency</b>	
TTL/RS422	820 kHz
HTL/Push pull	820 kHz
Sin/Cos 1.0 V <sub>PP</sub>	200 kHz
TTL/RS422, 0-SET	820 kHz
HTL/Push pull, 0-SET	820 kHz
TTL/HTL programmable	820 kHz
TTL/HTL programmable, 0-SET	820 kHz
<b>Reference signal, number</b>	1
<b>Reference signal, position</b>	90°, electric, logically gated with A and B 90°, electric, logically gated with Sinus and Cosinus
<b>Reverse polarity protection</b>	✓
<b>Short-circuit protection of the outputs</b>	
4.5 V ... 5.5 V, TTL/RS422	✓ <sup>3)</sup>
10 V ... 32 V, TTL/RS422	✓ <sup>4)</sup>
10 V ... 32 V, HTL/Push pull	✓ <sup>3)</sup>
4.5 V ... 5.5 V, Sin/Cos 1.0 V <sub>PP</sub>	✓ <sup>3)</sup>
4.5 V ... 32 V, TTL/RS422, 0-SET	✓ <sup>4)</sup>
4.5 V ... 32 V, HTL/Push pull, 0-SET	✓ <sup>3)</sup>
4.5 V ... 32 V, TTL/HTL programmable	✓ <sup>5) 6)</sup>
4.5 V ... 32 V, TTL/HTL programmable, 0-SET	✓ <sup>5) 6)</sup>

<sup>1)</sup> With mechanical zero pulse width.

<sup>2)</sup> Only with devices with M12 connector in connection with electrical interfaces M, V and W.

<sup>3)</sup> Short-circuit opposite to another channel, US or GND permissible for maximum 30 s.

<sup>4)</sup> Short-circuit opposite to another channel or GND permissible for maximum 30 s.

<sup>5)</sup> Programming TTL with ≥ 5,5 V: short-circuit opposite to another channel or GND permissible for maximum 30 s.

<sup>6)</sup> Programming HTL or TTL with < 5,5 V: short-circuit opposite to another channel, US or GND permissible for maximum 30 s.

<sup>7)</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.

**MTTFd: mean time to dangerous failure** 300 years (EN ISO 13849-1) <sup>7)</sup>

<sup>1)</sup> With mechanical zero pulse width.

<sup>2)</sup> Only with devices with M12 connector in connection with electrical interfaces M, V and W.

<sup>3)</sup> Short-circuit opposite to another channel, US or GND permissible for maximum 30 s.

<sup>4)</sup> Short-circuit opposite to another channel or GND permissible for maximum 30 s.

<sup>5)</sup> Programming TTL with  $\geq 5,5$  V: short-circuit opposite to another channel or GND permissible for maximum 30 s.

<sup>6)</sup> Programming HTL or TTL with  $< 5,5$  V: short-circuit opposite to another channel, US or GND permissible for maximum 30 s.

<sup>7)</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.

## Mechanical data

<b>Mechanical interface</b>	Solid shaft, Servo flange Solid shaft, Face mount flange Solid shaft, Square flange Blind hollow shaft
<b>Shaft diameter</b>	
Solid shaft, Servo flange	6 mm x 10 mm
Solid shaft, Face mount flange	10 mm x 19 mm
Solid shaft, Square flange	10 mm x 19 mm
Blind hollow shaft	8 mm 3/8" 10 mm 12 mm 1/2" 14 mm 15 mm 5/8"
<b>Mass</b>	0.5 kg
<b>Shaft material</b>	Stainless steel
<b>Flange material</b>	Stainless steel
<b>Housing material</b>	Stainless steel
<b>Start up torque</b>	1 Ncm (+20 °C)
<b>Operating torque</b>	0.5 Ncm (+20 °C)
<b>Permissible movement axial static/dynamic</b>	
Blind hollow shaft	$\pm 0.5$ mm, $\pm 0.01$ mm
<b>Permissible movement radial static/dynamic</b>	
Blind hollow shaft	$\pm 0.3$ mm, $\pm 0.05$ mm
<b>Permissible shaft loading radial/axial</b>	
Solid shaft	80 N (radial) 40 N (axial)
<b>Maximum operating speed</b>	
Solid shaft	9,000 /min <sup>1)</sup>
Blind hollow shaft	6,000 /min <sup>1)</sup>
<b>Moment of inertia of the rotor</b>	
Solid shaft	6.2 gcm <sup>2</sup>
Blind hollow shaft	40 gcm <sup>2</sup>
<b>Bearing lifetime</b>	$3.6 \times 10^{10}$ revolutions
<b>Max. angular acceleration</b>	500,000 rad/s <sup>2</sup>

<sup>1)</sup> Self warming of 3.3 K per 1000 revolutions/min when applying note working temperature range.

Ambient data

<b>EMC</b>	4.5 V ... 5.5 V, TTL/RS422	According to EN 61000-6-2 and EN 61000-6-3
	10 V ... 32 V, TTL/RS422	According to EN 61000-6-2 and EN 61000-6-4
	10 V ... 32 V, HTL/Push pull	According to EN 61000-6-2 and EN 61000-6-4
	4.5 V ... 5.5 V, Sin/Cos 1.0 V <sub>PP</sub>	According to EN 61000-6-2 and EN 61000-6-3
	4.5 V ... 32 V, TTL/RS422, 0-SET	According to EN 61000-6-2 and EN 61000-6-3
	4.5 V ... 32 V, HTL/Push pull, 0-SET	According to EN 61000-6-2 and EN 61000-6-3
	4.5 V ... 32 V, TTL/HTL programmable	According to EN 61000-6-2 and EN 61000-6-3
	4.5 V ... 32 V, TTL/HTL programmable, 0-SET	According to EN 61000-6-2 and EN 61000-6-3
<b>Enclosure rating</b>		IP 67, shaft side (according to IEC 60529) IP 67, housing side, connector outlet (according to IEC 60529) <sup>1)</sup> IP 67, housing side, cable outlet (according to IEC 60529)
<b>Permissible relative humidity</b>		90 % (condensation of the optical scanning not permitted)
<b>Working temperature range</b>		-40 °C ... +100 °C <sup>2)</sup> -30 °C ... +100 °C <sup>3)</sup>
<b>Storage temperature range</b>		-40 °C ... +100 °C, without package
<b>Resistance to shocks</b>		100 g, 6 ms (according to EN 60068-2-27)
<b>Resistance to vibration</b>		10 g, 10 Hz ... 2,000 Hz (according to EN 60068-2-6)

<sup>1)</sup> With mating connector fitted.

<sup>2)</sup> Stationary position of the cable.

<sup>3)</sup> Flexible position of the cable.

Type code

Solid shaft

Mechanical design

S	1	Servo flange, solid shaft 6 x 10 mm (via flange adapter)
S	4	Face mount flange, solid shaft 10 x 19 mm
Q	4	Square flange, solid shaft 10 x 19 mm (via flange adapter)

Electrical interface

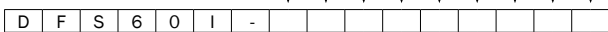
A	4,5 ... 5,5 V, TTL/RS422
C	10 ... 32 V, TTL/RS422
E	10 ... 32 V, HTL/Push Pull
N	4.5 ... 5.5 V, SIN/COS 1.0 VSS (1,024 pulses only)
V	4.5 ... 32 V, TTL/RS422 with 0-set
W	4.5 ... 32 V, HTL/Push Pull with 0-set
P	4,5 ... 32 V, TTL/HTL programmable <sup>1)</sup>
M	4,5 ... 32 V, TTL/HTL programmable, with 0-Set <sup>1)</sup>

Connection type

C	Male Connectoer M12, 8-pin or 12 pin, radial
K	Cable 8-wire or 12-wire, radial 1,5 m
L	Cable 8-wire or 12-wire, radial 3 m
M	Cable 8-wire or 12-wire, radial 5 m
N	Cable 8-wire or 12-wire, radial 10 m

Resolution

Always use 5 digits in clear text



<sup>1)</sup> Factory setting: output level TTL.



