PRODUCT CATALOG



ENCODERS

Incremental encoders, absolute encoders, safety encoders, linear encoders, wire draw encoders

SICK
Sensor Intelligence.

A

WIDE PRODUCT SPECTRUM FOR INDUSTRIAL AUTOMATION

From simple detection tasks to sophisticated sensors in a complex production process: every product in SICK's wide portfolio offers a sensor solution that optimally combines economy and safety.

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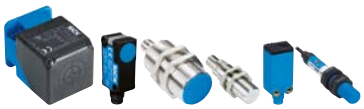
Photoelectric sensors

- MultiTask photoelectric sensors
- Miniature photoelectric sensors
- Small photoelectric sensors
- Compact photoelectric sensors
- Cylindrical photoelectric sensors
- Fiber-optic sensors and fibers



Proximity sensors

- Inductive proximity sensors
- Capacitive proximity sensors
- Magnetic proximity sensors



Magnetic cylinder sensors

- Analog positioning sensors
- Sensors for T-slot cylinders
- Sensors for C-slot cylinders
- Sensor adapters for other cylinder types



Registration sensors

- Contrast sensors
- Markless sensors
- Color sensors
- Luminescence sensors
- Fork sensors
- Array sensors
- Registration sensors



Automation light grids

- Measuring automation light grids
- Switching automation light grids



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Opto-electronic protective devices

- Safety laser scanners
- Safety light curtains
- Safety camera systems
- Multiple light beam safety devices
- Single-beam photoelectric safety switches
- Mirror columns and device columns



Safety switches

- Electro-mechanical safety switches
- Non-contact safety switches
- Safety command devices



sens:Control – safe control solutions

- Safety controllers
- Safe sensor cascades
- Safety relays



Gas analyzers

- Gas transmitters
- In-situ gas analyzers
- Extractive gas analyzers



Dust measuring devices

- Scattered light dust measuring devices
- Transmittance dust measuring devices
- Gravimetric dust measurement devices



Analyzer solutions

- CEMS solutions
- Process solutions



A

Traffic sensors

- Tunnel sensors
- Overheight detectors
- Visual range measuring devices



Ultrasonic gas flow measuring devices

- Volume flow measuring devices
- Mass flow measuring devices
- Flow velocity measuring devices
- Gas flow meters
- Flow computers



Motor feedback systems

- Motor feedback system rotary HIPERFACE®
- Motor feedback system rotary HIPERFACE DSL®
- Motor feedback system rotary incremental
- Motor feedback system rotary incremental with commutation
- Motor feedback system linear HIPERFACE®



Encoders

- Absolute encoders
- Incremental encoders
- Linear encoders
- Wire draw encoders
- Safety encoders



Identification solutions

- Bar code scanners
- Image-based code readers
- Hand-held scanners
- RFID



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Vision

- Vision sensors
- Smart cameras
- 3D vision sensors



Distance sensors

- Short range distance sensors (displacement)
- Mid range distance sensors
- Long range distance sensors
- Linear measurement sensors
- Ultrasonic sensors
- Optical data transmission
- Position finders



Detection and ranging solutions

- 2D laser scanners
- 3D laser scanners



Fluid sensors

- Level sensors
- Pressure sensors
- Flow sensors
- Temperature sensors



System solutions

- Customized analyzer systems
- Collision awareness systems
- Flexible automation systems
- Object detection systems
- Profiling systems
- Quality control systems
- Security systems
- Track and trace systems





INCREMENTAL ENCODERS

F

Versatile, compact, and flexible – Incremental encoders

Incremental encoders generate information about position, angle and rotation counts. The number of graduations per revolution determines the number of impulses that the encoder transmits to the control unit for each revolution. The current position can be determined by the control unit by counting these impulses from a reference point. When the machine is switched on, a reference run to the reference point is required to determine the absolute position of the encoder.

Your benefits

- Increased machine availability due to rugged, reliable design
- Precise determination of position and speed due to high resolution of up to 65,536 lines
- Perfect adaptation to application-specific requirements due to wide range of variants
- Small type encoders allow compact system design
- Reduced time and costs due to standardization by means of programming function, i.e., fewer part numbers, less warehouse stock, and minimization of downtime

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Product family overview F-78



DBS36 Core F-82
The multi-fit stepal encoder



DBS50 Core F-98
The multi-fit incremental encoder



DKS40 . . . . . F-110
Rugged, high-performance incremental encoder



DBS60 Core F-120
Rugged, versatile incremental encoder for industrial applications



DFS60 . . . . . F-162
High resolution, programmable encoder for demanding applications



DGS34 . . . . . F-192
Encoder with a large hollow shaft for harsh ambient conditions



DGS35 . . . . . F-192
Encoder with a large hollow shaft for harsh ambient conditions



DKV60 measuring wheel encoder F-202
Rugged, high-performance measuring wheel incremental encoder



DFV60 measuring wheel encoder F-210
High-resolution, programmable measuring wheel incremental encoder

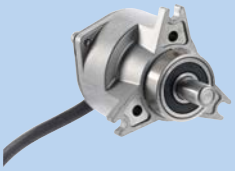
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PRODUCT FAMILY OVERVIEW

		
	DBS36 Core	**DBS50 Core**
	The multi-fit incremental encoder	The multi-fit incremental encoder
Technical data overview		
Numbers of lines / pulses from...to...	10 ... 2,500	10 ... 2,500
Mechanical design	Solid shaft, face mount flange Blind hollow shaft	Solid shaft, face mount flange
Electrical interface	4.5 V ... 5.5 V, TTL/RS422 7 V ... 30 V, TTL/RS422 7 V ... 30 V, HTL/Push Pull 7 V ... 27 V, HTL/Push Pull, 3 channel 4.5 V ... 5.5 V, Open Collector NPN 4.5 V ... 30 V, Open Collector NPN	4.5 V ... 5.5 V, TTL/RS422 7 V ... 30 V, TTL/RS422 7 V ... 30 V, HTL/Push Pull 7 V ... 27 V, HTL/Push Pull, 3 channel 4.5 V ... 5.5 V, Open Collector NPN 4.5 V ... 30 V, Open Collector NPN
Permissible shaft load (solid shaft)	20 N axial / 40 N radial	30 N axial / 50 N radial
Enclosure rating up to	IP 65	IP 65
Programmable	–	–
Maximum output frequency	≤ 300 kHz	≤ 300 kHz
Ambient temperature	–20 °C ... +85 °C	–20 °C ... +85 °C
At a glance		
	• Connection with universal cable outlet • Designs with blind hollow shaft or face mount flange with solid shaft • Face mount flange with 6 mounting hole patterns and servo groove • Hollow shaft with universal stator coupling • Compact housing diameter of 37 mm with compact construction depth, • Electrical interfaces: TTL/RS-422, HTL/Push Pull and Open Collector NPN • Number of lines: 10 to 2,500 • Temperature range: –20 °C... +85 °C • Enclosure rating: IP 65	• Connection with universal cable outlet • Face mount flange with 8 mm solid shaft • Face mount flange with 2 mounting hole patterns and servo groove • Compact housing diameter of 37 mm with compact construction depth, flange diameter 50 mm • Various electrical interfaces: TTL/RS-422, HTL/Push Pull and Open Collector NPN • Number of lines from 10 to 2,500 possible • Temperature range: –20 °C... +85 °C • Enclosure rating: IP 65
Detailed information	➜ F-82	➜ F-98

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	DKS40	DBS60 Core
		
	Rugged, high-performance incremental encoder	Rugged, versatile incremental encoder for industrial applications
	1 ... 2,048	4 ... 5,000
	Solid shaft, face mount flange	Solid shaft, face mount flange Solid shaft, servo flange Blind hollow shaft Through hollow shaft Through hollow shaft clamping at the back
	4.5 ... 5.5 V, TTL/RS422, 6 channel 10 ... 30 V, HTL/Push Pull, 6 channel 4.5 ... 5.5 V, Open Collector NPN, 3 channel 10 ... 30 V, Open Collector NPN, 3 channel	4.5 V ... 5.5 V, TTL/RS422 10 V ... 30 V, TTL/RS422 10 V ... 27 V, HTL/Push Pull 4.5 V ... 30 V, TTL/HTL universal
	20 N axial / 40 N radial	50 N axial / 100 N radial
	IP 64	IP 67
	–	–
	≤ 50 kHz / ≤ 200 kHz	≤ 300 kHz
	0 °C ... +60 °C	–20 °C ... +85 °C
	• Compact diameter • Rugged, low-cost design • Interfaces: Open collector NPN, TTL/RS–422 or HTL/Push Pull. • Connection via cable outlet, for radial or axial use with open ends or fitted with an M12 connector • Face mount flange with solid shaft • Housing for simple clamping ring mounting • Any number of lines possible from 1 to 2,048	• Face mount flange, servo flange, blind and through hollow shaft • Housing unit: Ø 58 mm; compact mounting depth, large bearing distance • Flange and stator couplings enable diverse mounting options • Number of lines: up to 5,000 pulses • Cable outlet, radial M23 or M12 male connector • TTL/RS-422 and HTL/Push-Pull, universal interface TTL/HTL with 4.5 V DC to 30 V DC • Hollow shafts: metal up to Ø 5/8", insulated up to Ø 15 mm; clamping at the front and back
	➜ F-110	➜ F-120

