



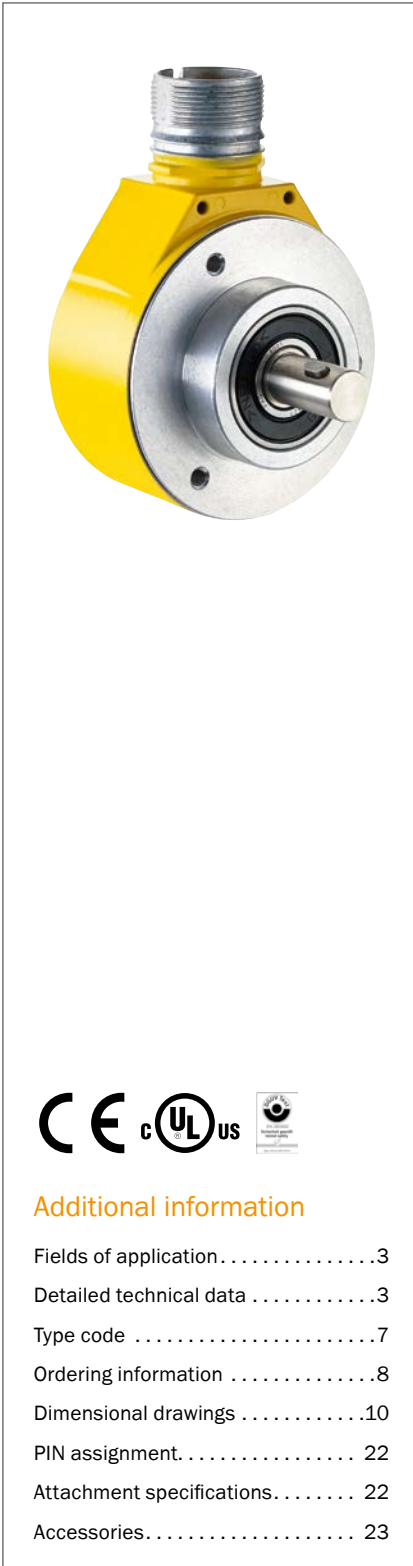
AFS/AFM60S Pro

SAFE, EASY, FLEXIBLE:
ENCODERS FOR SAFE POSITIONING.

Safety encoders

SICK
Sensor Intelligence.

SAFE, EASY, FLEXIBLE: ENCODERS FOR SAFE POSITIONING



Product description

The AFS/AFM60S Pro is an absolute encoder for functional safety. It fulfills very strict test criteria and is a certified safety product up to SIL3/PL e. The absolute encoder supports the safety functions in accordance with IEC 61800-5-2 and impresses in particular with its safe positioning function. Thanks to the high enclosure rating and large temperature range, the AFS/AFM60S Pro can be

used in harsh environments. With its SSI and sin/cos interface, it can be easily integrated into a range of different controls. In doing so, singleturn resolution, counting direction and other parameters can be adapted individually. The integrated error memory detects important ambient data which provides support during installation and maintenance.

At a glance

- Certified up to SIL3 (IEC 61508), SIL-CL3 (EN 62061), PL e (EN ISO 13849)
- Single- or multiturn encoder with SSI and sin/cos interface
- Programmable, integrated error memory
- Solid or hollow shaft encoder, mounting with key
- Cable connection, M23 or M12 male connector
- Operating temperature range: -30 °C ... +95 °C

Your benefits

- Certified safety product that ensures the best possible protection for persons, machinery, and systems
- Easy handling of safety functions with complete solutions from SICK: Safe positioning with the AFS/AFM60S Pro and the FX3-MOC1 motion control module of the Flexi Soft safety controller
- Positive and non-positive connections for mechanical reliability
- Safety status conforming to the test basics of the Institute for Occupational Safety and Health of the German Social Accident Insurance (IFA)
- Different configuration and connection options for high levels of flexibility and straightforward implementation
- Suitable for applications with small installation spaces



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→ www.sick.com/AFS_AFM60S_Pro

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

- Measurement of position, speed and direction of rotation in various industries in which everything depends on safe

position and movement monitoring: Mobile automation, mechanical construction, wind energy, storage and conveyors

Detailed technical data

Performance

	Singleturn	Multiturn
Number of steps per revolution (max. resolution)	262,144 (18 bit) ¹⁾	–
Max. resolution (number of steps per revolution x number of revolutions)	–	18 bit x 12 bit (262,144 x 4,096)
Error limits G	0.05° ²⁾	
Repeatability standard deviation σ_r	0.002° ³⁾	

¹⁾ Number of steps per revolution parameterizable: Singleturn encoder 4 ... 262,144; multiturn encoder 4 ... 262,144 binary ($2^2 \dots 2^{18}$).

²⁾ In accordance with DIN ISO 1319-1, position of the upper and lower error limit depends on the installation situation, specified value refers to a symmetrical position, i.e. deviation in upper and lower direction is the same.

³⁾ In accordance with DIN ISO 55350-13; 68.3% of the measured values are inside the specified area.

Interfaces

Communication Interface detail	SSI + Sin/Cos
Parameterising data	Number of steps per revolution Preset position, preset position via hardware pin; count direction, count direction via hardware pin, reset factory setting, read out error memory, generate report
Initialization time	2 s ¹⁾
Position forming time	< 1 μ s
SSI	
Code type	Gray
Code sequence parameter adjustable	CW/CCW configurable ²⁾
Clock frequency	100 kHz ... \leq 1 MHz
Set (electronic adjustment)	H-active (L = 0 - 3 V, H = 4,0 - U _s V)
CW/CCW (counting sequence when turning)	L-active (L = 0 - 1,5 V, H = 2,0 - U _s V)
Sin/Cos	
Sine/cosine periods per revolution	1,024
Output frequency	\leq 153.6 kHz
Load resistance	\geq 120 Ω
Signal before differential generation	0.5 V _{pp} , \pm 20 %
Signal offset before differential generation	2.5 V \pm 10 %
Signal after differential generation	1 V _{pp} , \pm 20 %

¹⁾ Valid signals can be read once this time has elapsed.

²⁾ Default: CW when viewing the clockwise rotating shaft.

Electrical data

	Solid shaft Servo flange	Solid shaft face mount flange	Blind hollow shaft	Through hollow shaft
Connection type	Male connector, M23, 12-pin, radial Male connector, M23, 12-pin, axial Male connector, M12, 12-pin, radial Male connector, M12, 12-pin, axial Cable, 12-wire, radial, 0.5 m 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 Cable, 12-wire, axial, 0.5 m Cable, 12-wire, axial, 1.5 m Cable, 12-wire, axial, 3 m Cable, 12-wire, axial, 5 m Cable, 12-wire, axial, 10 m		Male connector, M23, 12-pin, radial Male connector, M12, 12-pin, radial Cable, 12-wire, radial, 0.5 m 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	
Supply voltage				
Male connector, M23, 12-pin	4.5 ... 32 V			
Male connector, M12, 12-pin	4.5 ... 30 V			
Cable, 12-wire	4.5 ... 32 V			
Power consumption	0.7 W (without load)			
Reverse polarity protection	✓			
Short-circuit protection	✓ ¹⁾			

¹⁾ SinCos interface: Short circuit to another channel or GND permitted for max. 30 s. With $U_s \leq 12$ V additional short circuit against U_s permitted for max. 30 s.
SSI interface: Short-circuit to another channel or GND permitted for max. 30 s. With $U_s \leq 5$ V additional short-circuit to U_s permitted for max. 30 s.

Mechanical data

	Solid shaft Servo flange	Solid shaft face mount flange	Blind hollow shaft	Through hollow shaft
Shaft diameter	6 mm	10 mm	6 mm 8 mm 3/8" 10 mm 12 mm 1/2" 14 mm 15 mm 5/8" ¹⁾	
Wavelength	10 mm	19 mm	-	
Weight	0.3 kg ²⁾		0.25 kg ²⁾	
Shaft material	Stainless steel			
Flange material				
Singleturn	Aluminum		Die-cast zinc	
Multiturn	Aluminum			
Material, stator coupling	Stainless steel			
Housing material	Aluminum die cast			
Start up torque	≤ 0.5 Ncm, at 20 °C		≤ 0.8 Ncm, at 20 °C	
Operating torque	≤ 0.3 Ncm, at 20 °C		≤ 0.6 Ncm, at 20 °C	

¹⁾ For singleturn only.

²⁾ Relates to devices with male connector connection.

³⁾ Depending on the application, the operating life may also be limited by the bearing lifetime.

⁴⁾ The value corresponds to L_{10mr} (ISO/TS 16281) at 10 °C to 60 °C operating temperature, speed >10 rpm, at max. permissible shaft load / shaft movement.

	Solid shaft Servo flange	Solid shaft face mount flange	Blind hollow shaft	Through hollow shaft
Permissible Load capacity of shaft	80 N (radial) 40 N (axial)		-	
Permissible movement static	-		± 0.3 mm (radial) ± 0.5 mm (axial)	
Permissible shaft movement, dynamic	-		± 0.05 mm (radial) ± 0.1 mm (axial)	
Moment of inertia of the rotor	8 gcm ²		56 gcm ²	
Bearing lifetime	3.6 x 10 ⁹ revolutions ^{3) 4)}			
Angular acceleration	≤ 500,000 rad/s ²		-	
Operating speed	≤ 9,000 min ⁻¹		≤ 6,000 min ⁻¹	

¹⁾ For singleturn only.

²⁾ Relates to devices with male connector connection.

³⁾ Depending on the application, the operating life may also be limited by the bearing lifetime.

⁴⁾ The value corresponds to L_{10mr} (ISO/TS 16281) at 10 °C to 60 °C operating temperature, speed >10 rpm, at max. permissible shaft load / shaft movement.

Ambient data

	Solid shaft Servo flange	Solid shaft face mount flange	Blind hollow shaft	Through hollow shaft
EMC	EN 61000-6-2 EN 61000-6-3 EN 61000-6-7			
Enclosure rating	IP65 (IEC 60529)			
Permissible relative humidity	90 % (condensation of the optical scanning not permitted)			
Operating temperature range				
Male connector, M23, 12-pin	-30 °C ... +95 °C ¹⁾			
Male connector, M12, 12-pin	-30 °C ... +85 °C ¹⁾			
Cable, 12-wire	-30 °C ... +85 °C ¹⁾			
Storage temperature range	-30 °C ... +85 °C, without package			
Resistance to shocks	100 g, 6 ms (according to EN 60068-2-27) ²⁾			
Resistance to vibration				
Male connector, M23, 12-pin	30 g, 10 Hz ... 1,000 Hz (EN 60068-2-6) ²⁾		10 g, 10 Hz ... 1,000 Hz (EN 60068-2-6) ²⁾	
Male connector, M12, 12-pin	30 g, 10 Hz ... 1,000 Hz (EN 60068-2-6) ²⁾		18 g, 10 Hz ... 1,000 Hz (EN 60068-2-6) ²⁾	
Cable, 12-wire	30 g, 10 Hz ... 1,000 Hz (EN 60068-2-6) ²⁾		18 g, 10 Hz ... 1,000 Hz (EN 60068-2-6) ²⁾	
Operating height (above sea level)	≤ 2,000 m (80 kPa)			
Protection class	III (according to DIN EN 61140)			
Contamination rating	2			

¹⁾ At measuring point operating temperature.

²⁾ Tested during operation within the safety-related accuracy.

Safety-related parameters

Safety integrity level	SIL3 (IEC 61508), SILCL3 (IEC 62061) ¹⁾
Performance level	PL e (EN ISO 13849-1) ¹⁾
Category	3 (EN ISO 13849-1) 4 (EN ISO 13849-1)
PFH _b : Probability of dangerous failure per hour	5,5 x 10 ⁻⁹ at 40 °C ²⁾ 1,8 x 10 ⁻⁸ , at 80 °C ²⁾

¹⁾ For more detailed information on the exact configuration of your machine/unit, please consult your relevant SICK branch office.

²⁾ The specified values refer to the temperature at the measuring point operating temperature and to a diagnostic coverage of 99 %, which must be achieved by the external evaluation unit.

³⁾ Depending on the application, the operating life may also be limited by the bearing lifetime.

⁴⁾ The safety-related accuracy indicates the maximum position error limit with which safety functions can be supported.

T_M (mission time)	20 years (EN ISO 13849-1) ³⁾
Safety-related accuracy	0.09° category 3 ⁴⁾ 0.35° category 4 ⁴⁾

¹⁾ For more detailed information on the exact configuration of your machine/unit, please consult your relevant SICK branch office.