Electrical interface	Voltage area	Connection type	Type	Part no.
TTL/HTL programmable	4.5 V ... 32 V	Cable, 8-wire, radial, 1.5 m	DFS60I-S4PK65536	1083970
		Cable, 8-wire, radial, 5 m	DFS60I-S4PM65536	1083969
		Male connector M12, 8-pin, radial	DFS60I-S4PC65536	1083971
TTL/HTL programmable, 0-SET	4.5 V ... 32 V	Connector M12, 12-pin, radial	DFS60I-S4MC65536	1083968

Blind hollow shaft

- **Shaft diameter:** 10 mm
- **Voltage area:** 4.5 V ... 32 V
- **Range of pulses per revolution:** 65,536 (See maximum revolution range.)

Electrical interface	Connection type	Type	Part no.
TTL/HTL programmable	Cable, 8-wire, radial, 1.5 m	DFS60I-BDPK65536	1083943
	Cable, 8-wire, radial, 5 m	DFS60I-BDPM65536	1083942
	Male connector M12, 8-pin, radial	DFS60I-BDPC65536	1083944
TTL/HTL programmable, 0-SET	Connector M12, 12-pin, radial	DFS60I-BDMC65536	1083941

Solid shaft, Square flange

- **Shaft diameter:** 10 mm

Electrical interface	Voltage area	Connection type	Range of pulses per revolution	Type	Part no.
TTL/HTL programmable	4.5 V ... 32 V	Cable, 8-wire, radial, 1.5 m	65,536 <sup>1)</sup>	DFS60I-Q4PK65536	1083947
		Cable, 8-wire, radial, 5 m	65,536 <sup>1)</sup>	DFS60I-Q4PM65536	1083946
		Male connector M12, 8-pin, radial	65,536 <sup>1)</sup>	DFS60I-Q4PC65536	1083963
TTL/HTL programmable, 0-SET	4.5 V ... 32 V	Connector M12, 12-pin, radial	65,536 <sup>1)</sup>	DFS60I-Q4MC65536	1083945
TTL/RS422	4.5 V ... 5.5 V	Male connector M12, 8-pin, radial	2,500 <sup>1)</sup>	DFS60I-Q4AC02500	1083393

<sup>1)</sup> See maximum revolution range.

Blind hollow shaft

- **Shaft diameter:** 12 mm

Electrical interface	Voltage area	Connection type	Range of pulses per revolution	Type	Part no.
HTL/Push pull	10 V ... 32 V	Male connector M12, 8-pin, radial	2,500 <sup>1)</sup>	DFS60I-BEEO2500	1082517
TTL/HTL programmable	4.5 V ... 32 V	Cable, 8-wire, radial, 1.5 m	65,536 <sup>1)</sup>	DFS60I-BEPK65536	1083939
		Cable, 8-wire, radial, 5 m	65,536 <sup>1)</sup>	DFS60I-BEPM65536	1083938
		Male connector M12, 8-pin, radial	65,536 <sup>1)</sup>	DFS60I-BEPC65536	1080553
TTL/HTL programmable, 0-SET	4.5 V ... 32 V	Connector M12, 12-pin, radial	65,536 <sup>1)</sup>	DFS60I-BEMC65536	1083937

<sup>1)</sup> See maximum revolution range.

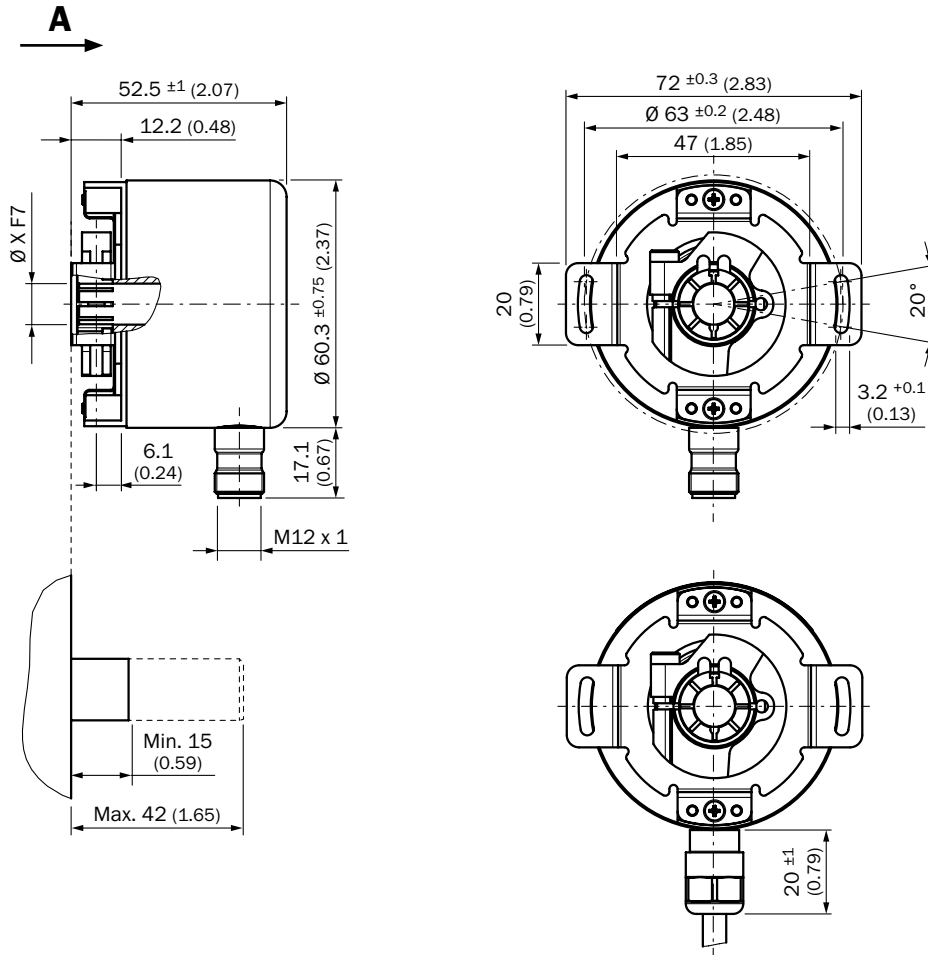






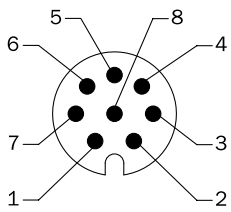


Blind hollow shaft

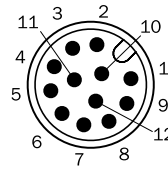


### PIN assignment

View of M12, 8-pin male device connector on encoder



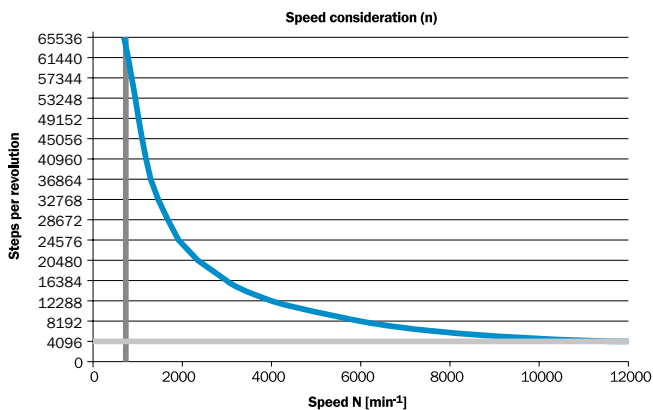
View of M12, 12-pin male device connector on encoder



PIN, 8-pin, M12 male connector	PIN, 12-pin, M12 male connector	Color of the wires for encoders with cable outlet	TTL/HTL signal	Sin/cos 1.0 V <sub>SS</sub>	Explanation
1	7	Brown	$\bar{A}$	COS-	Signal wire
2	6	White	A	COS+	Signal wire
3	9	Black	$\bar{B}$	SIN-	Signal wire
4	8	Pink	B	SIN+	Signal wire
5	4	Yellow	$\bar{Z}$	$\bar{Z}$	Signal wire
6	11	Violet	Z	Z	Signal wire
7	12	Blue	GND	GND	Ground connection of the encoder
8	5	Red	+U <sub>s</sub>	+U <sub>s</sub>	Supply voltage (volt-free to housing)
-	2	-	n.c.	n.c.	Not assigned
-	3	-	n.c.	n.c.	Not assigned
-	1	-	n.c.	n.c.	Not assigned
-	10 <sup>1)</sup>	-	0-SET <sup>1)</sup>	n.c.	Set zero pulse <sup>1)</sup>
Screen	Screen	Screen	Screen	Screen	Screen connected to housing on encoder side. Connected to ground on control side.