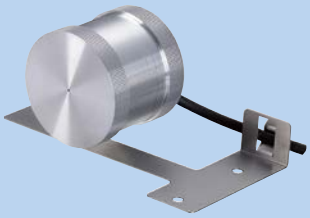
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PRODUCT FAMILY OVERVIEW

	 **DFS60**	 **DGS34/DGS35**	
	High resolution, programmable encoder for demanding applications	Encoder with a large hollow shaft for harsh ambient conditions	
Technical data overview			
Numbers of lines / pulses from...to...	Type E 100 ... 2,048 Type B 1 ... 10,000 Type A 1 ... 65,536	120 ... 16,384	
Mechanical design	Solid shaft, face mount flange Solid shaft, servo flange Blind hollow shaft Through hollow shaft	Blind hollow shaft, through hollow shaft	
Electrical interface	4.5 V ... 5.5 V, TTL/RS422 10 V ... 32 V, HTL/Push Pull 10 V ... 32 V, TTL/RS422 4.5 V ... 32 V, TTL/HTL programmable 4.5 V ... 5.5 V, sin/cos 1.0 V_{SS}	5 V, TTL 5 ... 15 V, HTL/TTL 8 ... 24 V, HTL	
Permissible shaft load (solid shaft)	40 N axial / 80 N radial	–	
Enclosure rating up to	IP 67	IP 66	
Programmable	✔	–	
Maximum output frequency	≤ 820 kHz	≤ 600 kHz	
Ambient temperature	Up to –40 °C to +100 °C	–20 °C ... +70 °C	
At a glance			
	• Short installation depth • High resolution of up to 16 bits • Optional programming: output voltage, zero pulse position, zero impulse width, counting direction, and pulse count. • Connection: radial or axial cable outlet, M23 or M12 male connector, radial or axial	• Incremental encoder with 3.5" diameter • Pulses per revolution: 120 ... 16,384 • Selection of various electrical interfaces: TTL/RS-422, HTL/Push Pull and Open Collector • High enclosure rating:IP 66 • Blind hollow shaft for shaft diameters up to 30 mm or 1–1/8" • Connection via cable outlet or 10-pin MIL male connector	
Detailed information	➜ F-162	➜ F-192	

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	DKV60 measuring wheel encoder	**DFV60 measuring wheel encoder**
	Rugged, high-performance measuring wheel incremental encoder	High-resolution, programmable measuring wheel incremental encoder
	1 ... 2,000	1 ... 65,536
	Measuring drum, knurled surface Measuring drum, O ring surface	2 measuring wheels, O ring surface
	4.5 V ... 5.5 V, TTL/RS422 10 V ... 30 V, HTL/Push Pull	4.5 V ... 32 V TTL/HTL programmable
	–	–
	IP 65	IP 65
	–	✔
	≤ 50 kHz / ≤ 200 kHz	≤ 820 kHz
	–10 °C ... +60 °C	–20 °C ... +100 °C
	• Complete, pre-assembled measuring system • Measuring wheel with knurl or O-ring for adaptation to the measuring surface • Mounting bracket made from anti-corrosive spring steel • High resolution up to 0.1 mm (1 ... 2,000 pulses/revolution) • Electrical interfaces: Open collector NPN, TTL/RS-422 or HTL/Push Pull • Connection via cable outlet, for radial or axial use with open ends or fitted with an M12 connector	• Rotating spring arm for universal use • 300 mm wheel circumference with O ring made from NBR70 • Mounting arm and measuring wheels made from aluminum • Programming output voltage, zero pulse position, zero impulse width, counting direction, and pulse count • Connection: radial M12 connector outlet or radial/axial cable outlet • Electrical interfaces: 5 V & 24 V TTL/RS-422, 24 V HTL/Push Pull • Remote zero set possible
	➜ F-202	➜ F-210

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THE MULTI-FIT INCREMENTAL ENCODER



Product description

The DBS36 Core incremental encoder features impressively high mechanical flexibility, excellent technical properties, and a number of variations. A blind hollow shaft with a shaft diameter of up to 8 mm and a face mount flange with 6 mm and 1/4" solid shaft are available. The design with face mount flange offers 2 different flanges with 6 different mounting hole patterns and a servo groove for mounting with servo clamps. The hollow shaft design has a universal stator coupling that can be used for multiple typical mounting hole circles. All models have compact dimensions and a universal cable outlet that allows for cables to run in an axial or radial direction.

At a glance

- Connection with universal cable outlet
- Designs with blind hollow shaft or face mount flange with solid shaft
- Face mount flange with 6 mounting hole patterns and servo groove
- Hollow shaft with universal stator coupling
- Compact housing diameter of 37 mm with compact construction depth,
- Electrical interfaces: TTL/RS-422, HTL/Push Pull and Open Collector NPN
- Number of lines: 10 to 2,500
- Temperature range: –20 °C... +85 °C
- Enclosure rating: IP 65

Your benefits

- The universal cable outlet allows for use in tight spaces and for flexible cabling
- Face mount flange with various mounting hole patterns provides high flexibility when mounting in existing and new applications
- Face mount flange with servo groove makes mounting with servo clamps possible
- The universal stator coupling of the DBS36 Core allows for easy device replacement without adapting the application
- Shafts in metric and US design enable worldwide use.
- The high flexibility of the mechanical interface of the encoder and the available accessories allow for the use of a single design in many applications
- Long-term and reliable operation thanks to a high enclosure rating, temperature resistance and bearing lifetime

Additional information

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→ www.mysick.com/en/DBS36_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.

8015560/2015-09-01

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Fields of application

There are numerous application possibilities for positioning and speed measurement, such as in the textile industry, propulsion technology, storage and conveyors, packaging machines, printing presses, glass industry, and elevators

Detailed technical data

Performance

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

Mechanical data

Mechanical design	Solid shaft, face mount flange Blind hollow shaft
Shaft diameter	
Solid shaft, face mount flange	6 mm x 12 mm 1/4" x 15.5 mm
Blind hollow shaft	8 mm (shaft diameter 1/4", 6 mm, 5 mm via collet possible – (see Accessories))
Mass	150 g (with connecting cable)
Shaft material	Stainless steel
Flange material	Aluminum
Housing material	Aluminum
Cable material	PVC
Start up torque	0.5 Ncm (+20 °C)
Operating torque	0.4 Ncm (+20 °C)
Permissible shaft movement, axial static/ dynamic	
Blind hollow shaft	± 0.5 mm, ± 0.2 mm
Permissible shaft movement, radial static/ dynamic	
Blind hollow shaft	± 0.3 mm, ± 0.1 mm
Permissible shaft load, radial/axial [1]	
Solid shaft, face mount flange	40 N (radial) 20 N (axial)
Operating speed	6,000/min [2] 6,000/min [3]
Maximum operating speed	8,000 rpm [4]
Rotor moment of inertia	
Solid shaft, face mount flange	0.6 gcm²
Blind hollow shaft	0.8 gcm²
Bearing lifetime	2 x 10^9 revolutions
Max. angular acceleration	≤ 500,000 rad/s²

[1] Higher values possible by limiting the overall service life.

[2] Solid shaft: Self-warming 3.3 K per 1,000 rpm.

[3] Hollow shaft: Self-warming 4.7 K per 1,000 rpm.

[4] No continuous operation. Signal quality is degraded.

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Electrical data

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

[1] M23 male connector for central mounting

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

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

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

Ambient data

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

Type code

Solid shaft

Mechanical design
- 3 Face mount flange, solid shaft, Ø 6 mm, length 12 mm
- 8 Face mount flange, solid shaft, Ø 1/4" mm, length 15.5 mm

Electrical interface
- A 4.5 ... 5.5 V, TTL/RS-422, 6 channel
- C 7 ... 30 V, TTL/RS-422, 6 channel
- E 7 ... 30 V, HTL Push Pull, 6 channel
- G 7 ... 27 V, HTL Push Pull, 3 channel
- P 4.5 ... 5.5 V, Open Collector NPN, 3 channel
- R 4.5 ... 30 V, Open Collector NPN, 3 channel

Connection type
- J Cable, 5 or 8-wire, universal, 0.5 m [1]
- K Cable, 5 or 8-wire, universal, 1.5 m [1]
- L Cable, 5 or 8-wire, universal, 3 m [1]
- M Cable, 5 or 8-wire, universal, 5 m [1]
- N Cable, 5 or 8-wire, universal, 10 m [1]
- P Cable, 8-wire universal, 0.5 m, with male connector M12, 8-pin
- Q Cable, 8-wire universal, 0.5 m, with male connector M23, 12-pin

Flange design
- 0 Face mount flange, standard hole pattern
- A Face mount flange, hole pattern A (only with shaft S3)

Resolution
- 0010... 2,500 pulses per revolution possible. For pulses see “Pulses per revolution” [2]