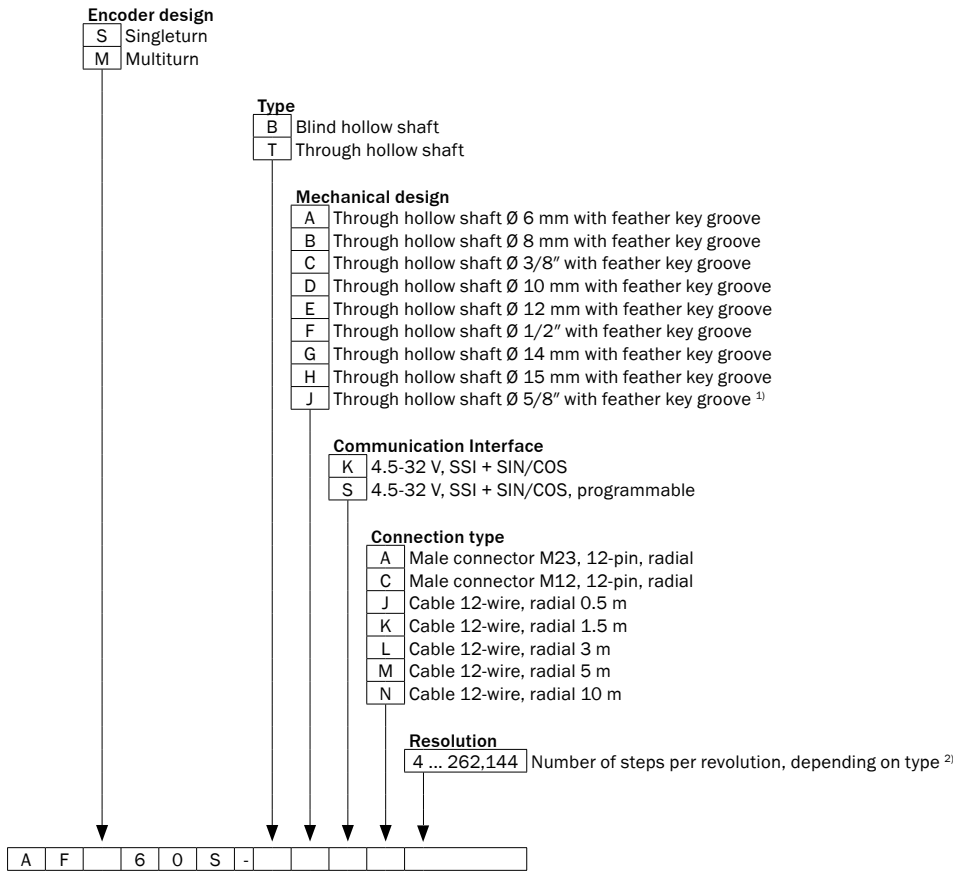
²⁾ The specified values refer to the temperature at the measuring point operating temperature and to a diagnostic coverage of 99 %, which must be achieved by the external evaluation unit.

³⁾ Depending on the application, the operating life may also be limited by the bearing lifetime.

⁴⁾ The safety-related accuracy indicates the maximum position error limit with which safety functions can be supported.

Type code

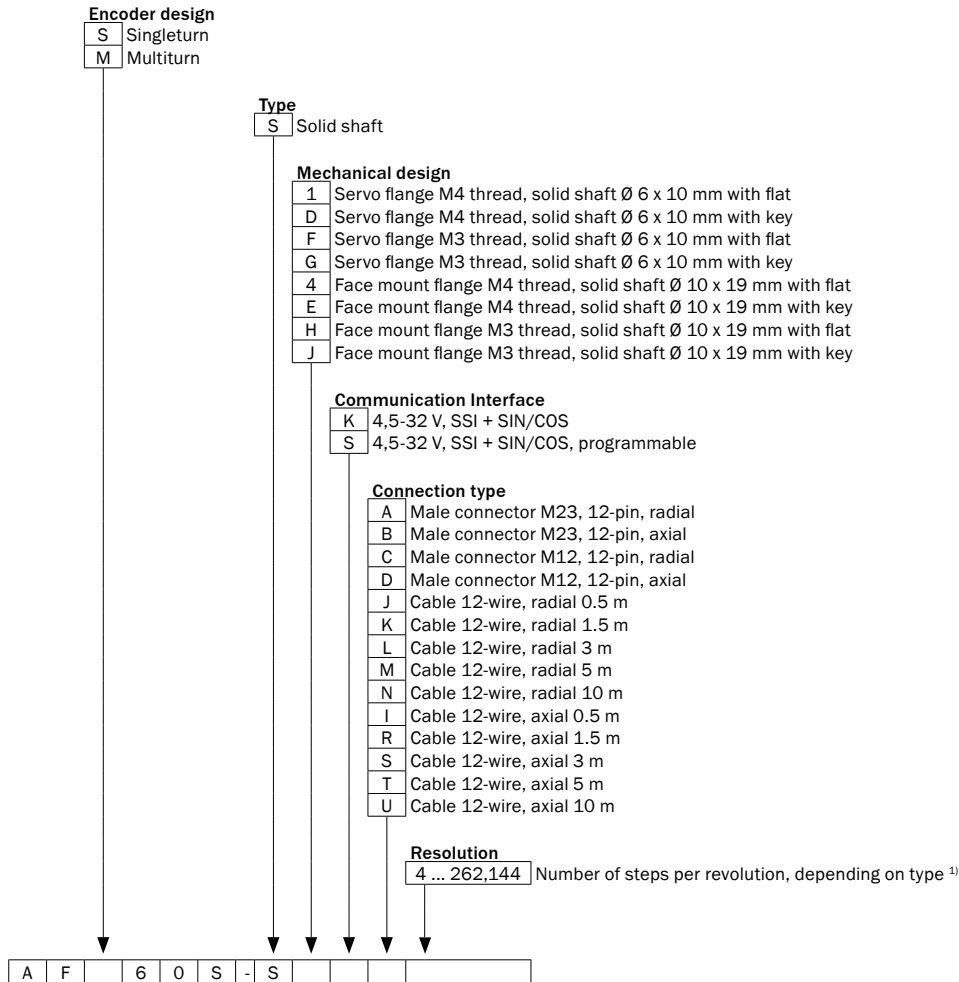
Hollow shaft



¹⁾ Only for singleturn.

²⁾ Number of steps per revolution parameterizable (communication interface "S"): Singleturn encoder 4 ... 262,144; multiturn encoder 4 ... 262,144 binary (2² ... 2¹⁸). Programmable via programming tool and configuration software "Safety Designer" (www.sick.de). Number of steps per revolution non-programmable devices: see below. Other numbers of steps possible on request.

Solid shaft



¹⁾ Number of steps per revolution parameterizable (communication interface "S"): Singleturn encoder 4 ... 262,144; multiturn encoder 4 ... 262,144 binary (2² ... 2¹⁸). Programmable via programming tool and configuration software "Safety Designer" (www.sick.de). Number of steps per revolution non-programmable devices: see below. Other numbers of steps possible on request.

Ordering information

Blind hollow shaft

- **Programmable/configurable:** ✓
- **Communication Interface detail:** SSI + Sin/Cos

Model	Shaft diameter	Connection type	Number of steps per revolution	Max. resolution	Type	Part no.
Multiturn	10 mm	Cable, 12-wire, radial, 1.5 m	-	18 bit x 12 bit (262,144 x 4,096)	AFM60S-BDSK262144	1096665
	12 mm	Male connector, M23, 12-pin, radial	-	18 bit x 12 bit (262,144 x 4,096)	AFM60S-BE-SA262144	1085755
	15 mm	Male connector, M23, 12-pin, radial	-	18 bit x 12 bit (262,144 x 4,096)	AFM60S-BH-SA262144	1088924
Singleturn	10 mm	Male connector, M23, 12-pin, radial	262,144 (18 bit) ¹⁾	-	AFS60S-BD-SA262144	1096666
	15 mm	Male connector, M23, 12-pin, radial	262,144 (18 bit) ¹⁾	-	AFS60S-BH-SA262144	1088781

¹⁾ Number of steps per revolution parameterizable: Singleturn encoder 4 ... 262,144; multiturn encoder 4 ... 262,144 binary (2² ... 2¹⁸).

Through hollow shaft

- **Communication Interface detail:** SSI + Sin/Cos

Model	Shaft diameter	Connection type	Number of steps per revolution	Max. resolution	Programmable/configurable	Type	Part no.
Multiturn	10 mm	Cable, 12-wire, radial, 1.5 m	-	18 bit x 12 bit (262,144 x 4,096)	✓	AFM60S-TDSK262144	1096664
	15 mm	Cable, 12-wire, radial, 1.5 m	-	18 bit x 12 bit (262,144 x 4,096)	✓	AFM60S-THSK262144	1085754
Singleturn	10 mm	Male connector, M23, 12-pin, radial	262,144 (18 bit) ¹⁾	-	-	AFS60S-TD-KA262144	1085753
	15 mm	Male connector, M12, 12-pin, radial	262,144 (18 bit) ¹⁾	-	✓	AFS60S-THSC262144	1096636

¹⁾ Number of steps per revolution parameterizable: Singleturn encoder 4 ... 262,144; multiturn encoder 4 ... 262,144 binary (2² ... 2¹⁸).

Solid shaft, face mount flange

- **Shaft diameter:** 10 mm
- **Wavelength:** 19 mm
- **Communication Interface detail:** SSI + Sin/Cos

Model	Connection type	Number of steps per revolution	Max. resolution	Programmable/configurable	Type	Part no.	
Multiturn	Cable, 12-wire, axial, 1.5 m	-	18 bit x 12 bit (262,144 x 4,096)	✓	AFM60S-S4SR262144	1096658	
	Cable, 12-wire, radial, 1.5 m	-	18 bit x 12 bit (262,144 x 4,096)	✓	AFM60S-S4SK262144	1088779	
					AFM60S-SESK262144	1096657	
	Male connector, M12, 12-pin, radial	-	-	18 bit x 12 bit (262,144 x 4,096)	✓	AFM60S-S4SC262144	1104950
					-	AFM60S-S4KC262144	1091564
	Male connector, M23, 12-pin, axial	-	-	18 bit x 12 bit (262,144 x 4,096)	✓	AFM60S-SESB262144	1085642
Male connector, M23, 12-pin, radial	-	-	18 bit x 12 bit (262,144 x 4,096)	✓	AFM60S-S4SA262144	1086179	
Singleturn	Cable, 12-wire, axial, 1.5 m	262,144 (18 bit) ¹⁾	-	✓	AFS60S-S4SR262144	1085633	
	Cable, 12-wire, radial, 1.5 m	262,144 (18 bit) ¹⁾	-	✓	AFS60S-SESK262144	1085632	
	Male connector, M12, 12-pin, axial	262,144 (18 bit) ¹⁾	-	✓	AFS60S-S4SD262144	1096920	
	Male connector, M12, 12-pin, radial	262,144 (18 bit) ¹⁾	-	✓	AFS60S-S4SC262144	1096659	
	Male connector, M23, 12-pin, radial	262,144 (18 bit) ¹⁾	-	✓	AFS60S-S4SA262144	1085752	

¹⁾ Number of steps per revolution parameterizable: Singleturn encoder 4 ... 262,144; multiturn encoder 4 ... 262,144 binary (2² ... 2¹⁸).

Solid shaft, Servo flange

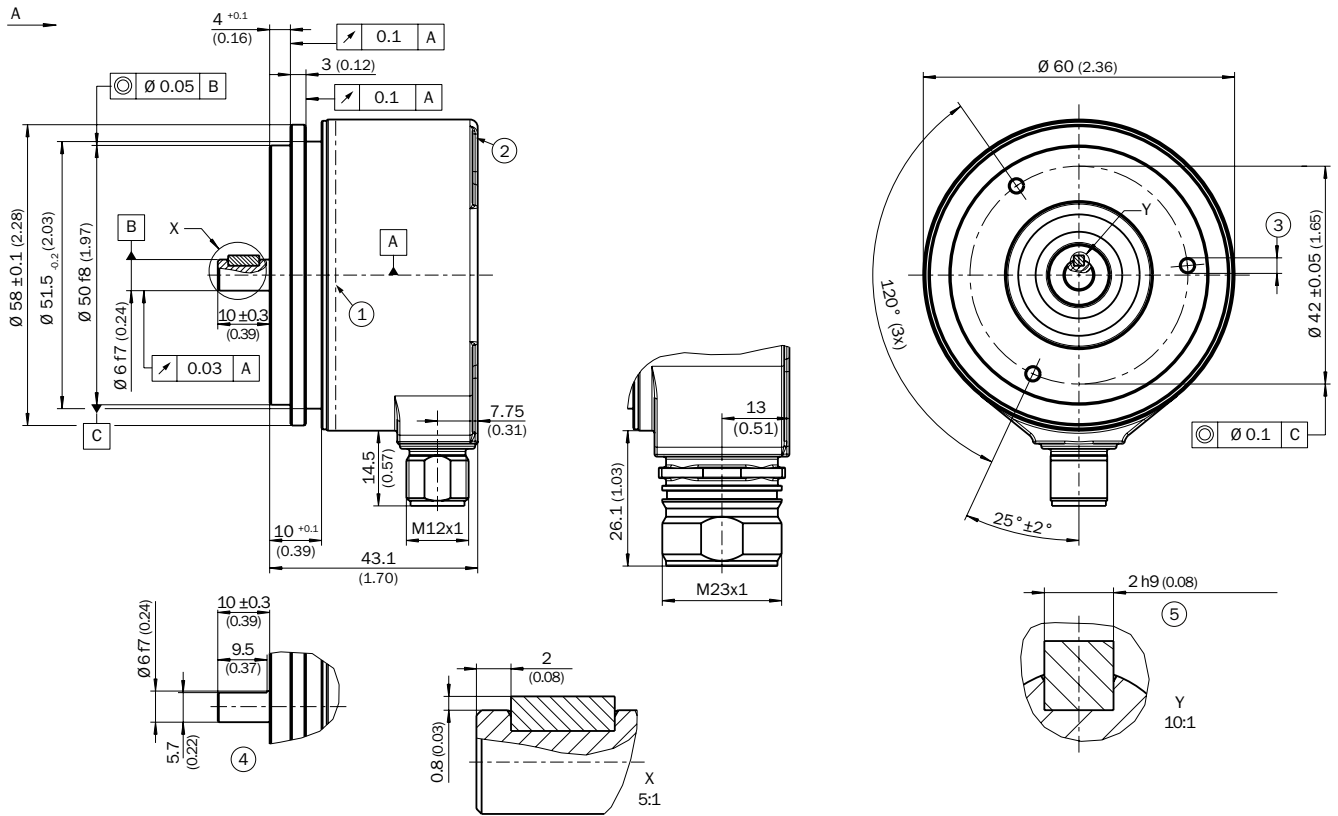
- **Shaft diameter:** 6 mm
- **Wavelength:** 10 mm
- **Communication Interface detail:** SSI + Sin/Cos