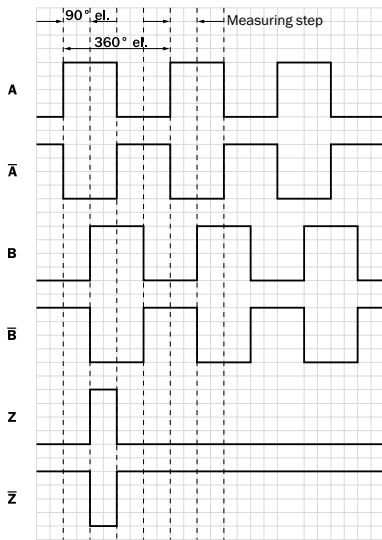
<sup>1)</sup> For electrical interfaces only: M, V, W with 0-SET function on PIN 10 on M12 male connector. The 0-SET input is used to set the zero pulse on the current shaft position. If the 0-SET input is connected to U<sub>s</sub> for longer than 250 ms after it had previously been unassigned for at least 1,000 ms or had been connected to the GND, the current position of the shaft is assigned to the zero pulse signal "Z".

### Maximum revolution range



Electrical Interfaces

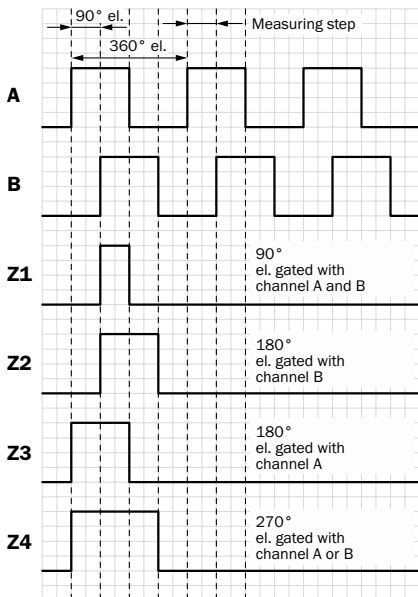
Signal outputs for electrical interfaces TTL and HTL



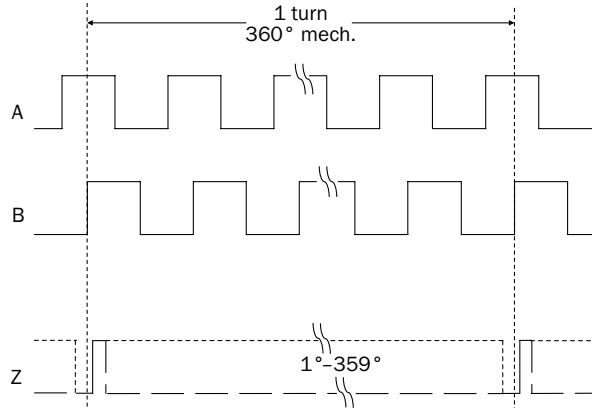
Supply voltage	Output
4.5 ... 5.5 V	TTL
10 ... 32 V	TTL
10 ... 32 V	HTL

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

Electrical zero pulse width 90°, 180° or 270°, programmable Width of the zero pulse in relation to a pulse period.



Mechanical zero pulse width 1° to 359°, programmable Width of the zero pulse in relation to a mechanical revolution of the shaft.



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

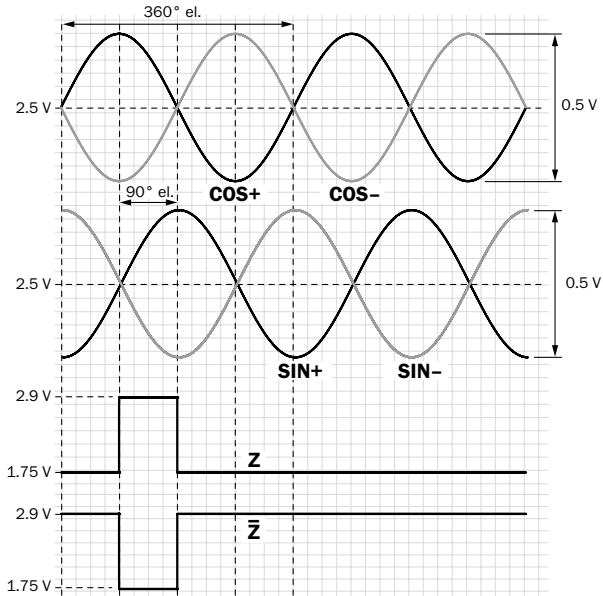
Supply voltage	Output
4.5 ... 32 V	HTL/TTL programmable

Electrical interfaces sin/cos 1.0 V<sub>SS</sub>

Supply voltage	Output
4.5 ... 5.5 V	Sin/cos 1.0 V <sub>SS</sub>

Signals **before** difference at 120 Ω load and U<sub>S</sub> = 5 V

**Signal diagram for clockwise shaft rotation, looking in direction “A” (shaft)**

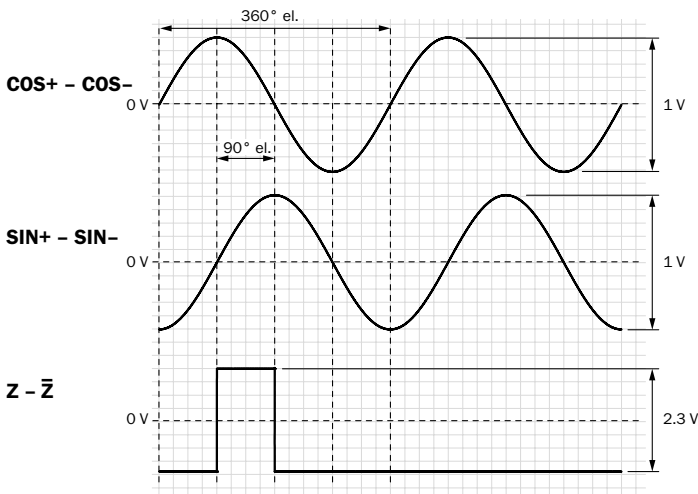


Interface signals Sin+, SIN-, COS+, COS-	Signals before difference at 120 Ω load	Signal offset
Differential analog	0.5 V <sub>SS</sub> ± 20%	2.5 V ± 10%

Interface signals Z, Z̄	Signals before difference at 120 Ω load
Digital, differential	Low: 1.75 V ± 15%; High: 2.9 V ± 15%

Signals **after** difference at 120 Ω load and U<sub>S</sub> = 5 V

**Signal diagram for clockwise shaft rotation, looking in direction “A” (shaft)**





Accessories

Mounting systems

Flanges

Bearing blocks

Figure	Brief description	Type	Part no.
	Bearing bracket for face mount flange and servo flange encoder. The Heavy Duty Bearing Block is intended for very large radial and axial shaft loads. Particularly for application on: Belt pulleys, Chain pinions, Friction wheels. The Bearing Block is suitable for mounting to Encoders with Servoflange.	BEF-FA-LB1210	2044591
	Bearing bracket for hollow shaft encoders, fastening screws included the Bearing Block is intended for very large radial and axial shaft loads. Particularly for application on: Belt pulleys, Chain pinions, Friction wheels. It is designed this way to enable fitting of encoder with blind hollow shaft with $\varnothing$ 12 mm., fastening screws included	BEF-FA-B12-010	2042728

Dimensional drawings → [page 22](#)


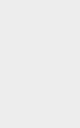

Flange plates

Figure	Brief description	Type	Part no.
	Flange adapter, adaption of 36 mm spigot face mount flange to 58 mm square installation plate with shock-absorber, Aluminum	BEF-FA-036-060RSA	2029163
	Standard stator coupling	BEF-DS00XFX	2056812

Dimensional drawings → [page 22](#)

Mounting brackets and mounting plates

Mounting brackets

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with spigot 36 mm for face mount flange, mounting kit included	BEF-WF-36	2029164
	Mounting kit for servo flange encoder on bearing block, 1 cross-slotted coupling SKPS 1520 06/06 1 hexagon socket wrench SW1.5 DIN 911, 3 mounting eccentric BEMN 1242 49 3 screws M4 x 10 DIN 912, 1 hexagon socket wrench SW3 DIN 911, 1 bar coupling SKPS 1520 06/06 1 hexagon socket wrench SW1.5 DIN 911, 3 mounting eccentric BEMN 1242 49 3 screws M4 x 10 DIN 912, 1 hexagon socket wrench SW3 DIN 911	BEF-MK-LB	5320872
	Mounting angle spring-loaded, for flange with centerring collar 36 mm, working temperature range $-40^{\circ}$ ... $+120^{\circ}$ C, Aluminum	BEF-WF36F	4084775