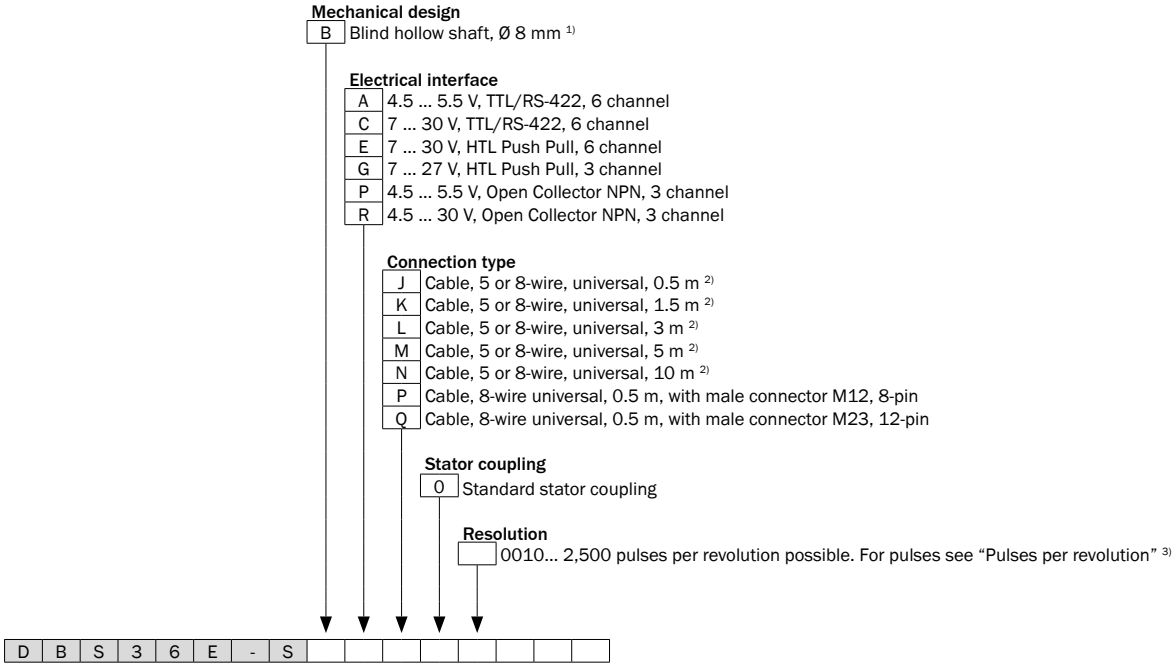
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[1] Number of wires depending on electrical interface: Interface A, C, E: 8-wire; Interface G, P, R: 5-wire.

[2] Other pulse on request.

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Hollow shaft



1) Shaft diameter 1/4", 6 mm, 5 mm via collet possible (see Accessories).

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

3) Other pulse on request.

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Pulses per revolution 1)

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

1) Additional available upon request.

Ordering information

Solid shaft, face mount flange

- **Shaft diameter:** 6 mm

Electrical interface	Voltage range	Connection type	Range of pulses per revolution	Type	Part no.
TTL/RS422	4.5 V ... 5.5 V	Cable, 8-wire universal, 0.5 m	100	DBS36E-S3AJ00100	1061237
			360	DBS36E-S3AJ00360	1061238
			400	DBS36E-S3AJ00400	1061239
			500	DBS36E-S3AJ00500	1061240
			1,024	DBS36E-S3AJ01024	1060867
		Cable, 8-wire, universal, 1.5 m	100	DBS36E-S3AK00100	1060535
			360	DBS36E-S3AK00360	1060536
			400	DBS36E-S3AK00400	1060537
			500	DBS36E-S3AK00500	1060538
			1,000	DBS36E-S3AK01000	1060539
			1,024	DBS36E-S3AK01024	1060144
			2,048	DBS36E-S3AK02048	1058602
			2,500	DBS36E-S3AK02500	1060268
	7 V ... 30 V	Cable, 8-wire universal, 0.5 m	500	DBS36E-S3CJ00500	1066387
		Cable, 8-wire, universal, 1.5 m	100	DBS36E-S3CK00100	1063772
			500	DBS36E-S3CK00500	1062944
			1,000	DBS36E-S3CK01000	1064515
			1,024	DBS36E-S3CK01024	1067267
			2,048	DBS36E-S3CK02048	1059906
			2,500	DBS36E-S3CK02500	1068997
HTL/Push Pull	7 V ... 30 V	Cable, 8-wire, universal, 0.5 m	100	DBS36E-S3EJ00100	1061242
			360	DBS36E-S3EJ00360	1061243
			400	DBS36E-S3EJ00400	1061244
			500	DBS36E-S3EJ00500	1061245
			1,000	DBS36E-S3EJ01000	1061246
			1,024	DBS36E-S3EJ01024	1061247
		Cable, 8-wire, universal, 1.5 m	100	DBS36E-S3EK00100	1060540
			200	DBS36E-S3EK00200	1062679
			256	DBS36E-S3EK00256	1065241
			360	DBS36E-S3EK00360	1060541
			400	DBS36E-S3EK00400	1060542
			500	DBS36E-S3EK00500	1060543
			1,000	DBS36E-S3EK01000	1060544
			1,024	DBS36E-S3EK01024	1060545
			2,048	DBS36E-S3EK02048	1059907
			2,500	DBS36E-S3EK02500	1061133
		Cable, 8-wire with male connector M12, universal, 0.5 m	2,048	DBS36E-S3EP02048	1068156

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Blind hollow shaft

- **Shaft diameter:** 8 mm

Electrical interface	Voltage range	Connection type	Range of pulses per revolution	Type	Part no.
TTL/RS422	4.5 V ... 5.5 V	Cable, 8-wire universal, 0.5 m	360	DBS36E-BBAJ00360	1061249
			400	DBS36E-BBAJ00400	1061250
			500	DBS36E-BBAJ00500	1061251
			1,000	DBS36E-BBAJ01000	1061252
			1,024	DBS36E-BBAJ01024	1060868
		Cable, 8-wire, universal, 1.5 m	100	DBS36E-BBAK00100	1060524
			360	DBS36E-BBAK00360	1060525
			400	DBS36E-BBAK00400	1060526
			500	DBS36E-BBAK00500	1060527
			1,000	DBS36E-BBAK01000	1060528
			1,024	DBS36E-BBAK01024	1060147
			2,048	DBS36E-BBAK02048	1058603
			2,500	DBS36E-BBAK02500	1061235
	7 V ... 30 V	Cable, 8-wire, universal, 1.5 m	100	DBS36E-BBCK00100	1060148
			1,000	DBS36E-BBCK01000	1065589
		Cable, 8-wire with male connector M12, universal, 0.5 m	2,048	DBS36E-BBCP02048	1062240
HTL/Push Pull	7 V ... 30 V	Cable, 8-wire universal, 0.5 m	100	DBS36E-BBEJ00100	1061253
			360	DBS36E-BBEJ00360	1061254
			400	DBS36E-BBEJ00400	1061255
			500	DBS36E-BBEJ00500	1061256
			1,000	DBS36E-BBEJ01000	1061257
			1,024	DBS36E-BBEJ01024	1061258
			2,000	DBS36E-BBEJ02000	1068715
			2,500	DBS36E-BBEJ02500	1062490
		Cable, 8-wire, universal, 1.5 m	100	DBS36E-BBEK00100	1060529
			200	DBS36E-BBEK00200	1064320
			360	DBS36E-BBEK00360	1060530
			400	DBS36E-BBEK00400	1060531
			500	DBS36E-BBEK00500	1060532
			1,000	DBS36E-BBEK01000	1060533
			1,024	DBS36E-BBEK01024	1060534
			2,048	DBS36E-BBEK02048	1059910
		Cable, 8-wire with male connector M12, universal, 0.5 m	100	DBS36E-BBEP00100	1065770
			200	DBS36E-BBEP00200	1068935

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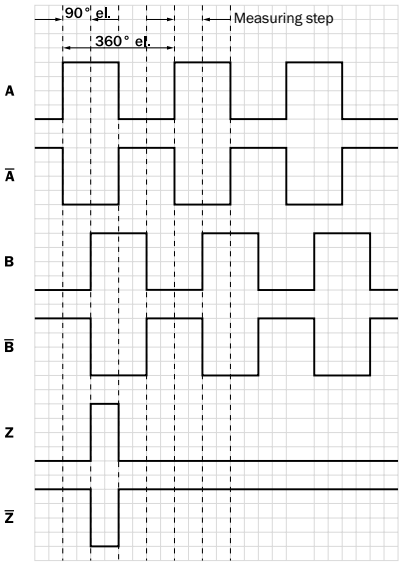
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Electrical interface	Voltage range	Connection type	Range of pulses per revolution	Type	Part no.
Open collector	4.5 V ... 5.5 V	Cable, 8-wire, universal, 1.5 m	200	DBS36E-BBPK00200	1065144
			500	DBS36E-BBPK00500	1064120
			1,000	DBS36E-BBPK01000	1067836
			2,048	DBS36E-BBPK02048	1059911
			2,500	DBS36E-BBPK02500	1065791
		Cable, 8-wire with male connector M12, universal, 0.5 m	360	DBS36E-BBAP00360	1067379
			500	DBS36E-BBAP00500	1068192
			1,000	DBS36E-BBAP01000	1066259
			1,024	DBS36E-BBAP01024	1062784
			2,500	DBS36E-BBAP02500	1062785