Model	Connection type	Number of steps per revolution	Max. resolution	Programmable/ configurable	Type	Part no.
Multiturn	Cable, 12-wire, axial, 1.5 m	-	18 bit x 12 bit (262,144 x 4,096)	✓	AFM60S-S1SR262144	1099029
	Cable, 12-wire, radial, 1.5 m	-	18 bit x 12 bit (262,144 x 4,096)	✓	AFM60S-S1SK262144	1096660
					AFM60S-SDSK262144	1087254
	Male connector, M12, 12-pin, radial	-	18 bit x 12 bit (262,144 x 4,096)	-	AFM60S-S1KC262144	1091563
Male connector, M23, 12-pin, radial	-	18 bit x 12 bit (262,144 x 4,096)	✓	AFM60S-S1SA262144	1088780	
Singleturn	Male connector, M12, 12-pin, radial	262,144 (18 bit) ¹⁾	-	✓	AFS60S-S1SC262144	1096669
	Male connector, M23, 12-pin, axial	262,144 (18 bit) ¹⁾	-	✓	AFS60S-S1SB262144	1096662
	Male connector, M23, 12-pin, radial	262,144 (18 bit) ¹⁾	-	✓	AFS60S-S1SA262144	1096663
					AFS60S-SD-SA262144	1096661
			-	AFS60S-SD-KA262144	1085625	

¹⁾ Number of steps per revolution parameterizable: Singleturn encoder 4 ... 262,144; multiturn encoder 4 ... 262,144 binary (2² ... 2¹⁸).

Dimensional drawings (Dimensions in mm (inch))

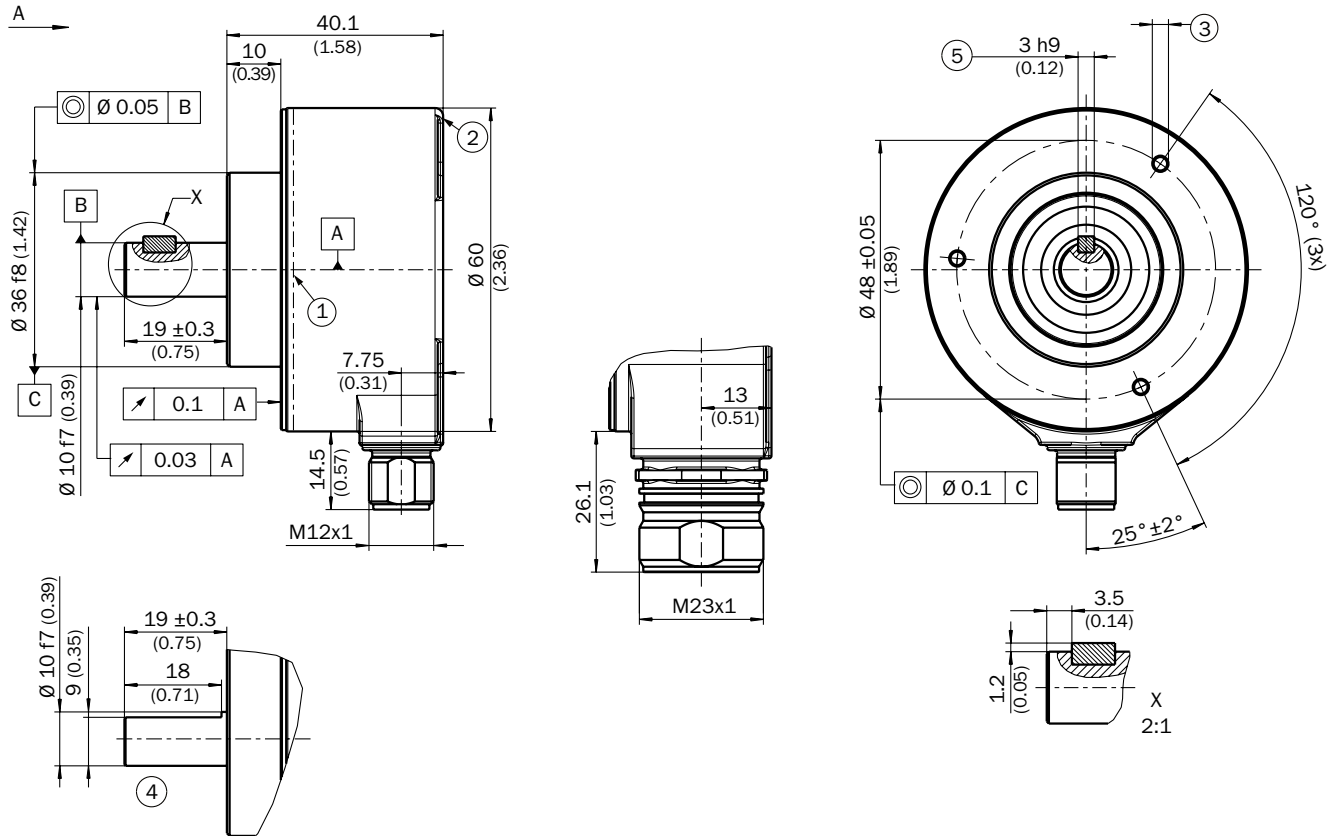
Solid shaft, servo flange, radial plug connection M12 and M23



General tolerances according to DIN ISO 2768-mk

- ① Measuring point working temperature (freely selectable, respectively circumferential at the cover shell, approx. 3 mm away from the flange)
- ② Measuring point vibration (respectively at the housing face. approx. 3 mm away from the cover edge)
- ③ M3 / M4 (3x) (6-deep)
- ④ Shaft with flat
- ⑤ Key

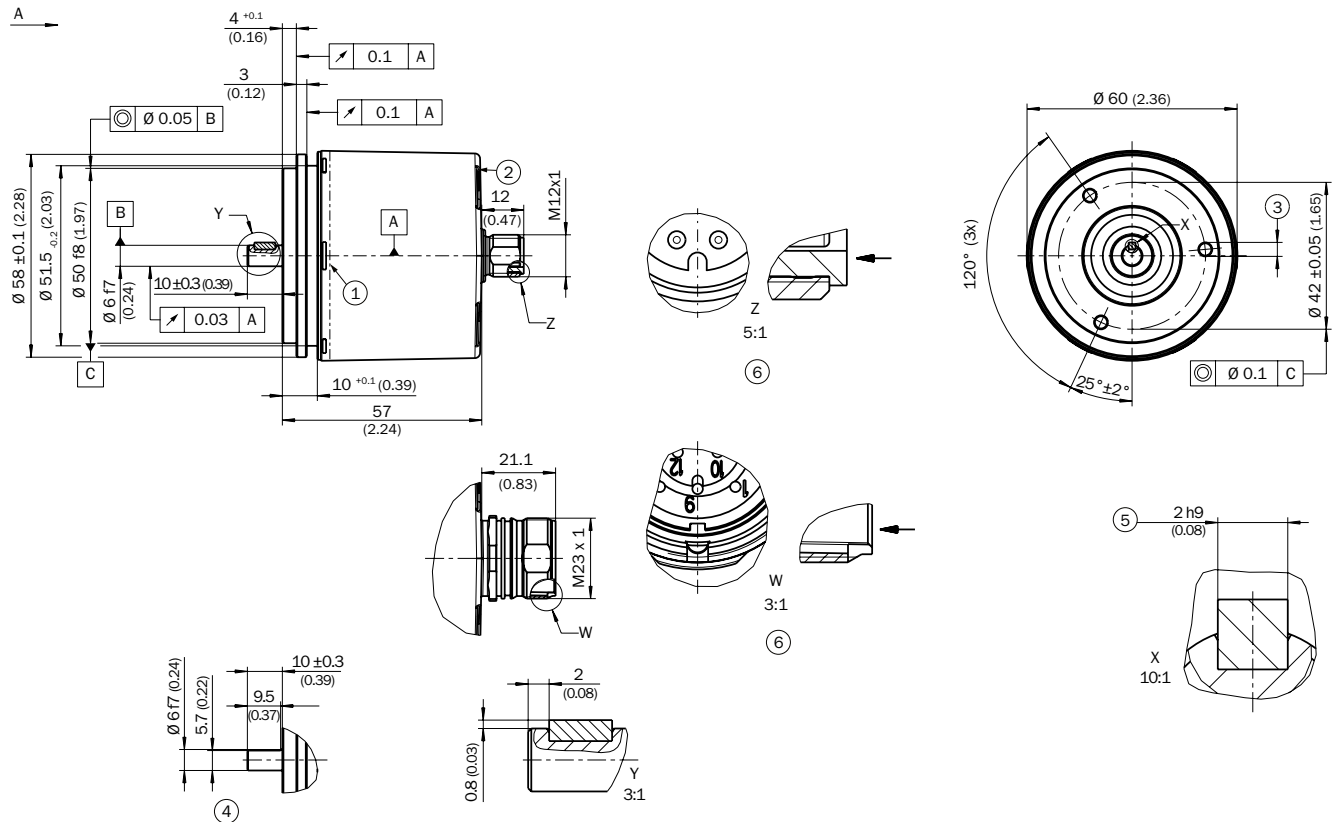
Solid shaft, face mount flange, radial plug connection M12 and M23



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- ③ M3 / M4 (3x) (6-deep)
- ④ Shaft with flat
- ⑤ Key DIN 6885-A 3x3x6

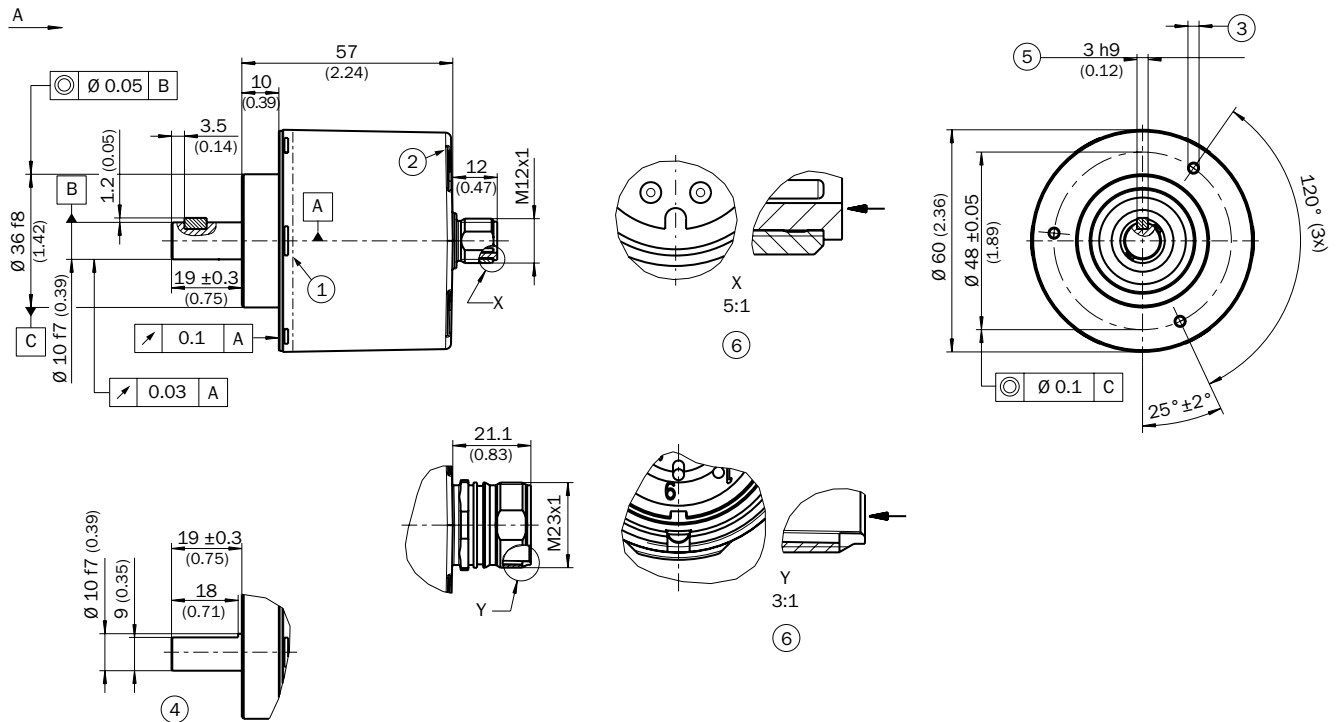
Solid shaft, servo flange, axial plug connection M12 and M23