Dimensional drawings → [page 23](#)



## Other mounting accessories

## Measuring wheels and measuring wheel systems

















Figure	Brief description	Type	Part no.
	Aluminium measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 200 mm	BEF-MR010020R	2055224
	Aluminium measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278
	Aluminium Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 500 mm	BEF-MR010050R	2055227
	Aluminium measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
	Aluminium measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	Aluminium measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 500 mm	BEF-MR006050R	2055225
	Aluminum measuring wheel with cross-knurled surface for 10 mm solid shaft, circumference 200 mm	BEF-MR10200AK	4084737
	Aluminum measuring wheel with cross-knurled surface for 10 mm solid shaft, circumference 500 mm	BEF-MR10500AK	4084733
	Aluminum measuring wheel with cross-knurled surface for 6 mm solid shaft, circumference 200 mm	BEF-MR06200AK	4084745
	Aluminum measuring wheel with ridged polyurethane surface for 10 mm solid shaft, circumference 200 mm	BEF-MR10200APG	4084740
	Aluminum measuring wheel with ridged polyurethane surface for 10 mm solid shaft, circumference 500 mm	BEF-MR10500APG	4084736
	Aluminum measuring wheel with ridged polyurethane surface for 6 mm solid shaft, circumference 200 mm	BEF-MR06200APG	4084748
	Aluminum measuring wheel with smooth polyurethane surface for 10 mm solid shaft, circumference 200 mm	BEF-MR10200AP	4084738
	Aluminum measuring wheel with smooth polyurethane surface for 10 mm solid shaft, circumference 500 mm	BEF-MR10500AP	4084734
	Aluminum measuring wheel with smooth polyurethane surface for 6 mm solid shaft, circumference 200 mm	BEF-MR06200AP	4084746
	Aluminum measuring wheel with studded polyurethane surface for 10 mm solid shaft, circumference 200 mm	BEF-MR10200APN	4084739
	Aluminum measuring wheel with studded polyurethane surface for 10 mm solid shaft, circumference 500 mm	BEF-MR10500APN	4084735
	Aluminum measuring wheel with studded polyurethane surface for 6 mm solid shaft, circumference 200 mm	BEF-MR06200APN	4084747
	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
	Plastic measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678
	Plastic measuring wheel with smooth plastic surface (Hytrel), for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989

Figure	Brief description	Type	Part no.
	Plastic measuring wheel with smooth plastic surface (Hytrel), for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988


Dimensional drawings → [page 24](#)

#### Modular measuring wheel system

Figure	Brief description	Type	Part no.
	Measuring wheel System for face mount flange mechanical design S4 (solid shaft 10 x19 mm), e.g. DFS60-S4	BEF-MRS-10-U	2085714



Dimensional drawings → [page 25](#)

#### Mounting bells

Figure	Brief description	Type	Part no.
	Mounting bell for encoder with servo flange, 50 mm spigot, mounting kit included	BEF-MG-50	5312987

Dimensional drawings → [page 25](#)

#### Servo clamps

Figure	Brief description	Type	Part no.
	Half-shell servo clamp (2 pcs) for servo flange with 50 mm spigot	BEF-WG-SF050	2029165
	Servo clamps, large, for servo flange (clamping claws, mounting eccentric), 3 pcs, without mounting hardware, without mounting hardware	BEF-WK-SF	2029166

Dimensional drawings → [page 25](#)

#### Shaft adaptation

##### Collets and clamping rings





Figure	Brief description	Type	Part no.
	Collet metal for hollow shaft, shaft diameter 1/2" (12.7 mm), outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-12Z-M	2076225
	Collet metal for hollow shaft, shaft diameter 10 mm, outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-010-M	2076220
	Collet metal for hollow shaft, shaft diameter 12 mm, outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-012-M	2076221
	Collet metal for hollow shaft, shaft diameter 14 mm, outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-014-M	2076222
	Collet metal for hollow shaft, shaft diameter 3/8" (9.525 mm), outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-38Z-M	2076224
	Collet metal for hollow shaft, shaft diameter 8 mm, outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-008-M	2076219
	Collet plastic insulated for hollow shaft, shaft diameter 1/2" (12.7 mm), outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-12Z-P	2076227
	Collet metal for hollow shaft, shaft diameter 15 mm, outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-015-M	2076223

Figure	Brief description	Type	Part no.
	Collet plastic insulated for hollow shaft, shaft diameter 10 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-010-P	2076230
	Collet plastic insulated for hollow shaft, shaft diameter 12 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-012-P	2076231
	Collet plastic insulated for hollow shaft, shaft diameter 3/8" (9.525 mm), outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-38Z-P	2076226
	Collet plastic insulated for hollow shaft, shaft diameter 6 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-006-P	2076228
	Collet plastic insulated for hollow shaft, shaft diameter 8 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-008-P	2076229
	Collet plastic insulated for hollow shaft, shaft diameter 14 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-014-P	2076232
	Collet plastic insulated for hollow shaft, shaft diameter 15 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-015-P	2076233
	Insulating sleeve 10 x 12 PEEK	PEEK CONDUCTOR INSULATION	2064571
	Insulating sleeve 12 x 14 PEEK	PEEK CONDUCTOR INSULATION	2064573
	Insulating sleeve 12.7 x 15 PEEK	PEEK CONDUCTOR INSULATION	2064572
	Insulating sleeve 8 x 10 PEEK	PEEK CONDUCTOR INSULATION	2065642
	Insulating sleeve PEEK for XFX60 (external diameter 12.7 mm, internal diameter 11 mm) ¶	PEEK CONDUCTOR INSULATION	2077319

Dimensional drawings → [page 26](#)

Shaft couplings





Figure	Brief description	Type	Part no.
	Bar coupling, shaft diameter 10 mm / 10 mm, max. shaft offset: radial ± 0.3 mm, axial ± 0.3 mm, angular ± 3°, max. speed 10,000 rpm, -10° to +80 °C, max. torque 80 Ncm; material: fiber-glass reinforced polyamide, aluminum hub	KUP-1010-S	2056408
	Bar coupling, shaft diameter 6 mm / 10 mm, max. shaft offset: radial ± 0,3 mm, axial ± 0,3 mm, angular ± 3°; max. speed 10.000 rpm, -10° to +80 °C, max. torque: 80 Ncm, material: fiber-glass reinforced polyamide, aluminum hub	KUP-0610-S	2056407
	Bar coupling, shaft diameter 6 mm / 6 mm, max. shaft offset: radial ± 0.3 mm, axial ± 0.3 mm, angular ± 3°; max. speed 10,000 rpm, -10° to +80 °C, max. torque 80 Ncm; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0606-S	2056406
	Bar coupling, shaft diameter 6 mm / 8 mm, max. shaft offset: radial ± 0,3 mm, axial ± 0,3 mm, angular ± 3°; max. speed 10.000 rpm, -10° to +80 °C, max. torque: 80 Ncm, material: fiber-glass reinforced polyamide, aluminum hub	KUP-0608-S	5314179
	Bar coupling, shaft diameter 8 mm / 10 mm, max. shaft offset: radial ± 0,3 mm, axial ± 0,3 mm, angular ± 3°; max. speed 10.000 rpm, -10° to +80 °C, max. torque: 80 Ncm, material: fiber-glass reinforced polyamide, aluminum hub	KUP-0810-S	5314178
	Bellows coupling, shaft diameter 10 mm / 10 mm, Maximum shaft offset: radial +/- 0.25 mm, axial +/- 0.4 mm, angular +/- 4°; max. speed 10,000 rpm, -30° to +120 °C, max. torque 120 Ncm; material: stainless steel bellows, aluminum hub	KUP-1010-B	5312983
	Bellows coupling, shaft diameter 10 mm / 12 mm, Maximum shaft offset: radial +/- 0.25 mm, axial +/- 0.4 mm, angular +/- 4°; max. speed 10,000 rpm, -30° to +120 °C, max. torque 120 Ncm; material: stainless steel bellows, aluminum hub	KUP-1012-B	5312984
	Bellows coupling, shaft diameter 6 mm / 10 mm, Maximum shaft offset: radial +/- 0.25 mm, axial +/- 0.4 mm, angular +/- 4°; max. speed 10,000 rpm, -30° to +120 °C, max. torque 120 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	Bellows coupling, shaft diameter 6 mm / 6 mm, Maximum shaft offset: radial +/- 0.25 mm, axial +/- 0.4 mm, angular +/- 4°; max. speed 10,000 rpm, -30° to +120 °C, max. torque 120 Ncm; material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981