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Interfaces

Signal outputs for electrical interfaces TTL and HTL



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

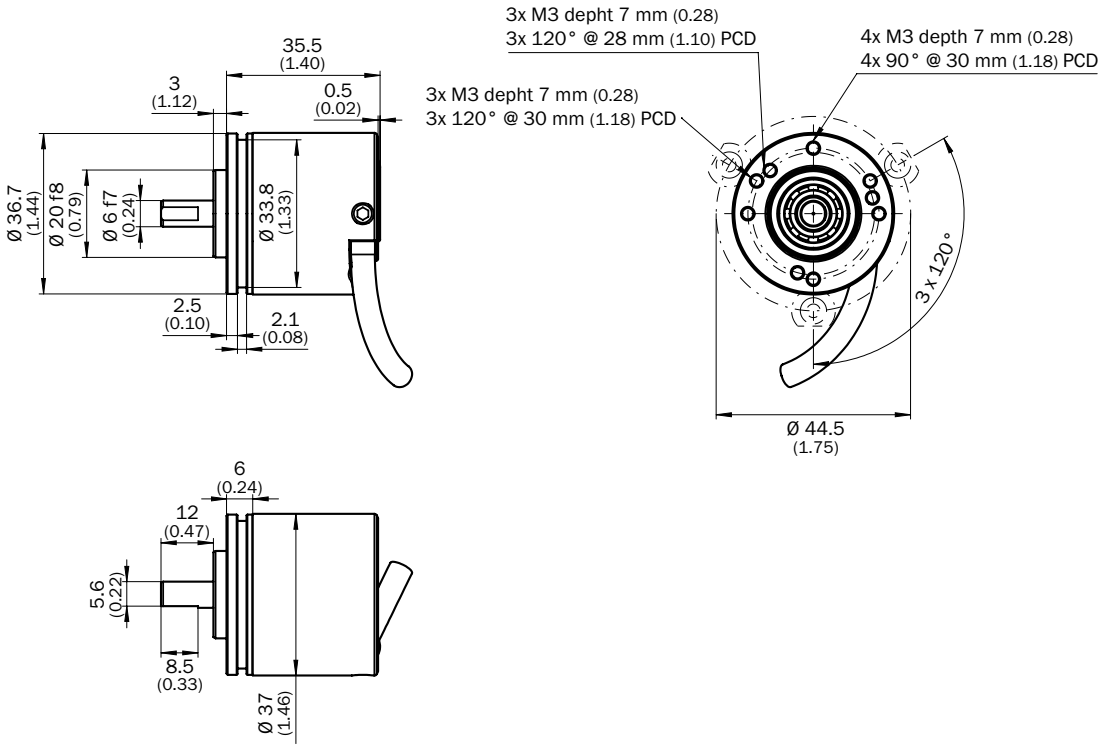
Interfaces G, P, R only for channels A, B, Z.

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

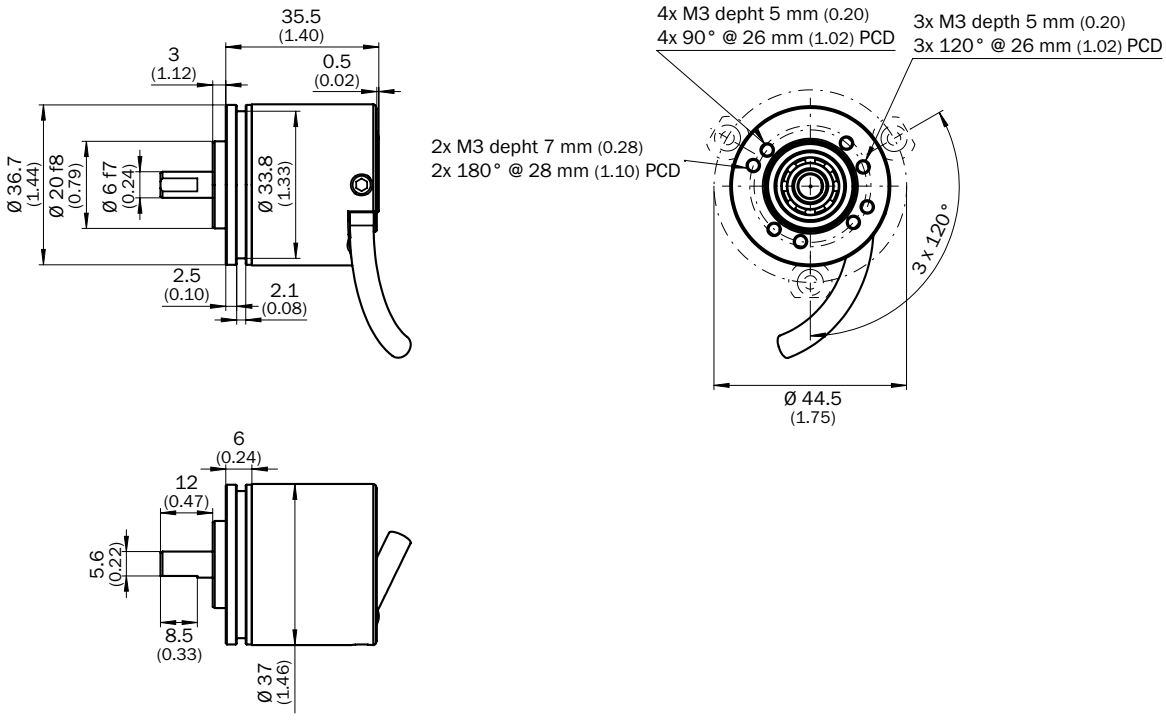
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Dimensional drawings (dimensions in mm)

Solid shaft, face mount flange, shaft 6 mm x 12 mm, standard hole pattern

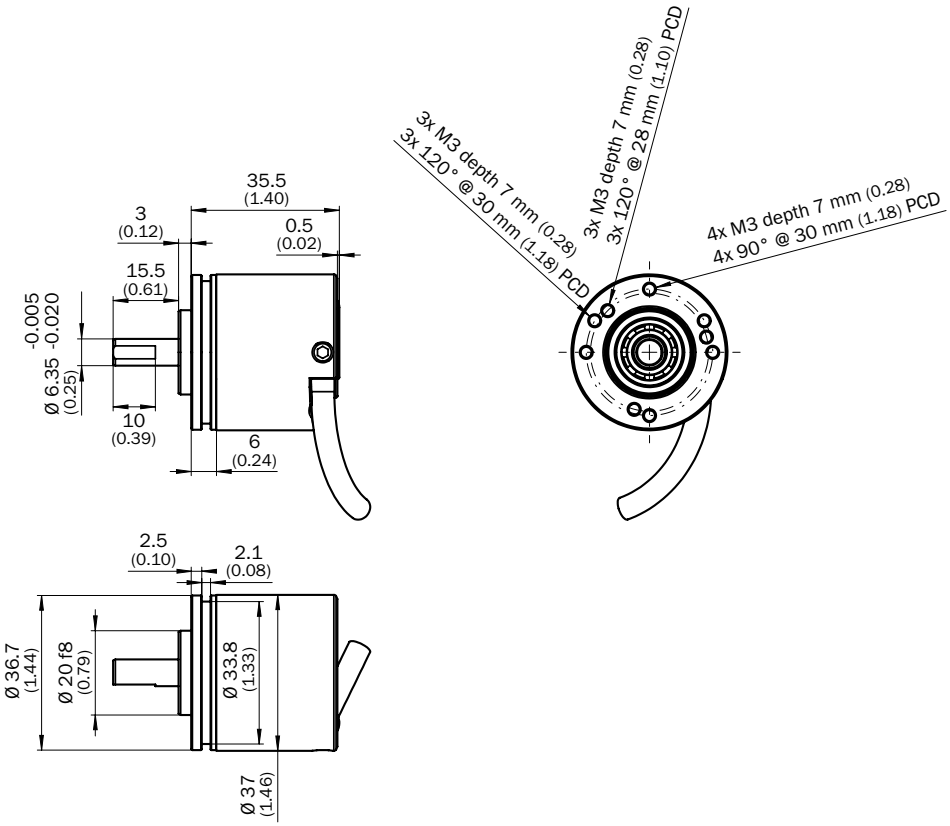


Solid shaft, face mount flange, shaft 6 mm x 12 mm, Type A flange design hole pattern