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- ④ Shaft with flat
- ⑤ Key DIN 6885-A 2x2x6
- ⑥ Connector orientation

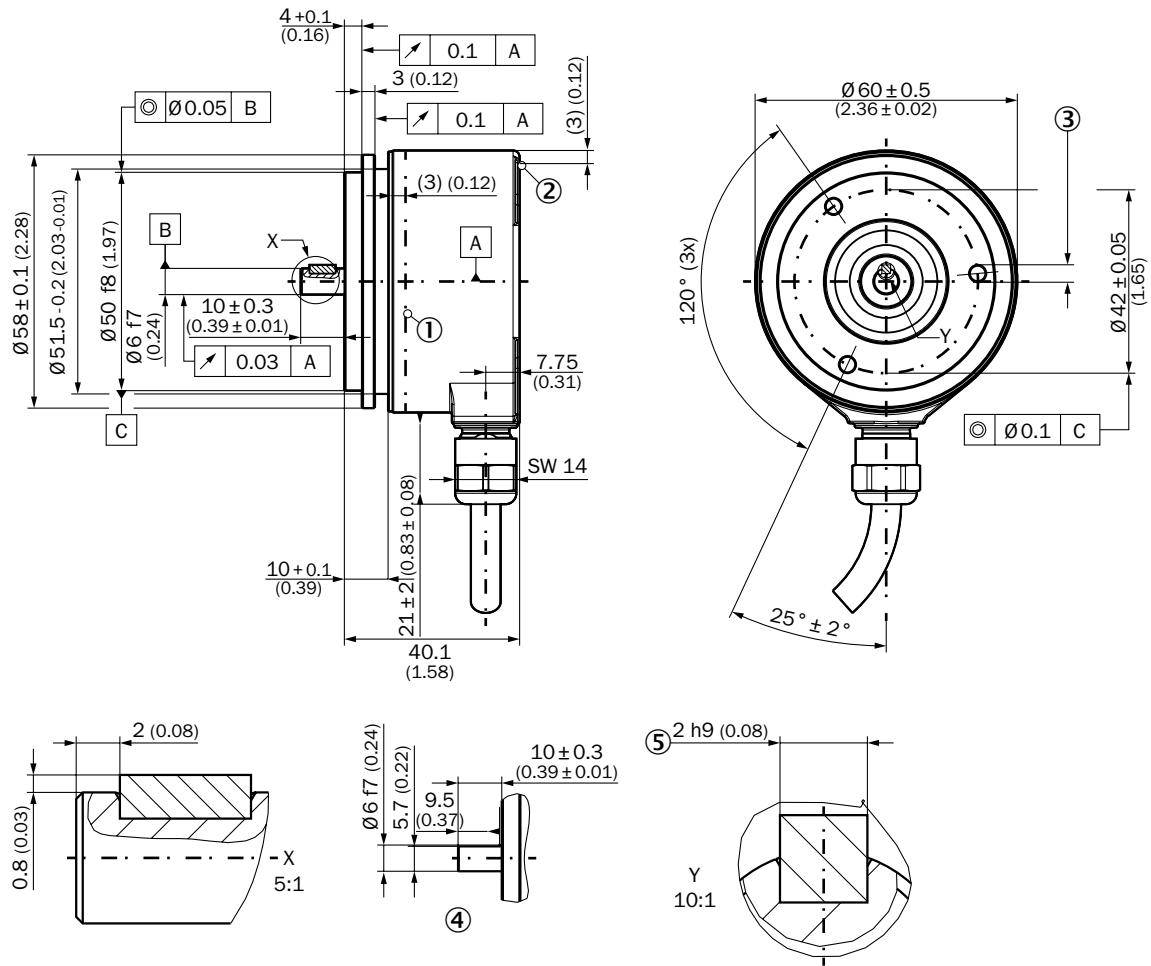
Solid shaft, face mount flange, axial plug connection M12 and M23



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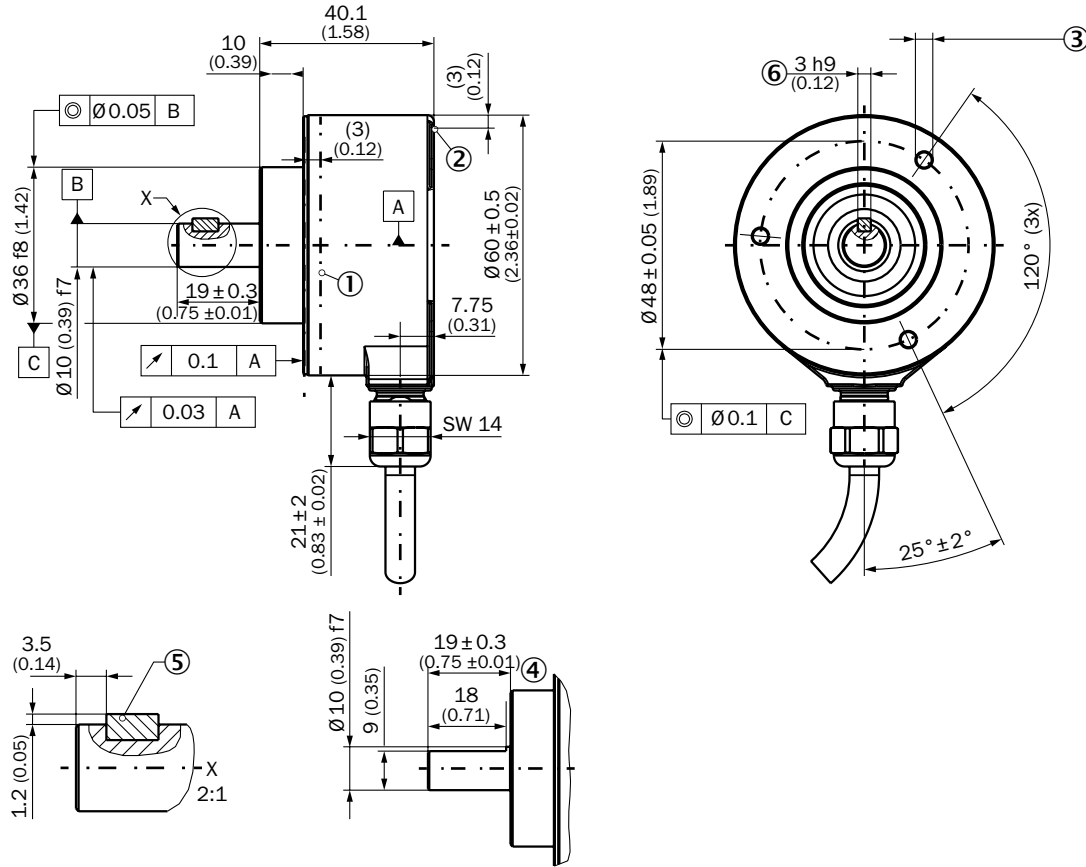
Solid shaft, servo flange, radial cable connection



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- ③ M3 / M4 (3x) (6-deep)
- ④ Shaft with flat
- ⑤ Key DIN 6885-A 2x2x6

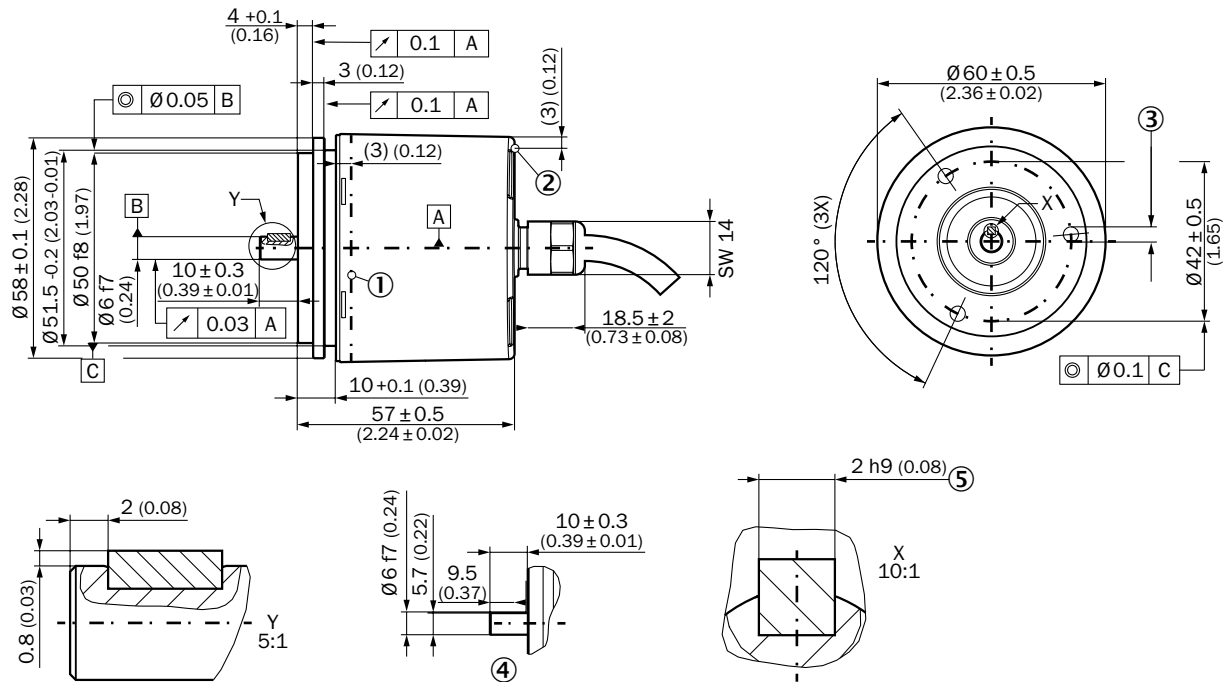
Solid shaft, face mount flange, radial cable connection



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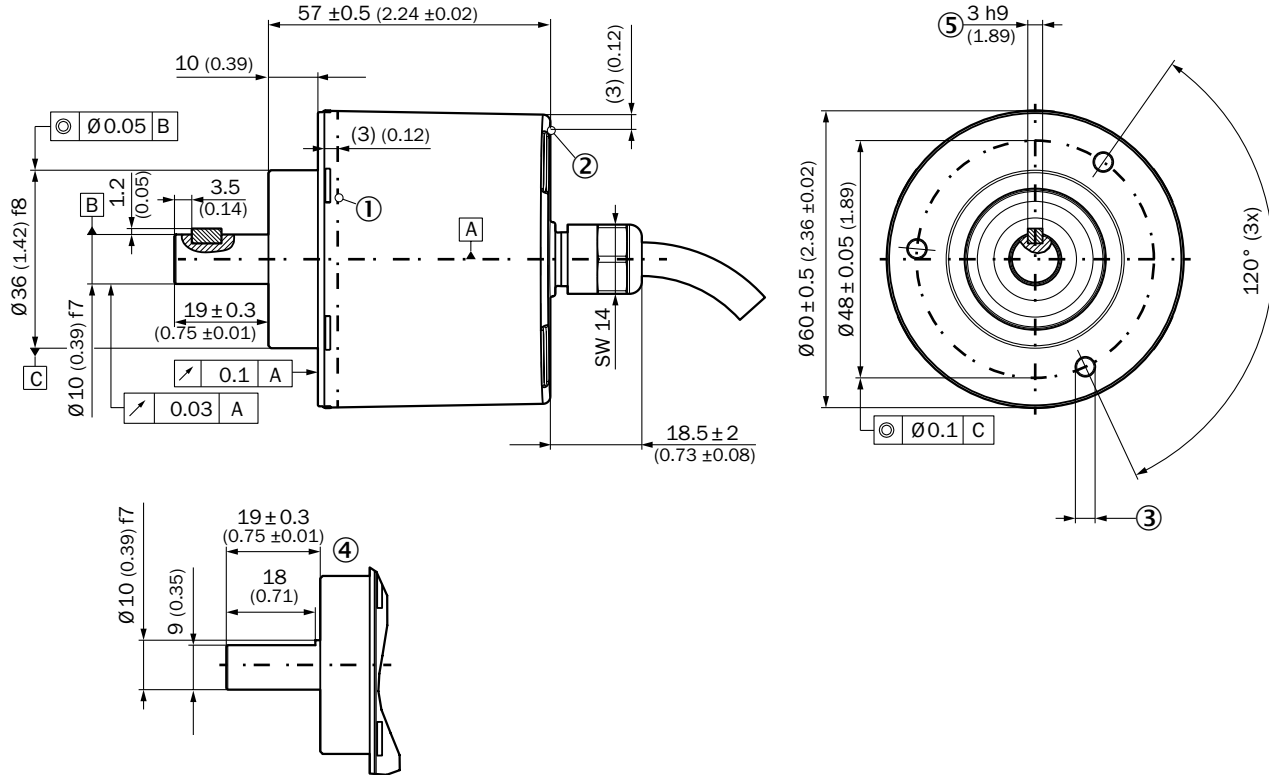
Solid shaft, servo flange, axial cable connection



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- ③ M3 / M4 (3x) (6-deep)
- ④ Shaft with flat
- ⑤ Key DIN 6885-A 2x2x6