Figure	Brief description	Type	Part no.
	Double loop coupling, shaft diameter 10 mm / 10 mm, Maximum shaft offset: radial +/- 2.5 mm, axial +/- 3 mm, angular +/- 10°; max. speed 3,000 rpm, -30° to +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-1010-D	5326703
	Double loop coupling, shaft diameter 10 mm / 12 mm, Maximum shaft offset: radial +/- 2.5 mm, axial +/- 3 mm, angular +/- 10°; max. speed 3,000 rpm, -30° to +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-1012-D	5326702
	Double loop coupling, shaft diameter 6 mm / 10 mm, max. shaft offset: radially +/- 2,5 mm, axially +/-3 mm, angle +/- 10 degrees;max. speed 3.000 rpm, -30 to +80 degrees Celsius, torsional spring stiffness of 25 Nm/rad	KUP-0610-D	5326697
	Double loop coupling, shaft diameter 8 mm / 10 mm, max. shaft offset: radially +/- 0,25 mm, axially +/-0,4 mm, angle +/- 4 degrees;max. speed 10.000 rpm, -30 to +120 degrees Celsius, torsional spring stiffness of 150 Nm/rad	KUP-0810-D	5326704
	Spring washer coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset, radial ± 0.3 mm, axial ± 0.4 mm, angle ± 2.5°, torsion spring stiffness 30 Nm/rad; material: aluminum flange, glass-fiber reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986
	Spring washer coupling, shaft diameter 6 mm / 10 mm, Maximum shaft offset: radial +/- 0.3 mm, axial +/- 0.4 mm, angular +/- 2.5°; max. speed 12,000 rpm, -10° to +80 °C, max. torque 60 Ncm; material: aluminum flange, glass fiber-reinforced polyamide membrane and hardened steel coupling pin	KUP-0610-F	5312985

Dimensional drawings → page 27




## Connection systems

Plug connectors and cables

Cables (ready to assemble)



Figure	Brief description	Type	Part no.
	Head A: cable Head B: cable Cable: SSI, drag chain use, 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: SSI, drag chain use, 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: SSI, drag chain use, 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, UV and saltwater-resistant	LTG-2612-MW	6028516

Connecting cables with female connector


Figure	Brief description	Cable length	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: cable Cable: drag chain use, PUR, halogen-free, shielded, 4 x 2 x 0.25 mm <sup>2</sup> , Ø 7 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, M12, 12-pin, straight, A-coded Head B: cable Cable: SSI, PUR, shielded, 12 x 0.14 mm <sup>2</sup> , Ø 8.5 mm	2 m	DOL-1212-G02MAC1	6053273
		5 m	DOL-1212-G05MAC1	6053274
		10 m	DOL-1212-G10MAC1	6053275
		20 m	DOL-1212-G20MAC1	6053276
	Head A: female connector, M12, 12-pin, angled, A-coded Head B: cable Cable: SSI, PUR, shielded, 12 x 0.14 mm <sup>2</sup> , Ø 8.5 mm	2 m	DOL-1212-W02MAC1	6039824
		5 m	DOL-1212-G05MAC1	6053274
		10 m	DOL-1212-G10MAC1	6039826
		20 m	DOL-1212-W20MAC1	6039827

Dimensional drawings → page 28

Connection cables with female connector and male connector

Figure	Brief description	Cable length	Type	Part no.
	Head A: female connector, plug-in system, 8-pin, straight Head B: male connector, D-Sub, 9-pin, straight Cable: Incremental, PVC, shielded	0.5 m	DSL-0D08-G0M5AC3	2061739
	Head A: female connector, M12, 8-pin, straight Head B: male connector, D-Sub, 9-pin, straight Cable: Incremental, shielded, 4 x 2 x 0.08 mm <sup>2</sup>	0.5 m	DSL-2D08-G0M5AC2	2048439
	Head A: female connector, M12, 12-pin, straight Head B: male connector, D-Sub, 9-pin, straight Cable: SSI + incremental, SSI + Sin/Cos, Incremental, shielded, 12 x 0.14 mm <sup>2</sup> , 8.5 mm	0.5 m	DSL-2D12-G0M5AC4	2088790

Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 8-pin, straight, A-coded Head B: - Cable: Incremental, SSI, shielded, CAT5, CAT5e	DOS-1208-GA01	6045001

Dimensional drawings → [page 28](#)



Male connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: male connector, M12, 8-pin, straight, A-coded Head B: - Cable: Incremental, shielded, CAT5, CAT5e	STE-1208-GA01	6044892
	Head A: male connector, M23, 12-pin, straight Head B: - Cable: HIPERFACE®, SSI, Incremental, RS-422, shielded	STE-2312-G	6027537
	Head A: male connector, M23, 12-pin, straight Head B: - Cable: HIPERFACE®, SSI, Incremental, PBT UL 94-V0, shielded	STE-2312-G01	2077273

Dimensional drawings → [page 28](#)

Further accessories

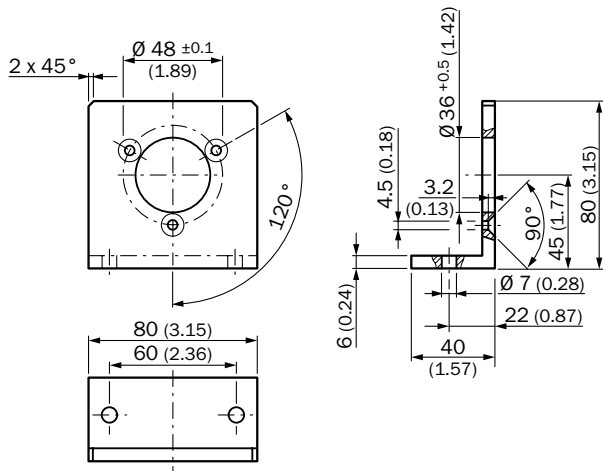
Programming and configuration tools

Figure	Brief description	Type	Part no.
	Programming Tool USB for programmable SICK encoders DFS60, VFS60, DFV60, AFS/AFM60 SSI, AFM60 SSI+Incremental, AFM60 SSI+Sin/Cos, AHS/AHM36 SSI and wire draw encoders with programmable DFS60, AFS/AFM60 SSI and AHS/AHM36 SSI.	PGT-08-S	1036616
	Display Programming Tool for programmable SICK encoders DFS60, DFV60, AFS/AFM60, AHS/AHM36 and wire draw encoders with DFS60, AFS/AFM60 and AHS/AHM36. Compact dimensions, low weight and intuitive to use.	PGT-10-Pro	1072254