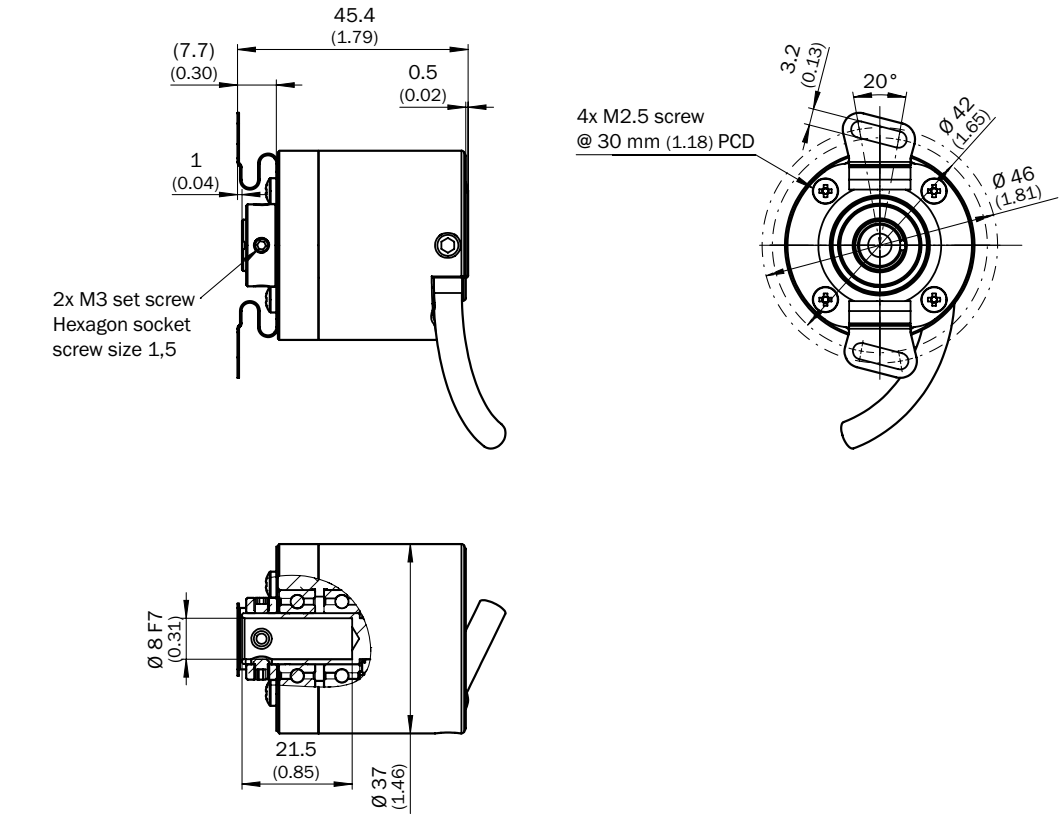
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Solid shaft, face mount flange, shaft 1/4" x 15.5 mm, standard hole pattern



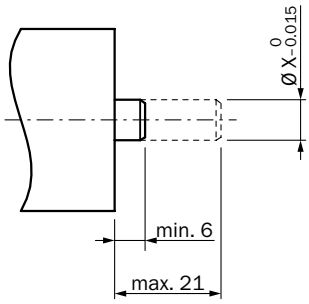
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Blind hollow shaft, cable outlet



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Proposed fitting

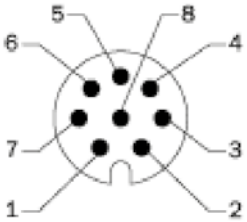


Diameter X	Encoder	Collet
5 mm	DBS36E-BB	2066991
6 mm		2056390
1/4“		upon request
8 mm		not required

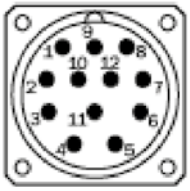
PIN assignment

8-core cable

View of M12 device connector on cable



View of M23 device connector on cable



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

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Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 20 mm, including mounting kit for face mount flange	BEF-WF-20	2066393

Flanges

Flange plate

Figure	Brief description	Type	Part no.
	Flange adapter, adaption of face mount flange with centering hub 20 mm to 33 mm servo flange, aluminum	BEF-FA-020-033	2066312

Other mounting accessories

Measuring wheels and measuring wheel systems

Figure	Brief description	Type	Part no.
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	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

Servo clamps

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

Miscellaneous

Figure	Brief description	Type	Part no.
	Two-sided stator coupling, screw hole diameter 42 - 46 mm, slot width 3.2 mm	BEF-DS-DBS36	2066301

Shaft adaptation

Collets and clamping rings

Figure	Brief description	Type	Part no.
	Collet for blind hollow shaft, shaft diameter 5 mm, external diameter 8 mm	SPZ-005-AD-A	2066991
	Collet for blind hollow shaft, shaft diameter 6 mm, external diameter 8 mm	SPZ-006-DD36-A	2056390

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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	KUP-0606-B	5312981
	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 °C to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	Bar coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle ± 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, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°, max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0608-S	5314179
	Double-loop coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C to +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0610-D	5326697
	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 °C to +80 °C, max. torque 60 Ncm; material: aluminum flange, fiber-glass reinforced polyamide membrane and tempered steel coupling pin	KUP-0610-F	5312985

Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm², 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 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	2 m	DOL-2312-G02MLA3	2030682
		7 m	DOL-2312-G07MLA3	2030685
		10 m	DOL-2312-G10MLA3	2030688
		15 m	DOL-2312-G15MLA3	2030692
		20 m	DOL-2312-G20MLA3	2030695
		25 m	DOL-2312-G25MLA3	2030699
		30 m	DOL-2312-G30MLA3	2030702
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: incremental, suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	1.5 m	DOL-2312-G1M5MA3	2029212
		3 m	DOL-2312-G03MMA3	2029213
		5 m	DOL-2312-G05MMA3	2029214
		10 m	DOL-2312-G10MMA3	2029215
		20 m	DOL-2312-G20MMA3	2029216
		30 m	DOL-2312-G30MMA3	2029217

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

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Female connectors (ready to assemble)

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

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	By the meter	LTG-2308-MWENC	6027529
	Head A: cable Head B: cable Cable: PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm		LTG-2612-MW	6028516

Male connector (ready to assemble)

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

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

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THE MULTI-FIT INCREMENTAL ENCODER



Product description

The DBS50 Core incremental encoder features impressively high mechanical flexibility, excellent technical properties, and a number of variations. The DBS50E has a face mount flange with 50 mm diameter and a solid shaft with 8 mm diameter. The housing diameter is extremely compact at 37 mm and thus saves valuable space. The face mount flange offers 2 different mounting hole patterns and a servo groove for mounting with servo clamps. The encoder has compact dimensions and a universal cable outlet that allows for cables to run in an axial or radial direction. The DBS50 Core incremental encoder is fully compatible with the DDS50E incremental encoder.

At a glance

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

Your benefits

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

Additional information

Fields of application F-99
Detailed technical data. F-99
Type code. F-102
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Interfaces. F-104
Dimensional drawings F-105
PIN assignment. F-106
Recommended accessories. F-106

→ www.mysick.com/en/DBS50_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.

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Fields of application

There are numerous application possibilities for positioning and speed measurement, such as in the textile industry, propulsion technology, storage and conveyors, packaging machines, printing presses, glass industry, and elevators

Detailed technical data

Performance

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

Mechanical data

Mechanical design	Solid shaft, face mount flange
Shaft diameter	8 mm x 15.5 m
Mass	170 g (with connecting cable 1.5 m)
Shaft material	Stainless steel
Flange material	Aluminum
Housing material	Aluminum
Cable material	PVC
Start up torque	0.9 Ncm (+20 °C)
Operating torque	0.6 Ncm (+20 °C)
Permissible shaft load, radial/axial	30 N (axial) 50 N (radial)
Operating speed	6,000 / min [1]
Maximum operating speed	8,000 rpm [2]
Rotor moment of inertia	0.65 gcm²
Bearing lifetime	2 x 10^9 revolutions
Max. angular acceleration	≤ 500,000 rad/s²

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

[2] No continuous operation. Signal quality is degraded.

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Electrical data

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

[1] M23 male connector for central mounting.

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

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

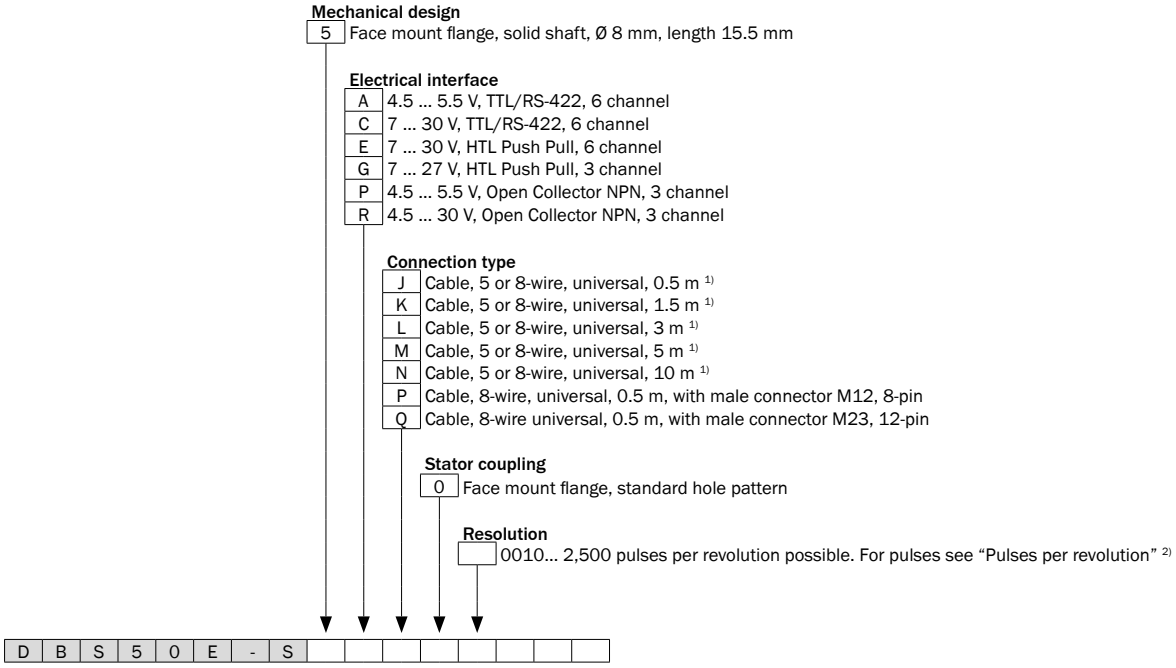
[4] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of devices, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information,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

Ambient data

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

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Type code



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

2) Other pulse on request.