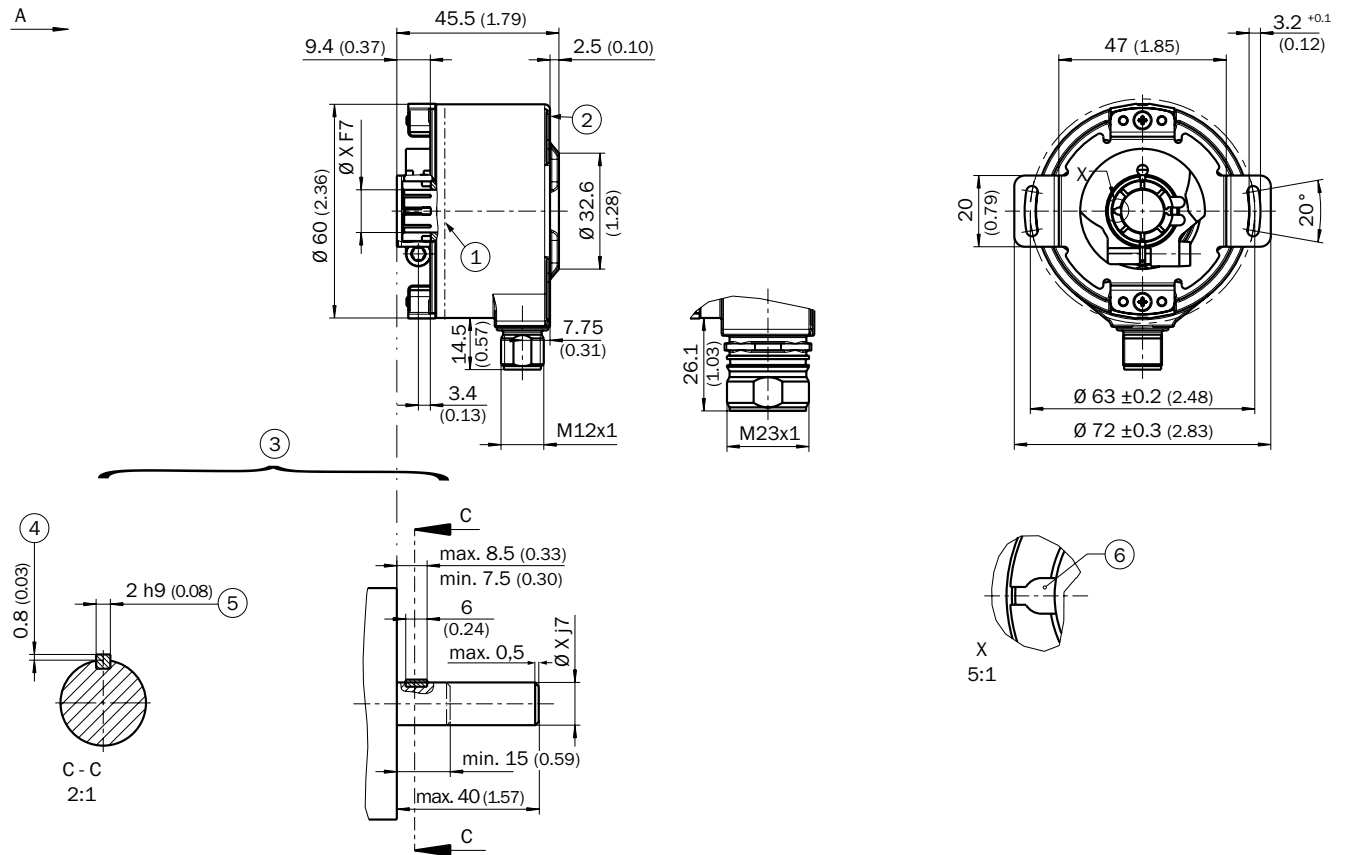
Solid shaft, face mount flange, axial cable connection



General tolerances according to DIN ISO 2768-mk

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- ② Measuring point vibration (respectively at the housing face. approx. 3 mm away from the cover edge)
- ③ M3 / M4 (3x) (6-deep)
- ④ Shaft with flat
- ⑤ Key DIN 6885-A 3x3x6

Blind hollow shaft, radial plug connection M12 and M23

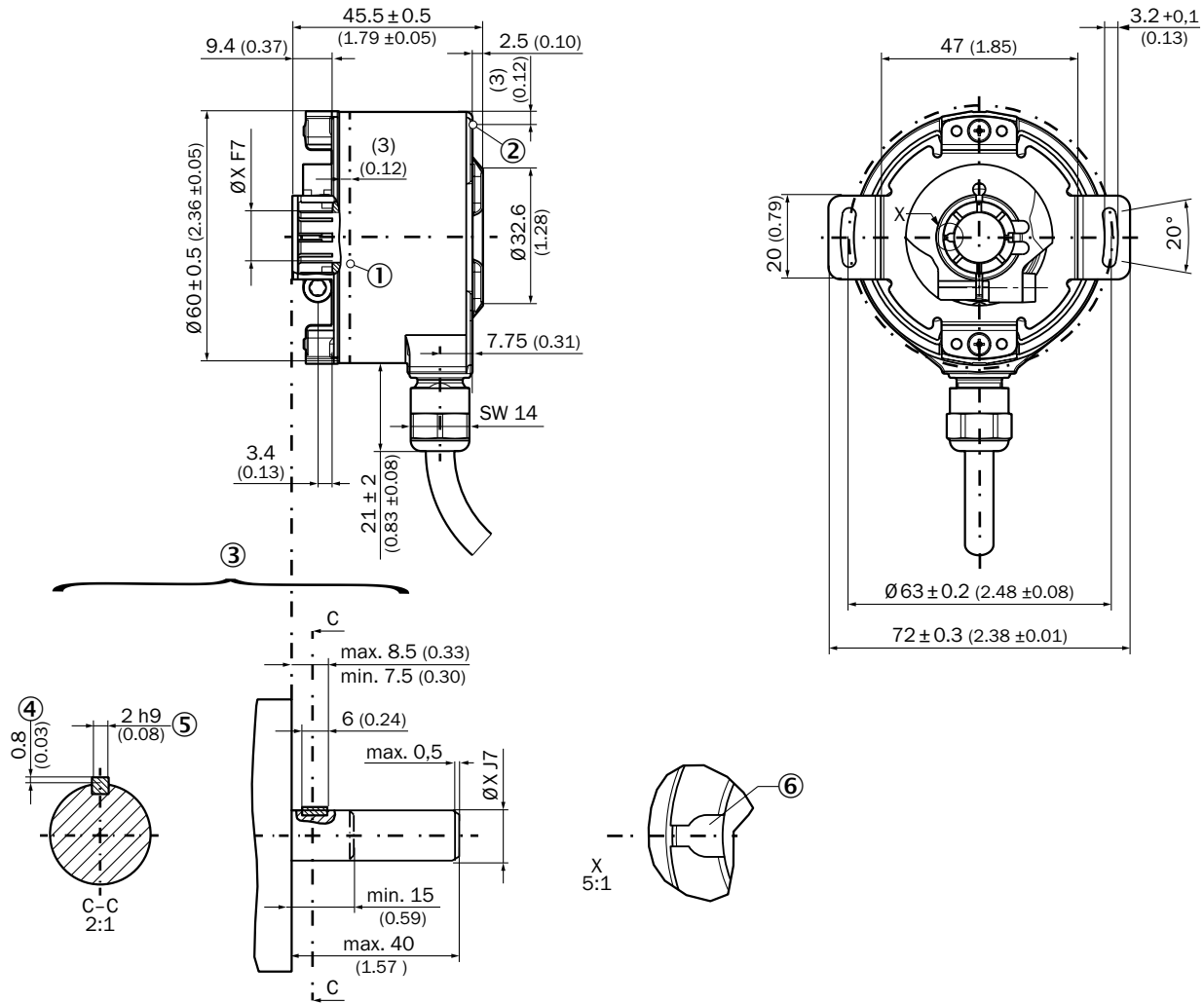


General tolerances according to DIN ISO 2768-mk

- ① Measuring point working temperature (freely selectable, respectively circumferential at the cover shell, approx. 3 mm away from the flange)
- ② Measuring point vibration (respectively at the housing face, approx. 3 mm away from the cover edge)
- ③ Attachment specifications
- ④ Max. 0.4 at $\varnothing 5/8''$
- ⑤ Key DIN 6885-A 2x2x6
- ⑥ Feather key groove

Shaft diameter XF7	Shaft diameter xj7
6 mm	Provided by customer
8 mm	
3/8"	
10 mm	
12 mm	
1/2"	
14 mm	
15 mm	
5/8"	

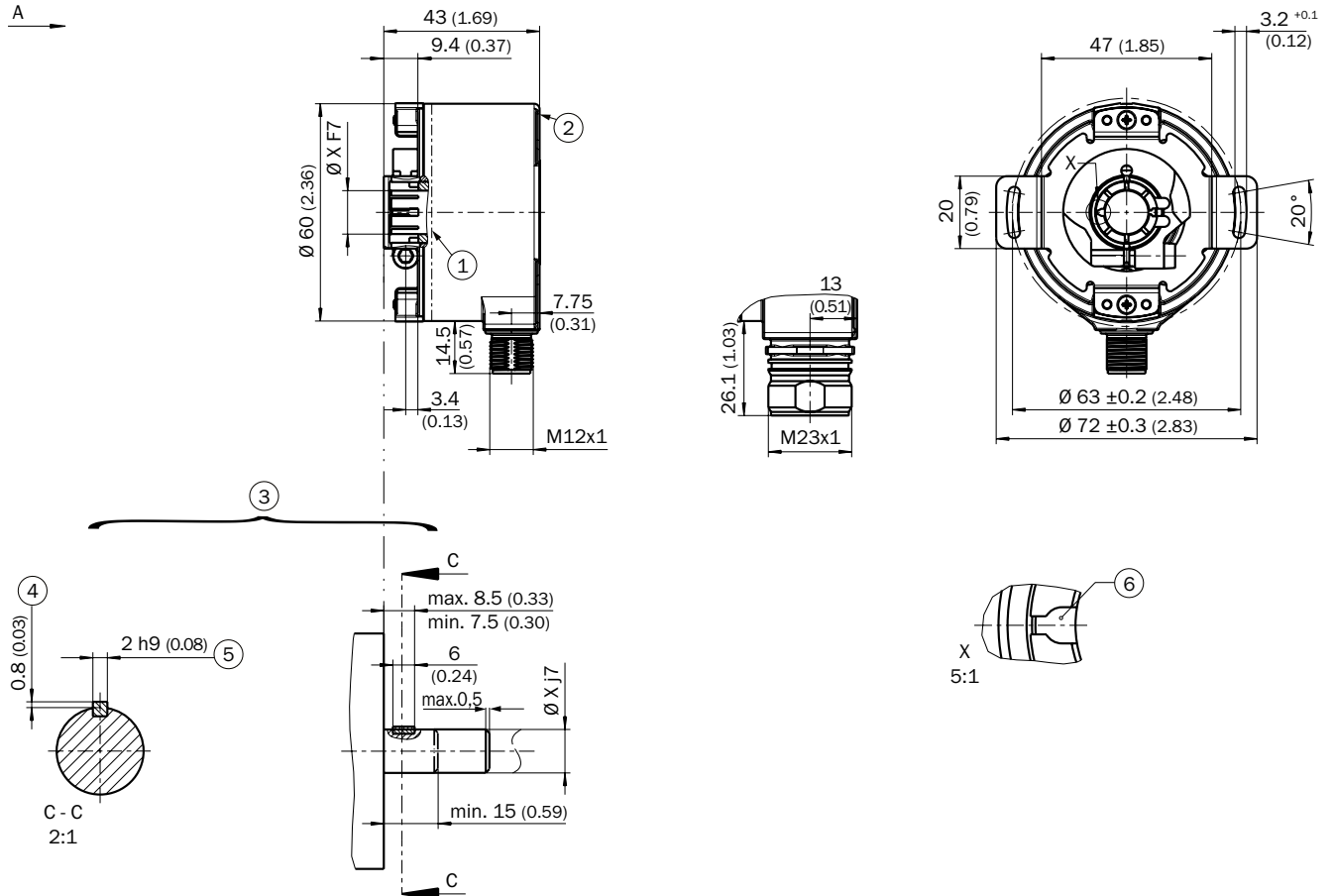
Blind hollow shaft, radial cable connection



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- ② Measuring point vibration (respectively at the housing face. approx. 3 mm away from the cover edge)
- ③ Attachment specifications
- ④ Max. 0.4 at $\text{Ø} 5/8''$
- ⑤ Key DIN 6885-A 2x2x6
- ⑥ Feather key groove

Shaft diameter XF7	Shaft diameter xj7
6 mm	Provided by customer
8 mm	
3/8"	
10 mm	
12 mm	
1/2"	
14 mm	
15 mm	
5/8"	