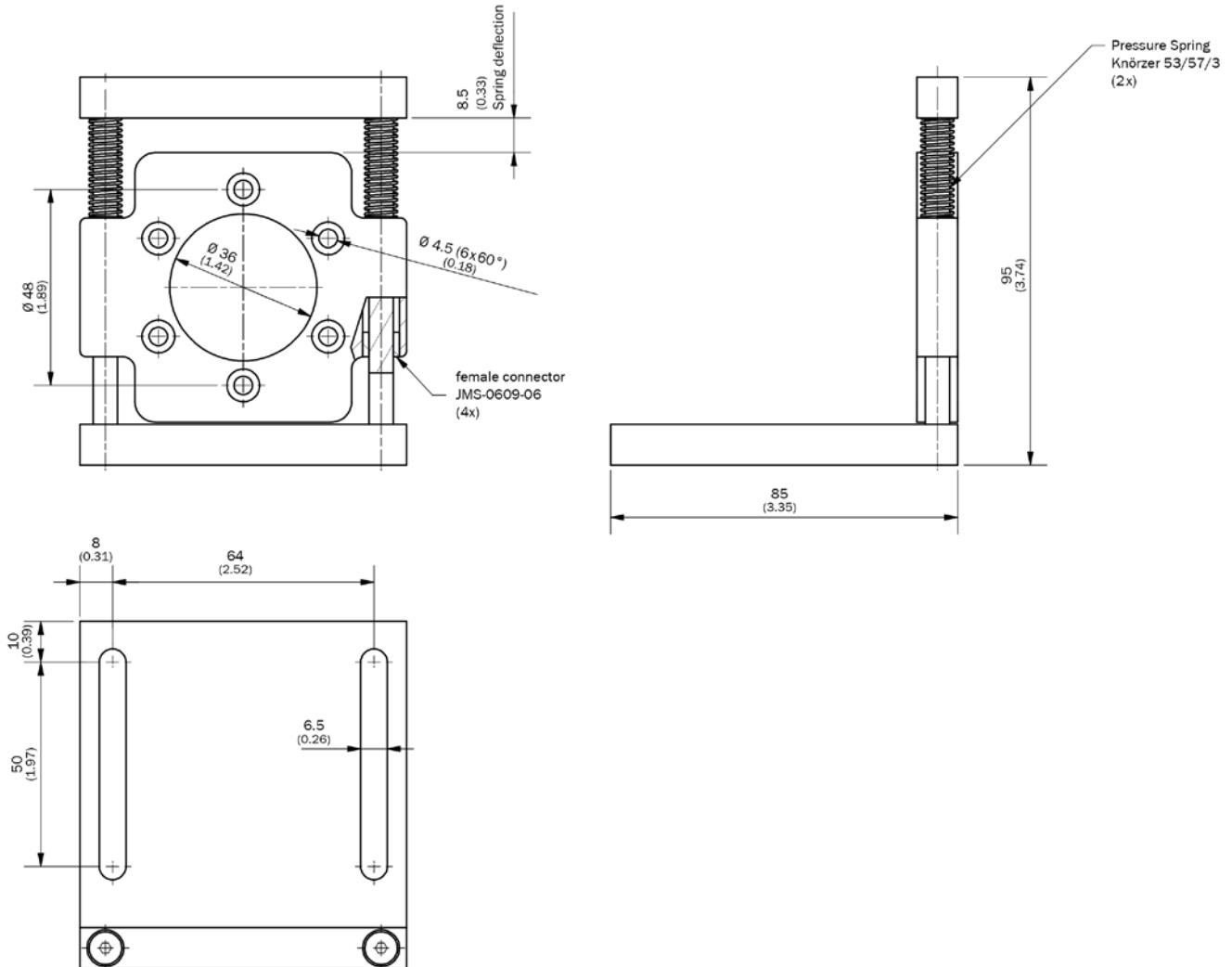


Mounting brackets and mounting plates

BEF-WF-36

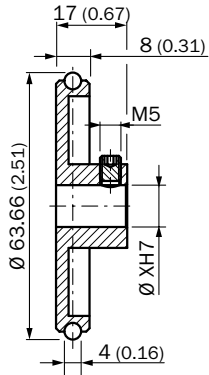


BEF-WF36F

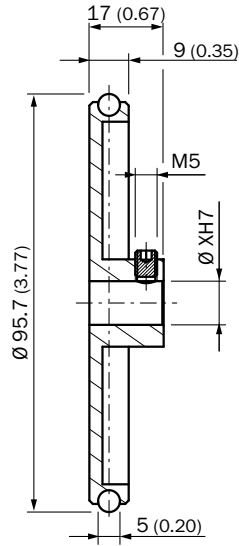


Other mounting accessories

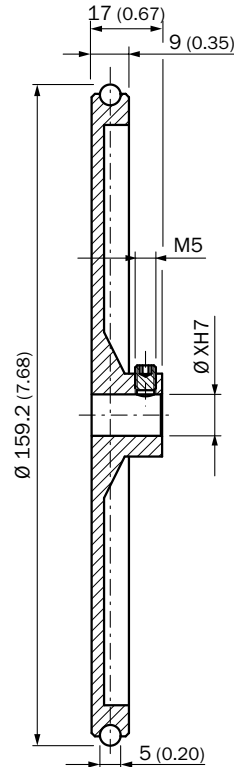
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BEF-MR006020R



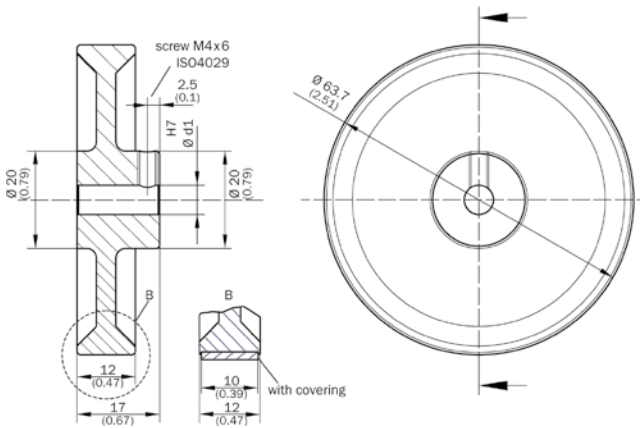
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BEF-MR006030R



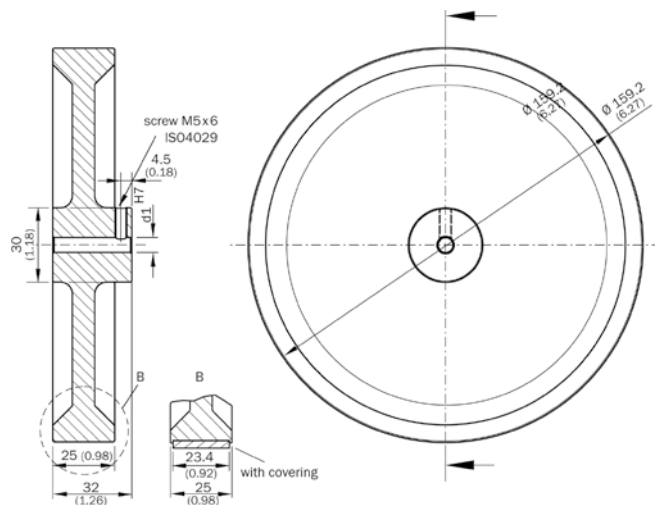
BEF-MR006050R  
BEF-MR010050R



BEF-MR10200AK, BEF-MR06200AK, BEF-MR10200APG,  
BEF-MR06200APG, BEF-MR10200AP, BEF-MR06200AP, BEF-  
MR10200APN, BEF-MR06200APN