Pulses per revolution 1)

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

1) Additional available upon request.

Ordering information

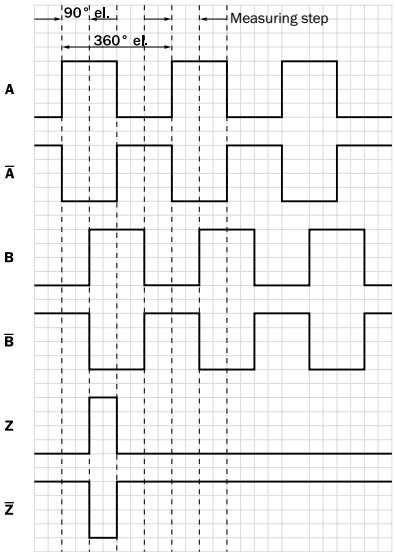
Solid shaft, face mount flange

- **Shaft diameter:** 8 mm

Electrical interface	Voltage range	Connection type	Range of pulses per revolution	Type	Part no.
TTL/RS422	4.5 V ... 5.5 V	Cable, 8-wire universal, 0.5 m	100	DBS50E-S5AJ00100	1061259
			360	DBS50E-S5AJ00360	1061260
			400	DBS50E-S5AJ00400	1061261
			500	DBS50E-S5AJ00500	1061262
			1,000	DBS50E-S5AJ01000	1061263
			1,024	DBS50E-S5AJ01024	1060870
			2,048	DBS50E-S5AJ02048	1061085
			2,500	DBS50E-S5AJ02500	1061086
		Cable, 8-wire, universal, 1.5 m	100	DBS50E-S5AK00100	1060685
			360	DBS50E-S5AK00360	1060686
			400	DBS50E-S5AK00400	1060687
			500	DBS50E-S5AK00500	1060688
			1,000	DBS50E-S5AK01000	1060145
			1,024	DBS50E-S5AK01024	1060689
			2,048	DBS50E-S5AK02048	1057446
			2,500	DBS50E-S5AK02500	1062722
		Cable, 8-wire with male connector M12, universal, 0.5 m	500	DBS50E-S5AP00500	1066755
			2,000	DBS50E-S5AP02000	1064388
	7 V ... 30 V	Cable, 8-wire, universal, 1.5 m	1,000	DBS50E-S5CK01000	1066828
			2,048	DBS50E-S5CK02048	1059902
			2,500	DBS50E-S5CK02500	1061172
HTL/Push Pull	7 V ... 30 V	Cable, 8-wire universal, 0.5 m	100	DBS50E-S5EJ00100	1061264
			360	DBS50E-S5EJ00360	1061265
			400	DBS50E-S5EJ00400	1061266
			500	DBS50E-S5EJ00500	1061267
			1,000	DBS50E-S5EJ01000	1061268
			1,024	DBS50E-S5EJ01024	1061269
		Cable, 8-wire, universal, 1.5 m	2,000	DBS50E-S5EK02000	1062698
			100	DBS50E-S5EK00100	1060690
			360	DBS50E-S5EK00360	1060691
			400	DBS50E-S5EK00400	1060692
			500	DBS50E-S5EK00500	1060693
			1,000	DBS50E-S5EK01000	1060694
			1,024	DBS50E-S5EK01024	1060695
			2,048	DBS50E-S5EK02048	1059903
			2,500	DBS50E-S5EK02500	1061230
		Cable, 8-wire with male connector M12, universal 0.5 m	100	DBS50E-S5EP00100	1067000
			360	DBS50E-S5EP00360	1066061
			1,000	DBS50E-S5EP01000	1062886
			1,024	DBS50E-S5EP01024	1068207
			2,000	DBS50E-S5EP02000	1066174

Interfaces

Signal outputs for electrical interfaces TTL and HTL



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

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

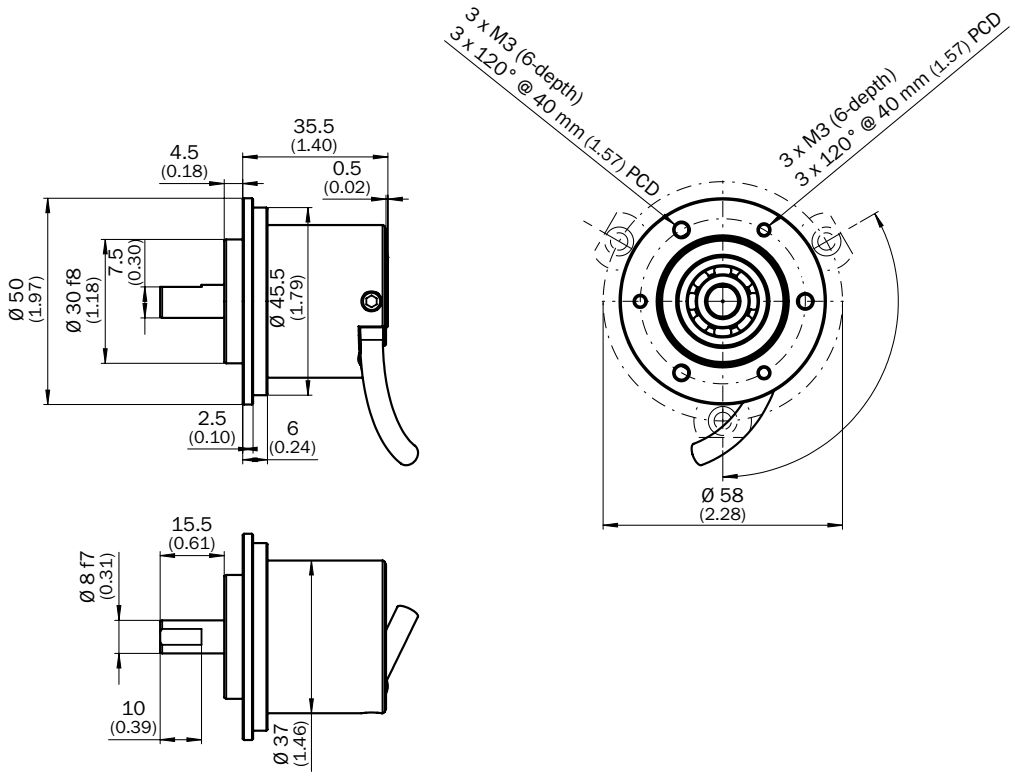
Interfaces G, P, R only for channels A, B, Z.

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Dimensional drawings (dimensions in mm)

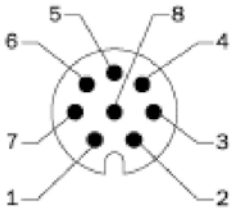


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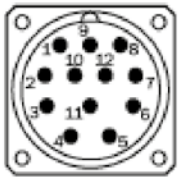
PIN assignment

8-core cable

View of M12 device connector on cable



View of M23 device connector on cable



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

F

Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

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

Other mounting accessories

Measuring wheels and measuring wheel systems

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

Modular measuring wheel system

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

Servo clamps

Figure	Brief description	Type	Part no.
	Servo clamps, small, for servo flanges (clamps, eccentric fastener), 3 pcs., without mounting material	BEF-WK-RES0L	2039082

Shaft adaptation

Shaft couplings

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

Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm², 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 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	2 m	DOL-2312-G02MLA3	2030682
		7 m	DOL-2312-G07MLA3	2030685
		10 m	DOL-2312-G10MLA3	2030688
		15 m	DOL-2312-G15MLA3	2030692
		20 m	DOL-2312-G20MLA3	2030695
		25 m	DOL-2312-G25MLA3	2030699
		30 m	DOL-2312-G30MLA3	2030702
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: incremental, suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	1.5 m	DOL-2312-G1M5MA3	2029212
		3 m	DOL-2312-G03MMA3	2029213
		5 m	DOL-2312-G05MMA3	2029214
		10 m	DOL-2312-G10MMA3	2029215
		20 m	DOL-2312-G20MMA3	2029216
		30 m	DOL-2312-G30MMA3	2029217

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

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Female connectors (ready to assemble)

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

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	By the meter	LTG-2308-MWENC	6027529
	Head A: cable Head B: cable Cable: PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², 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 mm² + 2 x 0.5 mm² +2 x 0.14 mm², Ø 7.8 mm		LTG-2612-MW	6028516

Male connector (ready to assemble)

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

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

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RUGGED, HIGH-PERFORMANCE INCREMENTAL ENCODER



Product description

The DKS40 incremental encoder offers an outstanding price-performance ratio. Its housing is made of solid zinc die cast and, with an external diameter of 50 mm, it is extremely compact, saving valuable installation space. Use of mini-disc technology makes the DKS40 extremely resistant to shock and vibration. In addition, the DKS40 has a high IP 64 enclosure rating.