Through hollow shaft, radial plug connection M12 and M23

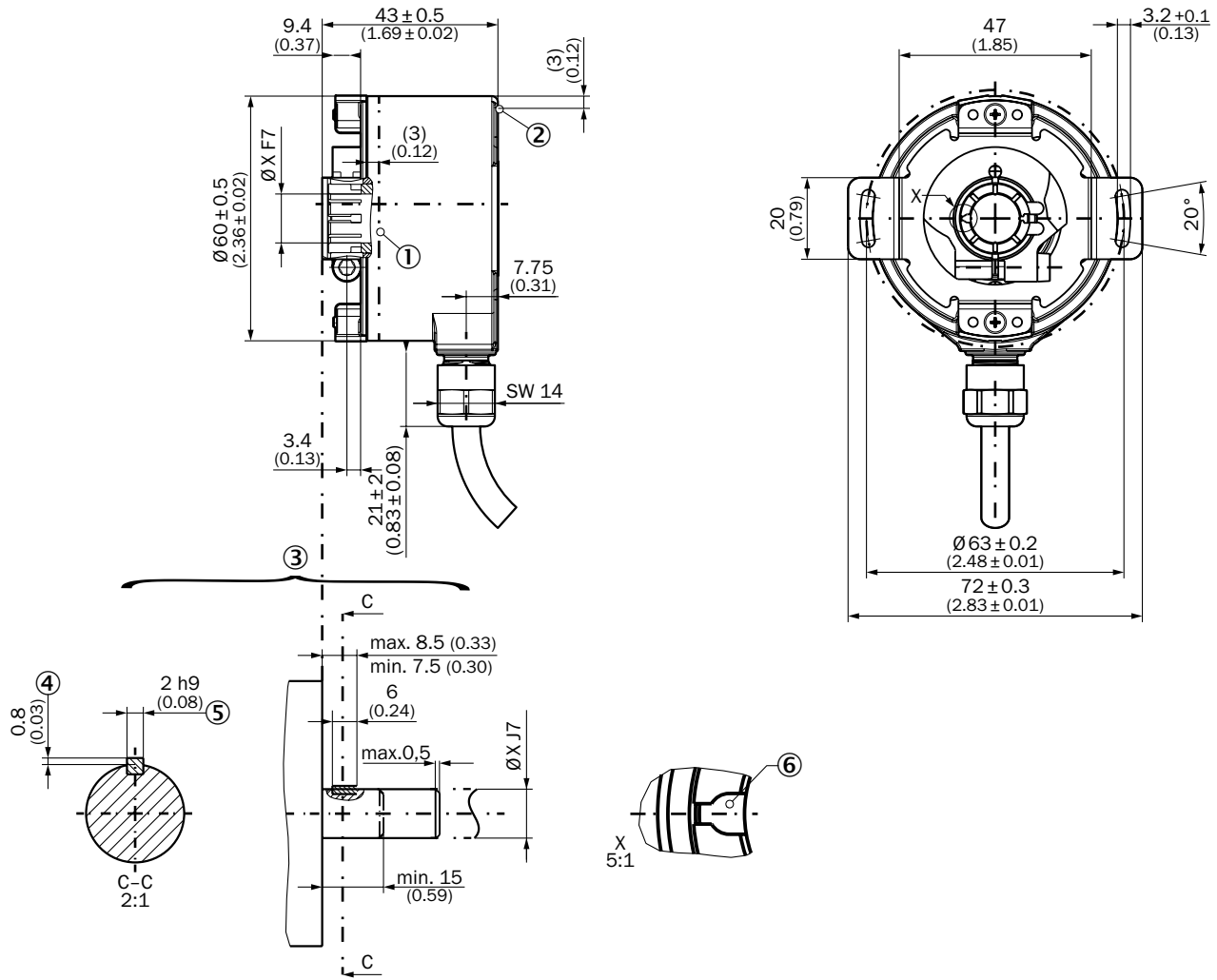


General tolerances according to DIN ISO 2768-mk

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- ⑤ Key DIN 6885-A 2x2x6
- ⑥ Feather key groove

Shaft diameter XF7	Shaft diameter xj7
6 mm	Provided by customer
8 mm	
3/8"	
10 mm	
12 mm	
1/2"	
14 mm	
15 mm	
5/8"	

Through hollow shaft, radial cable connection



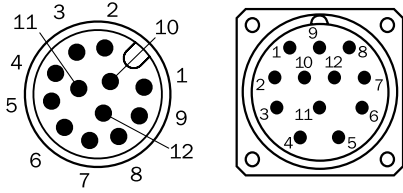
General tolerances according to DIN ISO 2768-mk

- ① Measuring point working temperature (freely selectable, respectively circumferential at the cover shell, approx. 3 mm away from the flange)
- ② Measuring point vibration (respectively at the housing face. approx. 3 mm away from the cover edge)
- ③ Attachment specifications
- ④ Key DIN 6885-A 2x2x6
- ⑤ Max. 0.4 at $\varnothing 5/8"$
- ⑥ Feather key groove

Shaft diameter XF7	Shaft diameter xj7
6 mm	Provided by customer
8 mm	
3/8"	
10 mm	
12 mm	
1/2"	
14 mm	
15 mm	
5/8"	

PIN assignment

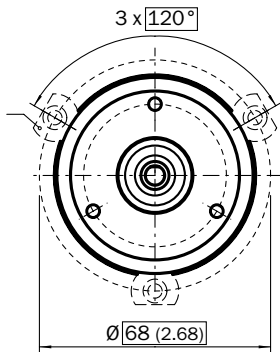
View of device plug M23 and M12 on the encoder



PIN (M23)	PIN (M12)	Wire colors (cable connection)	Signal	Explanation
1	5	Red	U _s	Operating voltage
2	12	Blue	GND	Ground connection
3	11	Yellow	Clock +	Interface signals
4	2	White	Data +	Interface signals
5	10	Orange	SET	Electronic adjustment
6	3	Brown	Data -	Interface signals
7	4	Violet	Clock -	Interface signals
8	9	Black	- SIN	Signal cable
9	1	Orange-black	CW/CCW (V/Rl)	Sequence in direction of rotation
10	7	Green	- COS	Signal cable
11	6	Gray	+ COS	Signal cable
12	8	Pink	+ SIN	Signal cable
			Screen	Screen connected to housing on encoder side. Connected to ground on control side.

Attachment specifications

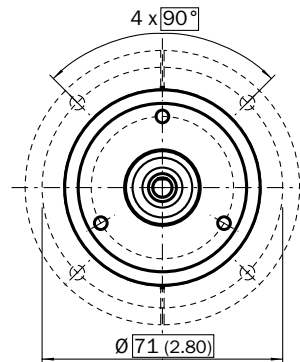
Mounting requirements for small servo clamp



All dimensions in mm (inch)

Part no. 2029166

Mounting requirements for half-shell servo clamp



All dimensions in mm (inch)

Part no. 2029165






Accessories

The accessories are part of the safety-related function chain and must be assessed and validated accordingly by the user. This is not an integral part of the safety assessment carried out by SICK STEGMANN.

Mounting systems

Flanges

Flange plates

Figure	Brief description	Type	Part no.
	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 50 mm servo flange, aluminum, including 3 flat head screws M4 x 10, Aluminum, including 3 countersunk screws M4 x 10	BEF-FA-036-050	2029160
	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 60 mm square mounting plate, aluminum, including 3 flat head screws M4 x 8, Aluminum, including 3 countersunk screws M4 x 8	BEF-FA-036-060REC	2029162
	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 58 mm square mounting plate with shock absorbers, aluminum, Aluminum	BEF-FA-036-060RSA	2029163
	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 63 mm square mounting plate, aluminum, including 3 flat head screws M4 x 10, Aluminum, including 3 countersunk screws M4 x 10	BEF-FA-036-063REC	2034225
	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 100 mm servo flange with 60 mm centering hub, aluminum, Aluminum	BEF-FA-036-100	2029161



Dimensional drawings → [page 27](#)

Other mounting accessories

Others

Brief description	Type	Part no.
1 M4x16 cylinder head screw and 1 2x2x6 feather key acc. to DIN 6885	BEF-MK-SE01	2073617

Servo clamps

Figure	Brief description	Type	Part no.
	Half-shell servo clamps (2 pcs.) for servo flanges with a 50 mm centering hub	BEF-WG-SF050	2029165
	Servo clamps, large, for servo flanges (clamps, eccentric fastener), 3 pcs., without mounting material, without mounting hardware	BEF-WK-SF	2029166

Dimensional drawings → [page 28](#)

Shaft adaptation

Shaft couplings







Figure	Brief description	Type	Part no.
	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 °C to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub, for use with feather key	KUP-0606-BP	2075379
	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 °C ... +120° C, max. torque 80 Ncm; material: stainless steel bellows, fixed with two setscrews each	KUP-0606-BS	2075378


Figure	Brief description	Type	Part no.
	Bellows coupling, shaft diameter 6 mm / 10 mm, maximum shaft offset: radial \pm 0.25 mm, axial \pm 0.4 mm, angular \pm 4°; max. speed 10,000 rpm, -30 °C to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub, for use with feather key	KUP-0610-BP	2075375
	Bellows coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial \pm 0.25 mm, axial \pm 0.4 mm, angular \pm 4°; max. speed 10,000 rpm, -30 °C ... +120° C, max. torque 80 Ncm; material: stainless steel bellows, fixed with two setscrews each	KUP-0610-BS	2075377
	Bellows coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset: radial \pm 0.25 mm, axial \pm 0.4 mm, angular \pm 4°; max. speed 10,000 rpm, -30 °C to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub, for use with feather key	KUP-1010-BP	2075373
	Bellows coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset: radial \pm 0.25 mm, axial \pm 0.4 mm, angular \pm 4°; max. speed 10,000 rpm, -30° ... +120° C, max. torque 80 Ncm; material: stainless steel bellows, fixed with two setscrews each	KUP-1010-BS	2075376

Dimensional drawings → page 28

Connection systems

Plug connectors and cables

Cables (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: cable Head B: Flying leads Cable: SSI, TTL, HTL, PUR, halogen-free, shielded, 4 x 2 x 0.25 mm ² + 2 x 0.5 mm ² + 2 x 0.14 mm ² , 7.8 mm, UV and saltwater-resistant	LTG-2612-MW	6028516

Connecting cables






Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 12-pin, straight, A-coded Head B: Flying leads Cable: SSI, PUR, halogen-free, shielded, 12 x 0.14 mm ² , 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: Flying leads Cable: SSI, PUR, halogen-free, shielded, 12 x 0.14 mm ² , 8.5 mm	2 m	DOL-1212-W02MAC1	6039824
		5 m	DOL-1212-W05MAC1	6039825
		10 m	DOL-1212-W10MAC1	6039826
		20 m	DOL-1212-W20MAC1	6039827

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: shielded, 7.8 mm	3 m	DOL-2312-G03M-MD2	2062300
		5 m	DOL-2312-G05M-MD2	2062301
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: shielded, Ø 6.8 mm	5 m	DOL-2312-G05MXD2	2095662
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: shielded, 7.8 mm	10 m	DOL-2312-G10M-MD2	2062302
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: unshielded, 7.8 mm	1.5 m	DOL-2312-G1M-5MD2	2062284
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: shielded, Ø 6.8 mm	1.5 m	DOL-2312-G1M-5MXD2	2097360
	Head A: female connector, M23, 12-pin, straight Head B: Flying leads Cable: shielded, 7.8 mm	20 m	DOL-2312-G20M-MD2	2062303
		30 m	DOL-2312-G30M-MD2	2062304

Dimensional drawings → [page 29](#)

Connection cables

Figure	Brief description	Length of cable	Type	Part no.
	Head A: male connector, Micro D-Sub, 15-pin, angled Head B: female connector, M12, 12-pin, straight Cable: shielded Details: For connecting the FX3-MOC motion control modules to an encoder	10 m	Connection cable	2094436
		1 m	Connection cable	2094372
		3 m	Connection cable	2094434
		5 m	Connection cable	2094435
	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 ² , 8.5 mm Details: Programming adapter cable for programming tool PGT-10-Pro and PGT-08-S	0.5 m	DSL-2D12-G0M5AC4	2088790
	Head A: female connector, M23, 12-pin, straight Head B: male connector, D-Sub, 9-pin, straight Cable: SSI, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm ² Details: Programming adapter cable for programming tool PGT-10-Pro and PGT-08-S	0.5 m	DSL-3D08-G0M5AC4	2059270

Field-attachable connectors







Figure	Brief description	Type	Part no.
	Head A: female connector, M23, 12-pin, straight Head B: - Cable: HIPERFACE®, SSI, Incremental, shielded	DOS-2312-G	6027538
		DOS-2312-G02	2077057

Figure	Brief description	Type	Part no.
	Head A: female connector, M23, 12-pin, angled Head B: - Cable: HIPERFACE®, SSI, Incremental, shielded	DOS-2312-W01	2072580
	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, shielded	STE-2312-G01	2077273
	Head A: male connector, M23, 12-pin, straight Head B: - Cable: HIPERFACE®, SSI, Incremental, shielded	STE-2312-GX	6028548


Dimensional drawings → page 29

Other connectors and cables

Figure	Short description	Type	Part no.
	System plug: Voltage supply of the Flexi Soft system and storage of system configuration (without EFI-compatible devices)	FX3-MPL000001	1043700
	System plug: Voltage supply of the Flexi Soft system, storage of system configuration (including EFI-compatible devices), and automatic configuration of connected EFI-compatible safety sensors (automatic configuration recovery)	FX3-MPL100001	1047162