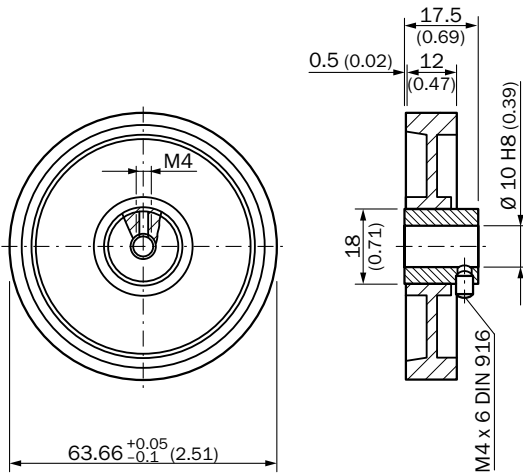


BEF-MR10500AK  
BEF-MR10500APG  
BEF-MR10500AP  
BEF-MR10500APN

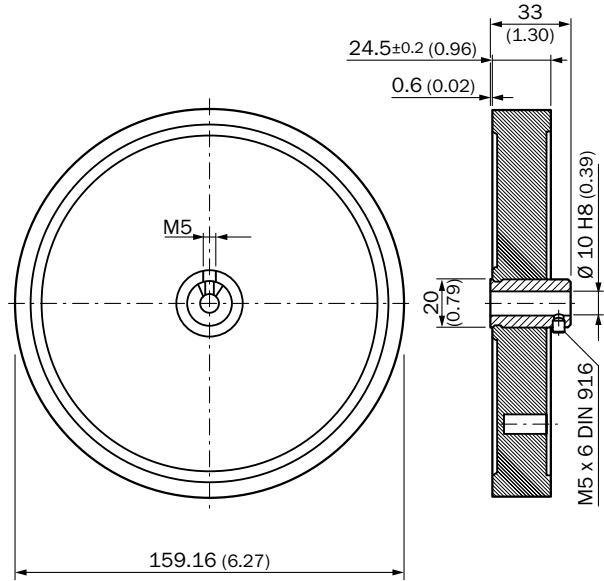




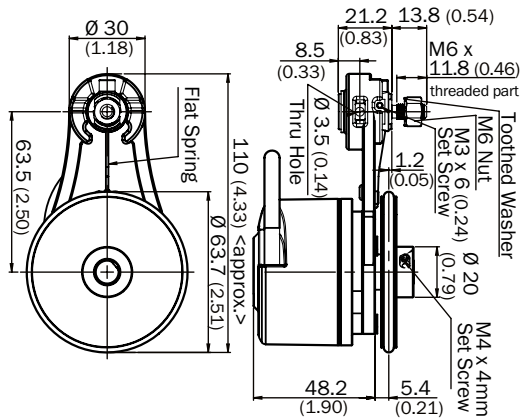
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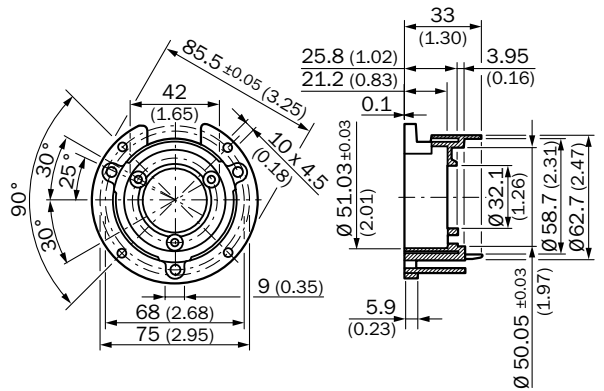
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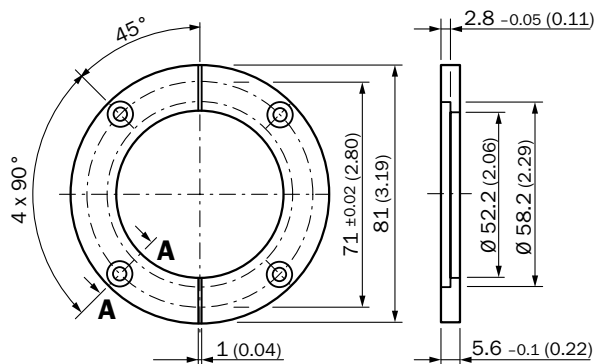
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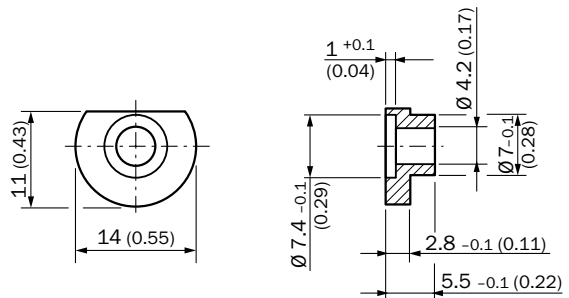
BEF-MG-50



BEF-WG-SF050

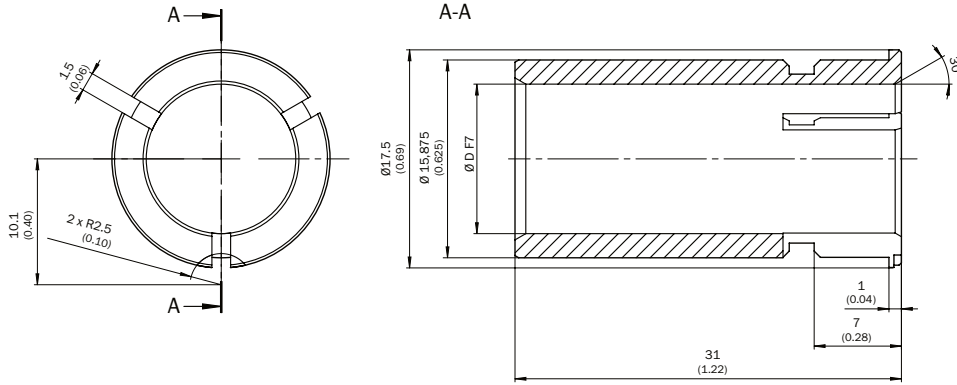


BEF-WK-SF



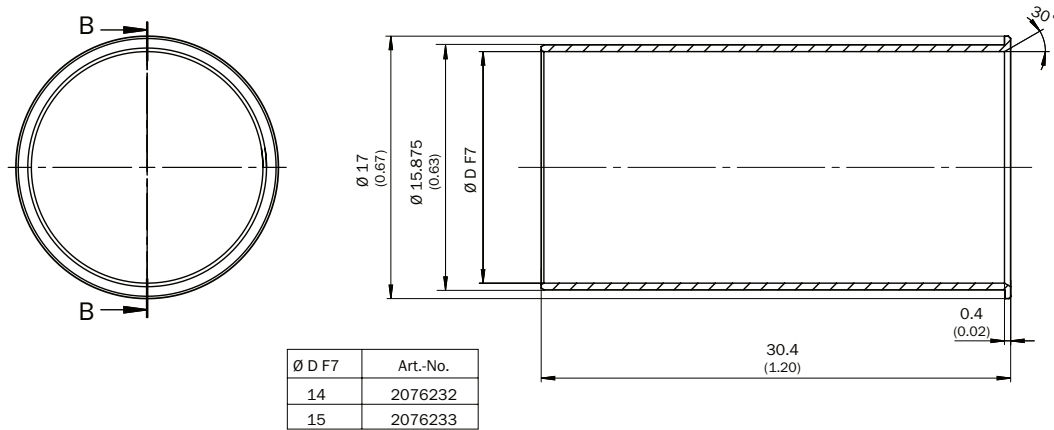
Shaft adaptation

SPZ-58Z-xxx-M



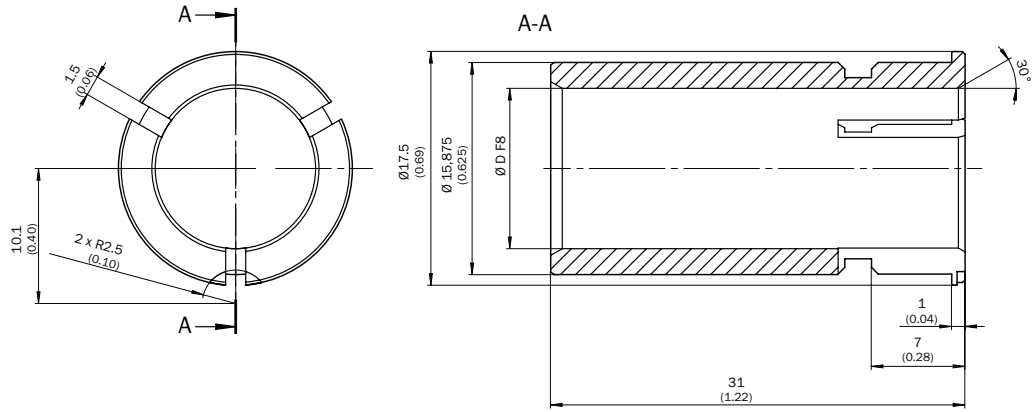
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12	2076221
1/2" (12.7)	2076225
14	2076222

SPZ-58Z-015-M



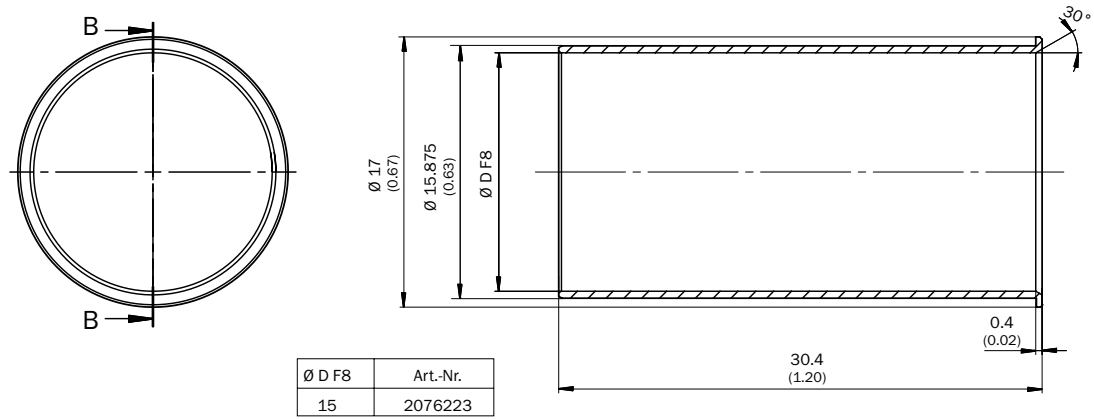
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SPZ-58Z-xxx-P