At a glance

- Compact diameter
- Rugged, low-cost design
- Interfaces: Open collector NPN, TTL/RS-422 or HTL/Push Pull.
- Connection via cable outlet, for radial or axial use with open ends or fitted with an M12 connector
- Face mount flange with solid shaft
- Housing for simple clamping ring mounting
- Any number of lines possible from 1 to 2,048

Your benefits

- Low-cost encoder with outstanding quality
- Withstands harsh ambient conditions due to high IP protection class and rugged design
- Universal cable outlet enables axial and radial cable guidance
- Compact dimensions enable simple installation even where space is cramped

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Additional information

Fields of application F-111
Detailed technical data. F-111
Type code. F-112
Ordering information. F-113
Dimensional drawings F-114
PIN assignment. F-115
Recommended accessories. F-115

→ www.mysick.com/en/DKS40

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Due to the variety of products, there is a wide range of application possibilities such as in tool machines, textile machines, wood processing machines, packaging machinery

Detailed technical data

Performance

Pulses per revolution	1 ... 2,048
Error limits binary pulses	0.09° [1]
Error limits non-binary pulses	0.13° [2]
Measuring step deviation at binary number of lines	0.035°
Measuring step deviation at non-binary number of lines	0.07°
Initialization time	40 ms
Measurement step	90° electrical/pulses per revolution

[1] "Binary" number of lines: 2n, where n is a whole number

[2] "Non-binary" number of lines: 2n, where n is not a whole number

Mechanical data

Mechanical design	Solid shaft
Shaft diameter	8 mm x 13 mm
Mass	0.18 kg
Start up torque	0.6 Ncm (+20 °C)
Operating torque	0.4 Ncm (+20 °C)
Permissible shaft load, radial/axial	40 N, 20 N
Maximum operating speed	6,000 rpm
Rotor moment of inertia	6 gcm²
Bearing lifetime	2 x 10^9 revolutions
Max. angular acceleration	5 x 10^5 rad/s²

Electrical data

Electrical interface	4.5 ... 5.5 V, TTL/RS422, 6 channel 10 ... 30 V, HTL/Push Pull, 6 channel 4.5 ... 5.5 V, Open Collector NPN, 3 channel 10 ... 30 V, Open Collector NPN, 3 channel
Connection type	Cable, 8-wire, universal outlet, 0.5 m [1] Cable, 8-wire, universal outlet, 1.5 m [1] Cable, 8-wire, universal outlet, 3.0 m [1] Cable, 8-wire, universal outlet, 5.0 m [1] Cable, 8-pin, universal outlet, 1.5 m, male connector M12 [1]
Operating current without load	≤ 40 mA
Supply voltage	4.5 V ... 5.5 V 10 V ... 30 V
Load current	≤ 30 mA
Maximum output frequency	
Open Collector NPN	≤ 50 kHz
TTL/RS422	≤ 200 kHz
HTL/Push Pull	≤ 200 kHz

[1] The universal cable outlet is positioned so that it is possible to lay it without bends in a radial and axial direction.

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

Reference signal, number	1
Reference signal, position	90° electric, logically gated with A and B
MTTFd: mean time to dangerous failure	600 years (EN ISO 13849-1) [2]

[1] The universal cable outlet is positioned so that it is possible to lay it without bends in a radial and axial direction.

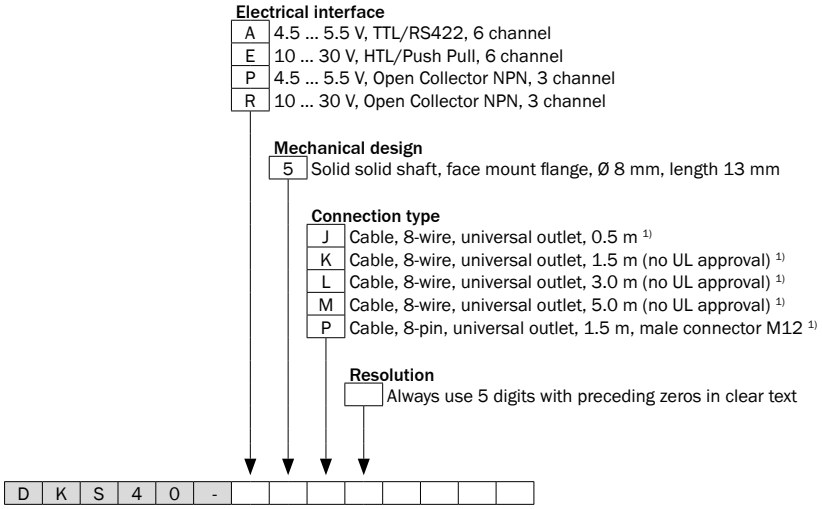
[2] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of devices, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information,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

Ambient data

EMC	EN 61000-6-2, EN 61000-6-3
Enclosure rating as per IEC 60529	IP 64
Air humidity	90% [1]
Operating temperature range	0 °C ... +60 °C
Storage temperature range	–40 °C ... +70 °C, without packaging
Resistance to shocks	50 g/ 7 ms (EN 60068-2-27)
Resistance to vibrations	20 g / 10 Hz ... 2,000 Hz (EN 60068-2-6)

[1] Condensation of optical surfaces not permitted.

Type code



[1] The universal cable outlet is positioned so that it is possible to lay it without bends in a radial and axial direction.

Ordering information

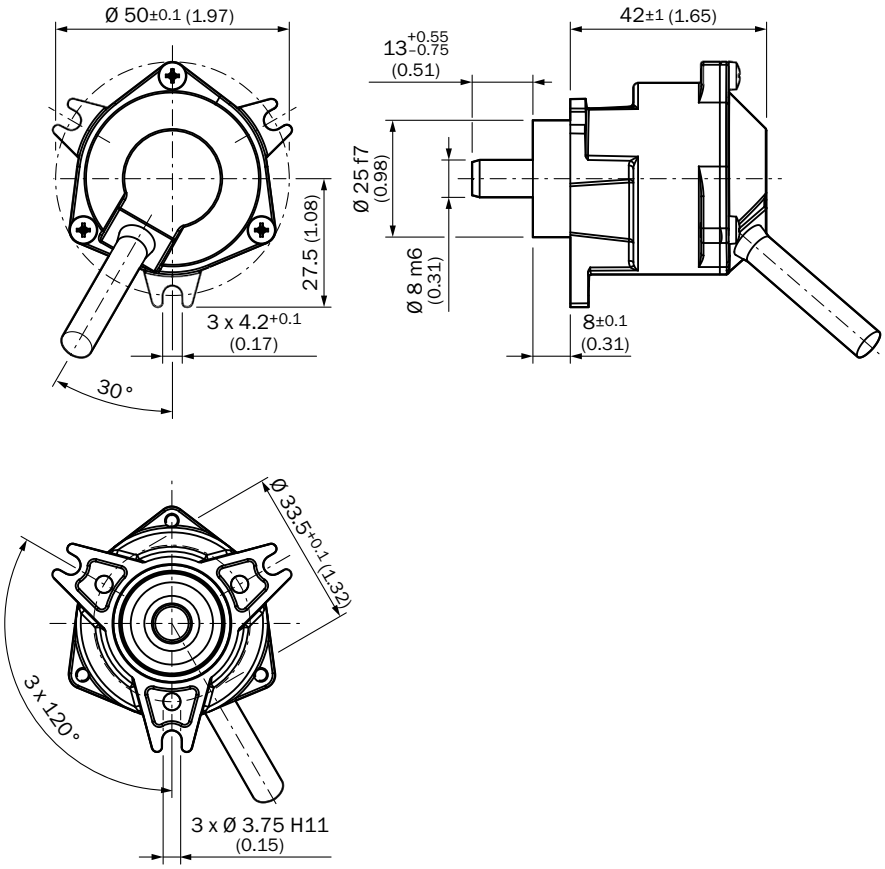
- **Mechanical design:** solid shaft, face mount flange

Electrical interface	Connection type	Pulses per revolution	Type	Part no.
10 ... 30 V Open Collector NPN	Cable, universal, 0.5 m	10	DKS40-R5J00010	1034621
		20	DKS40-R5J00020	1034622
		50	DKS40-R5J00050	1034623
		100	DKS40-R5J00100	1034624
		200	DKS40-R5J00200	1034625
		250	DKS40-R5J00250	1034626
		256	DKS40-R5J00256	1034627
		360	DKS40-R5J00360	1034628
		500	DKS40-R5J00500	1034629
		512	DKS40-R5J00512	1034630
		720	DKS40-R5J00720	1034631
		800	DKS40-R5J00800	1036154
		1,000	DKS40-R5J01000	1034632
		1,024	DKS40-R5J01024	1034633
		2,000	DKS40-R5J02000	1034813
		2,048	DKS40-R5J02048	1034814
4.5 ... 5.5 V TTL/RS422	Cable, universal, 0.5 m	4	DKS40-A5J00004	1036293
		10	DKS40-A5J00010	1034634
		20	DKS40-A5J00020	1034635
		50	DKS40-A5J00050	1034636
		100	DKS40-A5J00100	1034637
		200	DKS40-A5J00200	1034638
		250	DKS40-A5J00250	1034639
		360	DKS40-A5J00360	1034641
		500	DKS40-A5J00500	1034642
		512	DKS40-A5J00512	1034643
		720	DKS40-A5J00720	1034644
		1,000	DKS40-A5J01000	1034645
		1,024	DKS40-A5J01024	1034646
		2,000	DKS40-A5J02000	1034815
		2,048	DKS40-A5J02048	1034816