Further accessories

Programming and configuration tools

Figure	Brief description	Type	Part no.
	USB programming unit, for programmable SICK encoders AFS60, AFM60, DFS60, VFS60, DFV60 and wire draw encoders with programmable encoders	PGT-08-S	1036616

Safety controllers

Flexi Soft

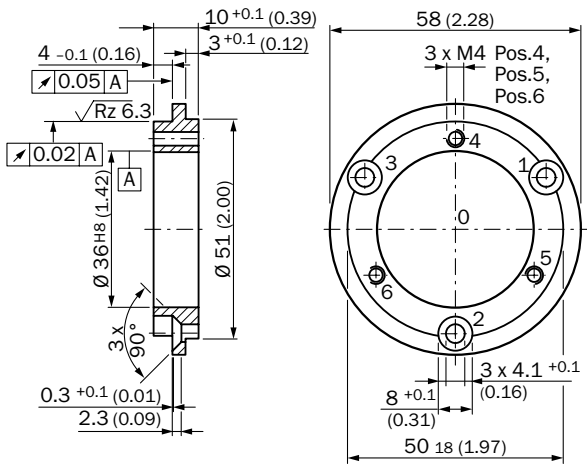
Figure	Further accessories	Type	Part no.
	Safety controllers, Flexi Soft	FX3-CPU000000	1043783
		FX3-CPU130002	1043784
		FX3-CPU230002	1058999
		FX3-CPU320002	1059305
		FX3-MOC000000	1062344

Dimensional drawings → page 33

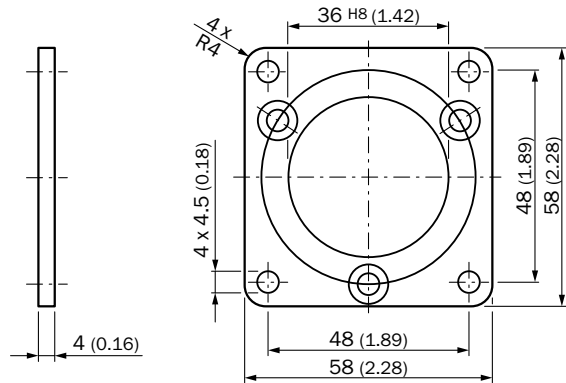
Dimensional drawings for accessories (Dimensions in mm (inch))

Flanges

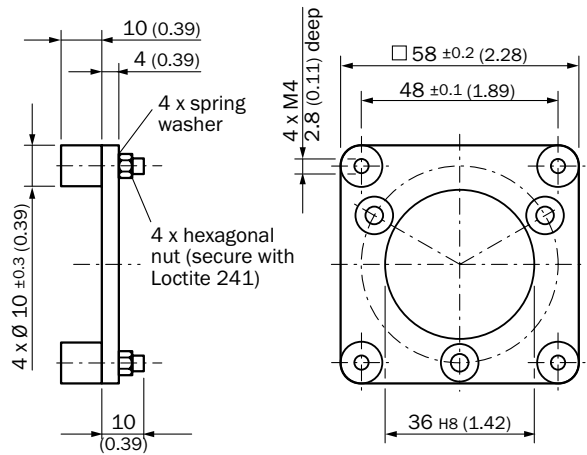
BEF-FA-036-050



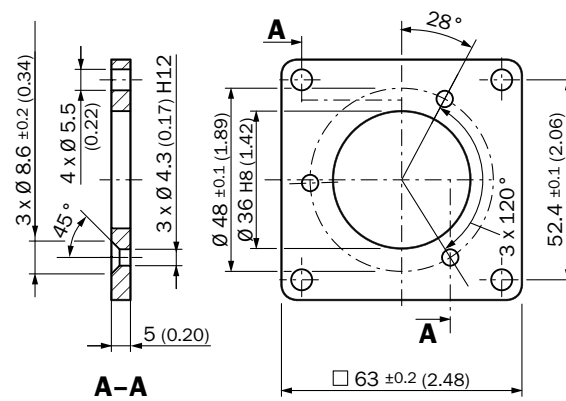
BEF-FA-036-060REC



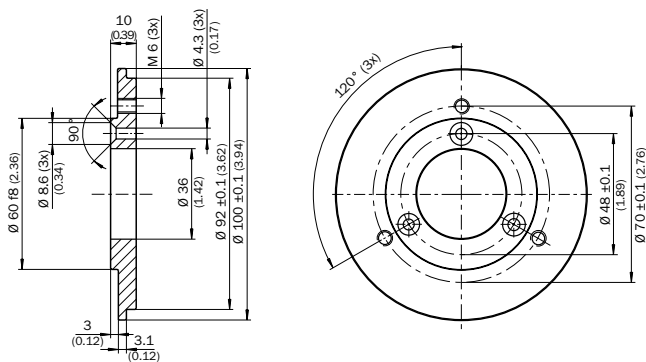
BEF-FA-036-060RSA



BEF-FA-036-063REC

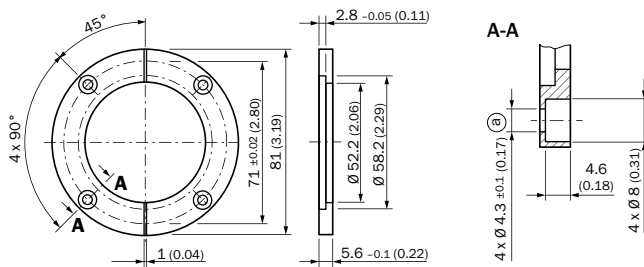


BEF-FA-036-100

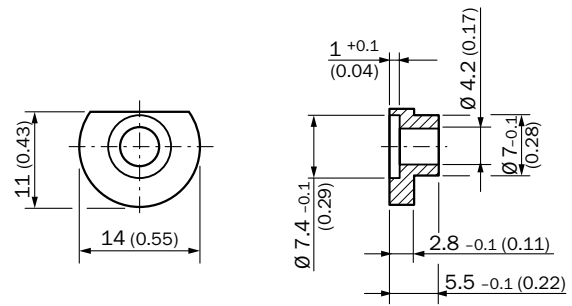


Other mounting accessories

BEF-WG-SF050

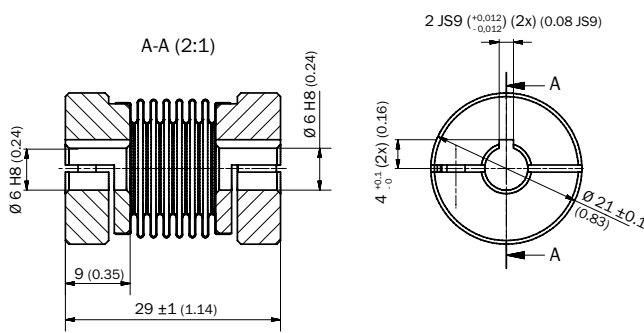


BEF-WK-SF

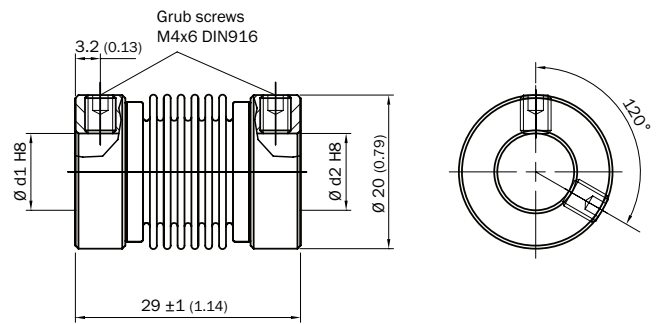


Shaft adaptation

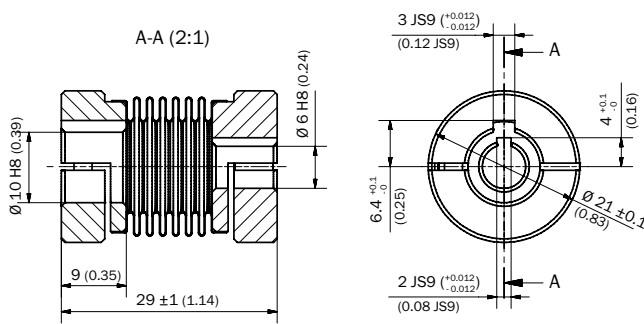
KUP-0606-BP



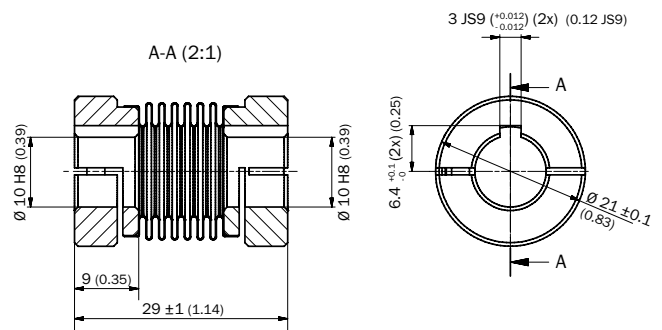
KUP-xxxx-BS



KUP-0610-BP

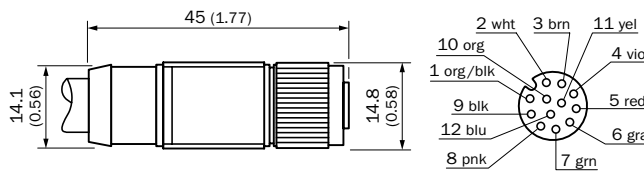


KUP-1010-BP

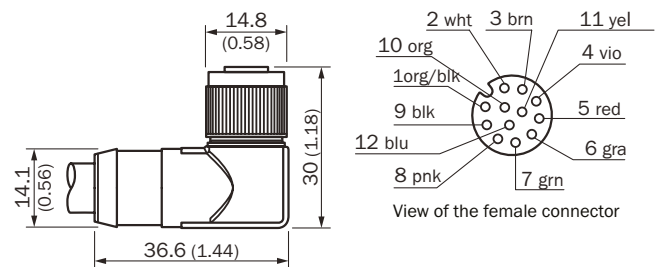


Plug connectors and cables

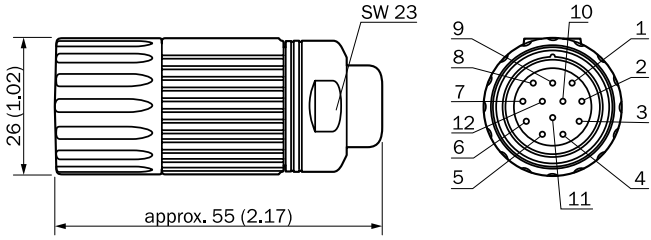
DOL-1212-GxxMAC1



DOL-1212-WxxMAC1

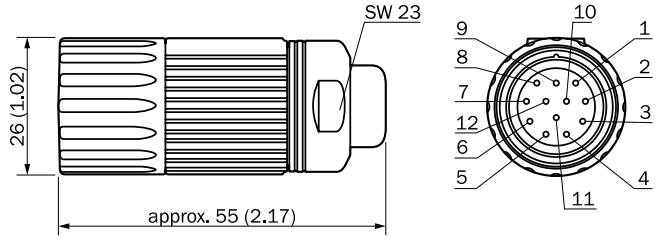


DOL-2312-G03MMD2



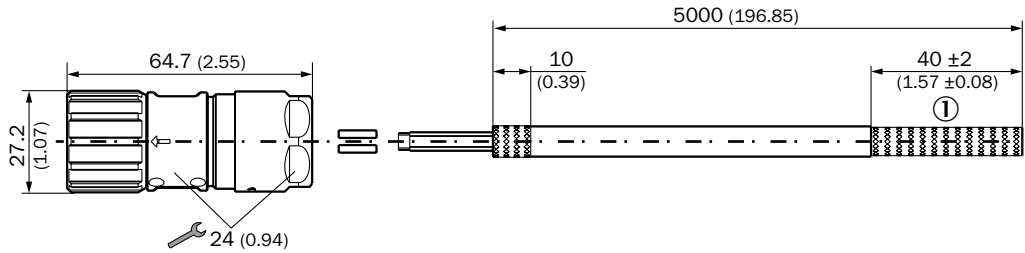
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- ③ Yellow
- ④ White
- ⑤ Orange
- ⑥ Brown
- ⑦ Purple
- ⑧ Black
- ⑨ Orange/black
- ⑩ Green
- ⑪ Gray
- ⑫ Pink

DOL-2312-G05MMD2



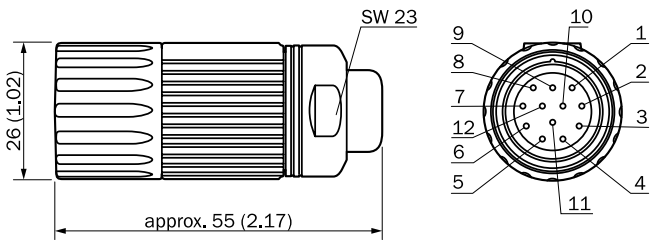
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- ⑥ Brown
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- ⑩ Green
- ⑪ Gray
- ⑫ Pink