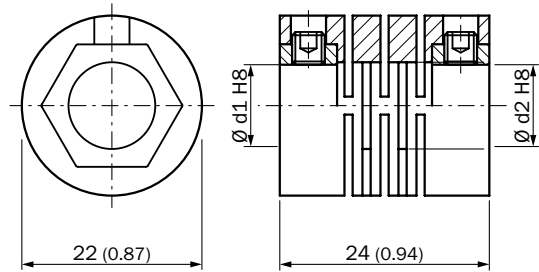
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1/2" (12.7)	2076227

SPZ-58Z-014-P  
SPZ-58Z-015-P

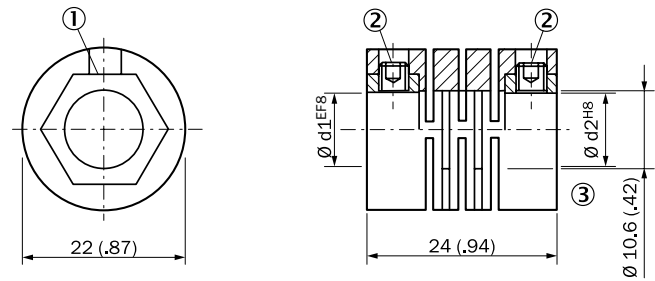


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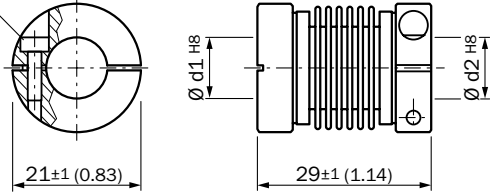


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KUP-0810-S

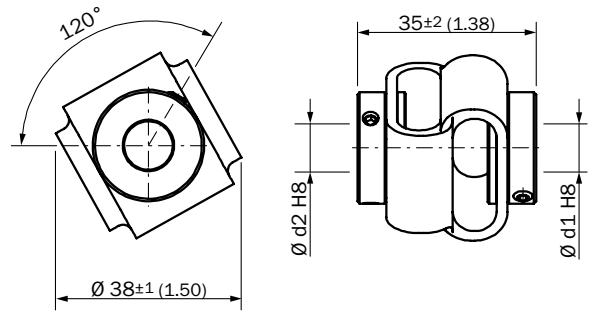


KUP-xxxx-B

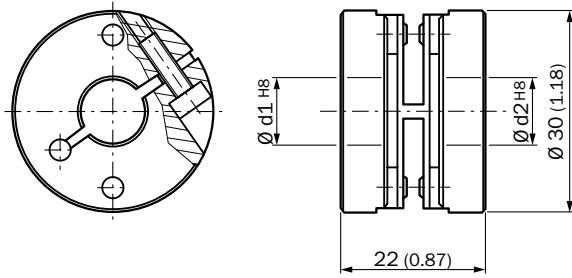
Cheese-head screw  
M2.5 x 8, DIN 912 A2



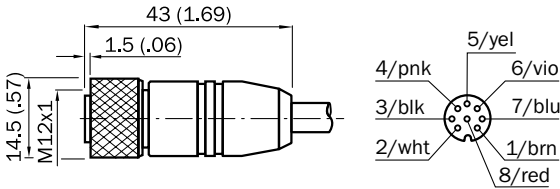
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KUP-1010-F  
KUP-0610-F

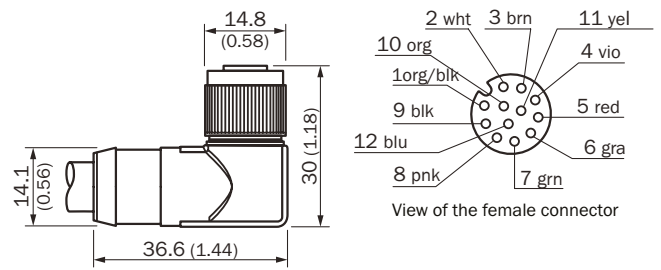


DOL-1208-GxxMAC1

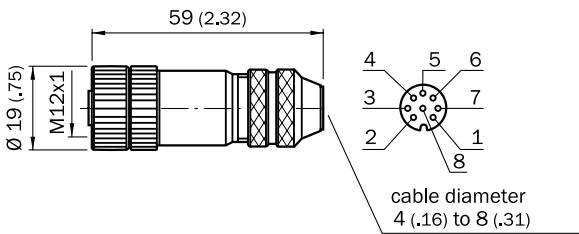


All dimensions in mm (inch)

DOL-1212-WxxMAC1

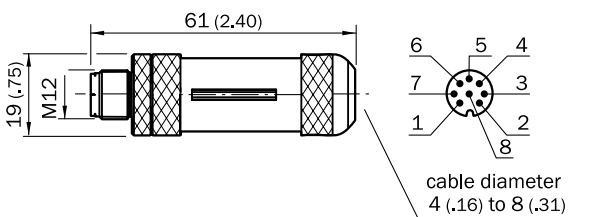


DOS-1208-GA01



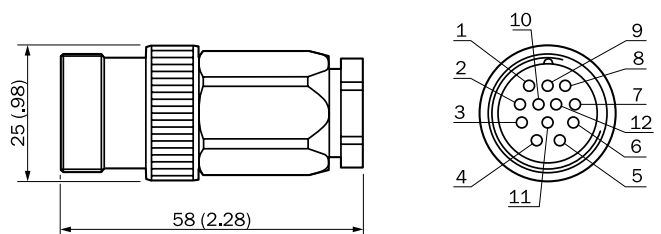
cable diameter  
4 (.16) to 8 (.31)

STE-1208-GA01

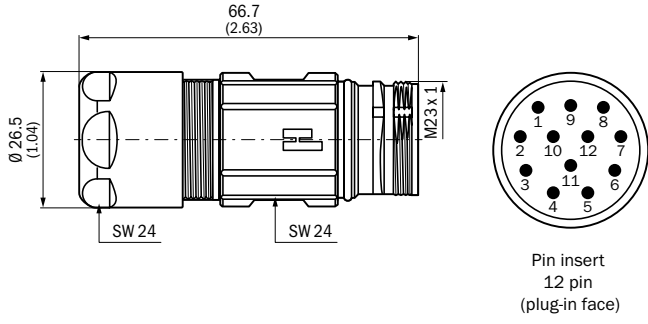


cable diameter  
4 (.16) to 8 (.31)

STE-2312-G



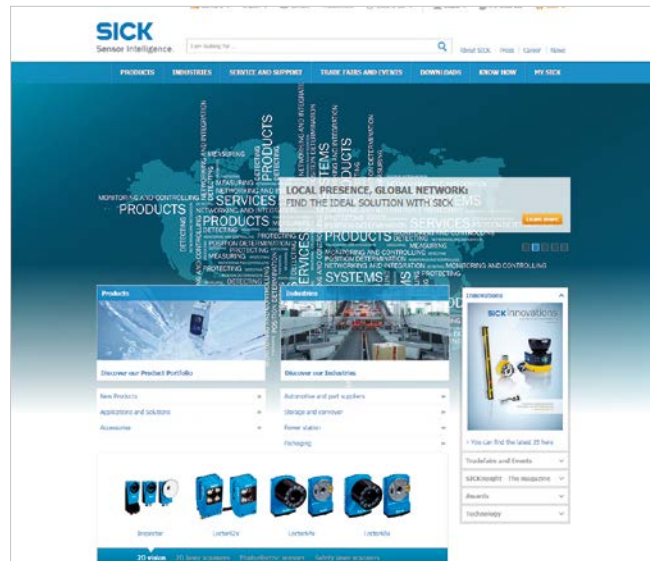
STE-2312-G01





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