DOL-2312-G05MXD2



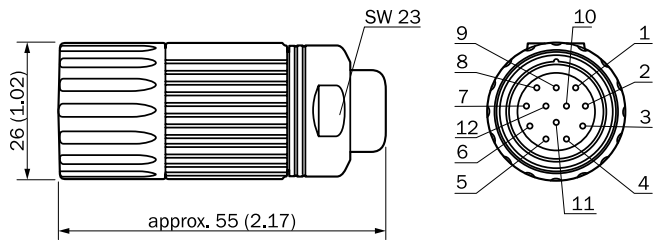
- ① Stripped

DOL-2312-G10MMD2



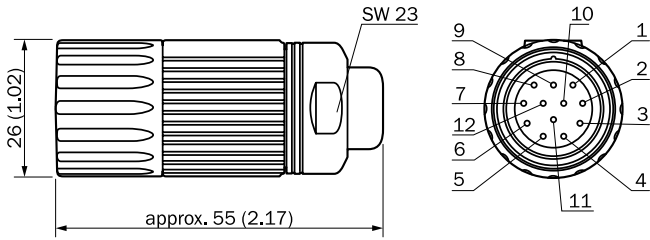
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- ④ White
- ⑤ Orange
- ⑥ Brown
- ⑦ Purple
- ⑧ Black
- ⑨ Orange/black
- ⑩ Green
- ⑪ Gray
- ⑫ Pink

DOL-2312-G1M5MD2



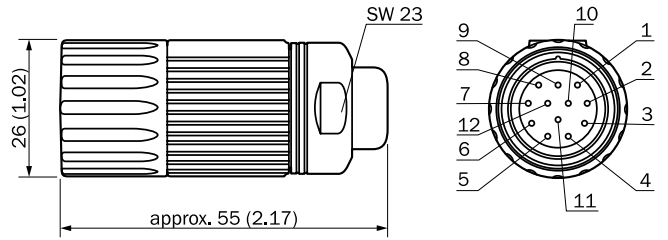
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- ④ White
- ⑤ Orange
- ⑥ Brown
- ⑦ Purple
- ⑧ Black
- ⑨ Orange/black
- ⑩ Green
- ⑪ Gray
- ⑫ Pink

DOL-2312-G20MMD2



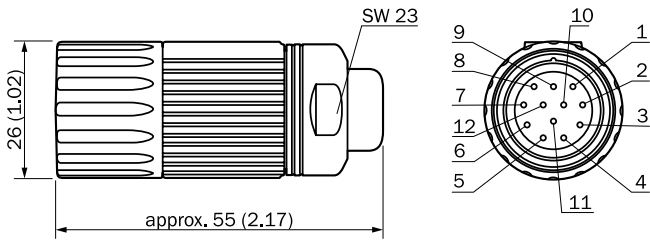
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- ④ White
- ⑤ Orange
- ⑥ Brown
- ⑦ Purple
- ⑧ Black
- ⑨ Orange/black
- ⑩ Green
- ⑪ Gray
- ⑫ Pink

DOL-2312-G30MMD2



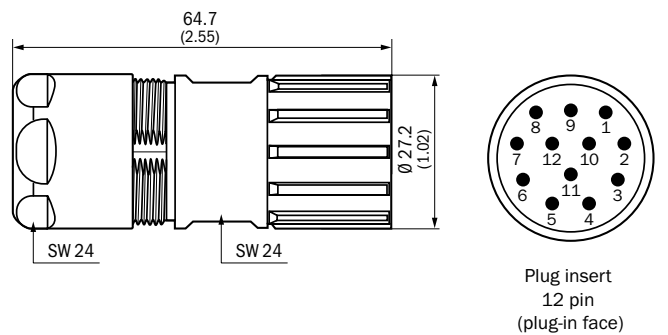
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- ⑤ Orange
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- ⑧ Black
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- ⑩ Green
- ⑪ Gray
- ⑫ Pink

DOS-2312-G

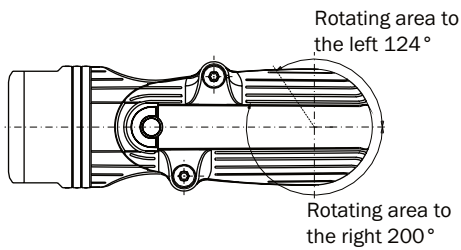
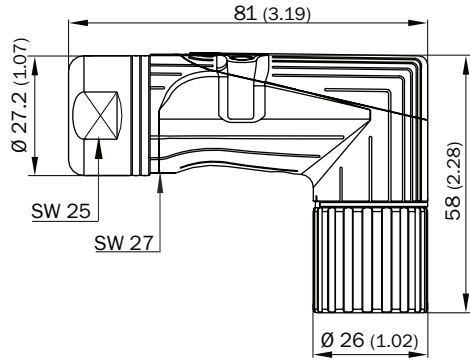


- ① Blue
- ② White
- ③ Yellow
- ④ Gray
- ⑤ Green
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- ⑦ Black
- ⑧ Red
- ⑨ Orange
- ⑩ Brown
- ⑪ Purple
- ⑫ Orange/black

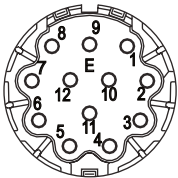
DOS-2312-G02



DOS-2312-W01

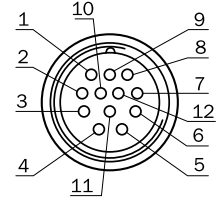
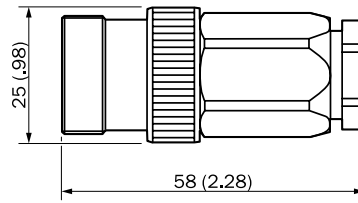


Main dimensions
Plug

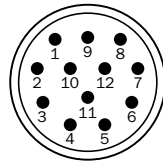
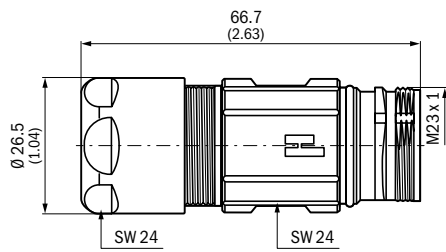


Contact arrangement
Mating view

STE-2312-G

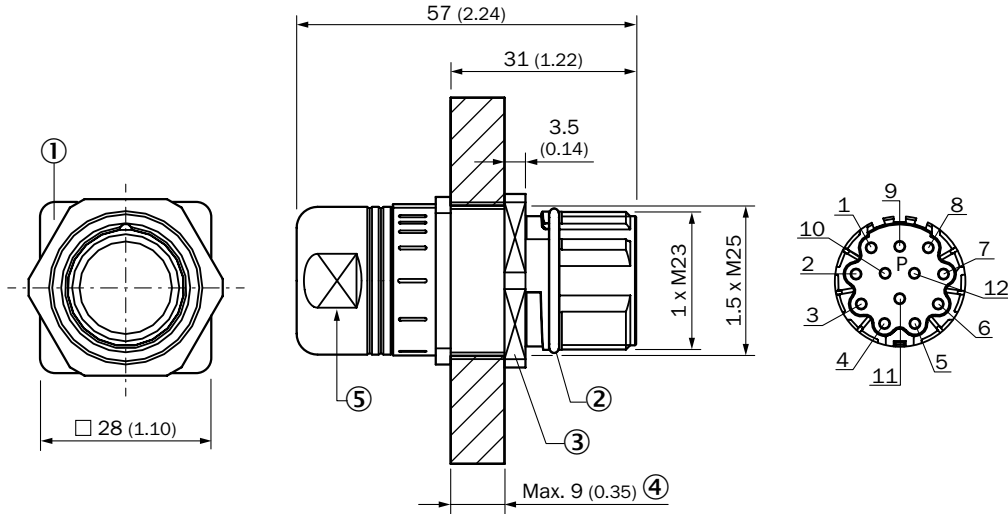


STE-2312-G01



Pin insert
12 pin
(plug-in face)

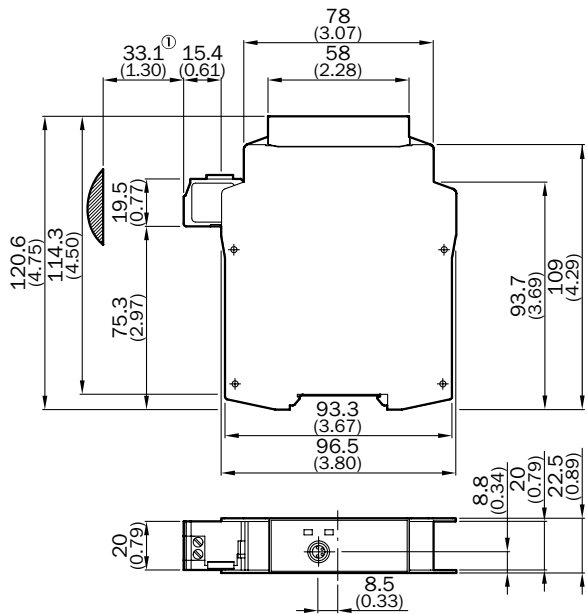
STE-2312-GX



- ① Fixed stop position
- ② Vibration protection
- ③ Fixing nut SW30
- ④ Max. wall thickness
- ⑤ SW23

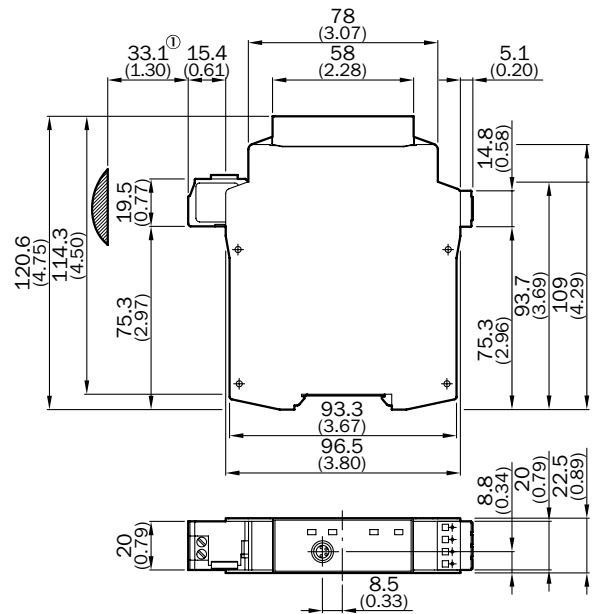
Flexi Soft

FX3-CPU0



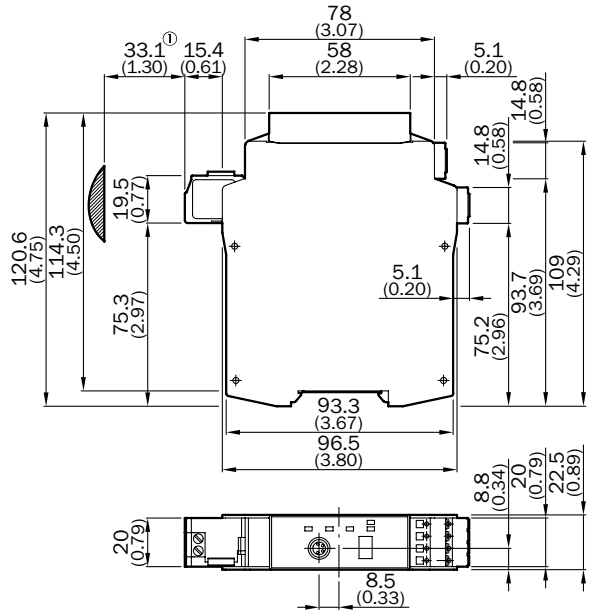
- ① Approximate connector range

FX3-CPU1, FX3-CPU2



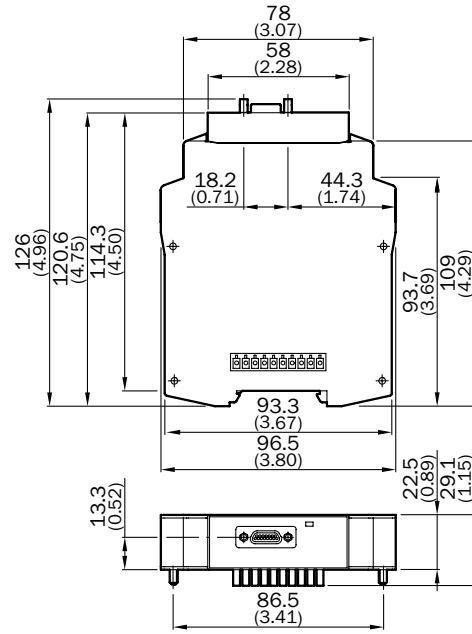
- ① Approximate connector range

CPU3



① Approximate connector range

FX3-MOC0, FX3-MOC1



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 Safe and professional
- 
Product and system support
 Reliable, fast, and on-site
- 
Verification and optimization
 Safe and regularly inspected
- 
Upgrade and retrofits
 Easy, safe, and economical
- 
Training and education
 Practical, focused, and professional

SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 9,700 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, SICK is always close to its 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.

SICK has extensive experience in various industries and understands their processes and requirements. With intelligent sensors, SICK delivers exactly what the 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 SICK a reliable supplier and development partner.

Comprehensive services round out the offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

That is “Sensor Intelligence.”

Worldwide presence:

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Hong Kong, India, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, USA, Vietnam.

Detailed addresses and further locations → www.sick.com