Electrical interface	Connection type	Pulses per revolution	Type	Part no.
10 ... 30 V HTL/Push Pull		10	DKS40-E5J00010	1034647
		20	DKS40-E5J00020	1034648
		50	DKS40-E5J00050	1034649
		100	DKS40-E5J00100	1034650
		200	DKS40-E5J00200	1034651
		250	DKS40-E5J00250	1034652
		256	DKS40-E5J00256	1034653
		360	DKS40-E5J00360	1034654
		500	DKS40-E5J00500	1034655
		512	DKS40-E5J00512	1034656
		720	DKS40-E5J00720	1034657
		1,000	DKS40-E5J01000	1034658
		1,024	DKS40-E5J01024	1034659
		2,000	DKS40-E5J02000	1034817
		2,048	DKS40-E5J02048	1034818

Dimensional drawings (dimensions in mm)

Face mount flange, cable output

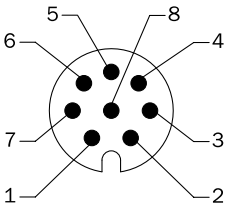


General tolerances according to ISO 2768-mk

PIN assignment

Cable, 8-wire

View of male connector, device side



PIN, 8-pin, M12 male connector	Wire colors	OC signal	TTL/HTL signal	Explanation
1	Brown	Not assigned	$\overline{A}$	Signal wire
2	White	A	A	Signal wire
3	Black	Not assigned	$\overline{B}$	Signal wire
4	Pink	B	B	Signal wire
5	Yellow	Not assigned	$\overline{Z}$	Signal wire
6	Violet	Z	Z	Signal wire
7	Blue	GND	GND	Ground connection of the encoder
8	Red	$+U_S$	$+U_S$	Supply voltage (volt-free to housing)
Screen	Screen	Screen	Screen	Screen, connected to housing on the encoder side. Connected to ground on control side.

F

Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 25 mm, including mounting kit for face mount flange	BEF-WF-25	2032621

Flanges

Flange plate

Figure	Brief description	Type	Part no.
	Flange adapter, adaption of face mount flange with centering hub 20 mm to 33 mm servo flange, aluminum	BEF-FA-020-033	2066312
	Flange adapter, adaption of face mount flange with 25 mm centering hub to size 60 face mount flange with 36 mm centering hub, aluminum	BEF-FA-025-036	2034226
	Flange adapter, adaption of face mount flange with centering hub 25 mm to 50 mm servo flange, aluminum	BEF-FA-025-050	2032622
	Flange adapter, adaption of face mount flange with 25 mm centering hub to 60 mm square mounting plate, aluminum	BEF-FA-025-060RCA	2032623
	Flange adapter, adaptation of face mount flange with 25 mm centering hub to 60 mm square mounting plate with shock absorbers, aluminum	BEF-FA-025-060RSA	2032624
	Flange adapter, adaption of face mount flange with 25 mm centering hub to 63 mm square mounting plate, aluminum	BEF-FA-025-063-REC	2033631

Other mounting accessories

Mounting bell

Figure	Brief description	Type	Part no.
	Mounting bell for encoders with a servo flange, centering collar 50 mm, including mounting kit	BEF-MG-50	5312987

Servo clamps

Figure	Brief description	Type	Part no.
	Servo clamps, large, for servo flanges (clamps, eccentric fastener), 3 pcs., without mounting material	BEF-WK-SF	2029166

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Shaft adaptation

Shaft couplings

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

Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm², 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 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	2 m	DOL-2312-G02MLA3	2030682
		7 m	DOL-2312-G07MLA3	2030685
		10 m	DOL-2312-G10MLA3	2030688
		15 m	DOL-2312-G15MLA3	2030692
		20 m	DOL-2312-G20MLA3	2030695
		25 m	DOL-2312-G25MLA3	2030699
		30 m	DOL-2312-G30MLA3	2030702
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: incremental, suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	1.5 m	DOL-2312-G1M5MA3	2029212
		3 m	DOL-2312-G03MMA3	2029213
		5 m	DOL-2312-G05MMA3	2029214
		10 m	DOL-2312-G10MMA3	2029215
		20 m	DOL-2312-G20MMA3	2029216
		30 m	DOL-2312-G30MMA3	2029217

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

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Female connectors (ready to assemble)

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

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	By the meter	LTG-2308-MWENC	6027529
	Head A: cable Head B: cable Cable: PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm		LTG-2612-MW	6028516

Male connector (ready to assemble)

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

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

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RUGGED, VERSATILE INCREMENTAL ENCODERS FOR INDUSTRIAL APPLICATIONS



Product description

The DBS60 Core is a rugged incremental encoder with a 58 mm diameter and compact installation depth. It offers a large range of mechanical and electrical interfaces. The solid shaft models are available with face mount flange and servo flange. The hollow shaft design is available as a blind hollow shaft and as a through hollow shaft and can receive shafts up to 5/8" (15.875 mm). The optional shaft insulation and the shaft clamping on the back of the encoder are unique to the hollow shafts. In addition to the standard interfaces 5 V and 24 V TTL/RS422 and 24 V HTL/Push-Pull, the DBS60 Core offers a flexible universal interface which combines the 5 V TTL and 24 V HTL in one product. The high enclosure rating IP 65 and the large ball bearing distance ensure high robustness and reliability, even in the case of high shaft loads. With a resolution of up to 5,000 pulses, the DBS60 Core is the ideal product for standard use in various different industries.

At a glance

- Face mount flange, servo flange, blind and through hollow shaft
- Housing: Ø 58 mm; compact installation depth, large bearing distance
- Flange and stator couplings enable diverse mounting options
- Number of lines: up to 5,000 pulses
- Cable outlet, radial M23 or M12 male connector
- TTL/RS-422 and HTL/Push-Pull, universal interface TTL/HTL with 4.5 V DC to 30 V DC
- Hollow shafts: metal up to Ø 5/8", isolated up to Ø 15 mm; clamping at the front and back

Your benefits

- Diverse installation options due to different flange and shaft designs
- Universal cable outlet and radial connector allow use in tight spaces and make flexible cable routing possible
- Compact housing dimensions save valuable space Optional hollow shaft clamp on the back facilitates mounting
- Protects the encoder against high shaft temperatures and currents through optional isolated shafts
- Flanges and stator couplings with different mounting holes allow diverse mounting options with one encoder variant
- Rugged design with large bearing distance allows high shaft loads and a longer service life
- The TTL/HTL combination interface enables less product variety and reduces storage costs

F

Additional information

Fields of application F-121
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→ www.mysick.com/en/DBS60_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.

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Fields of application

Measuring of position, speed and distance in applications with low to medium requirements on the encoder.
Developed for applications in factory and logistics automation, e.g., in

- Asynchronous motors
- Elevators
- Packaging machines
- Warehousing and transport logistics

Detailed technical data

Performance

Pulses per revolution	4 ... 5,000 [1]
Measurement step	90° electrical/pulses per revolution
Measurement step deviation	
< 3,600 pulses per revolution	± 18°/pulses per revolution
≥ 3,600 pulses per revolution	± 36°/pulses per revolution
Error limits	Measurement step deviation x 3
Duty cycle	
< 3,600 pulses per revolution	≤ 0.5 ± 5%
≥ 3,600 pulses per revolution	≤ 0.5 ± 10 %
Initialization time	< 5 ms [2]

[1] For available pulses per revolution see type code.
[2] After this period valid signals can be read.

Mechanical data

	Solid shaft	Blind hollow shaft	Through hollow shaft
Mechanical design	Solid shaft, servo flange Solid shaft, face mount flange	Blind hollow shaft	Through hollow shaft clamping at the back Through hollow shaft
Shaft diameter	6 mm x 10 mm [1] 10 mm x 19 mm [1]	6 mm 8 mm 3/8“ 10 mm 12 mm 1/2“ 14 mm 15 mm 5/8“ 6 mm (shaft isolated) 8 mm (shaft isolated) 3/8“ (shaft isolated) 10 mm (shaft isolated) 12 mm (shaft isolated) 1/2“ mm (shaft isolated) 14 mm (shaft isolated) 15 mm (shaft isolated)	
Mass	0.3 kg [2]	0.25 kg [2]	
Shaft material	Stainless steel	Stainless steel Stainless steel with plastic collar	
Flange material	Aluminum		
Housing material	Aluminum		

[1] Other on request.
[2] Based on an encoder with a connector outlet or a cable with a connector outlet.
[3] Higher values possible by limiting the overall service life.
[4] Take into account self-heating of 3.2 K per 1000 revolutions/min when designing the working temperature range.
[5] Take into account self-heating of 2.6 K per 1,000 revolutions/min when designing the operating temperature range.
[6] Maximum speed which does not lead to any harm to the encoder. Impact on the service life and signal quality is possible. Please note the maximum output frequency.

	Solid shaft	Blind hollow shaft	Through hollow shaft
Cable material	PVC		
Start up torque	1.2 Ncm (+20 °C)	0.5 Ncm (+20 °C)	
Operating torque	1.1 Ncm (+20 °C)	0.4 Ncm (+20 °C)	
Permissible shaft movement, axial static/ dynamic	–	± 0.5 mm, ± 0.2 mm	
Permissible shaft movement, radial static/dynamic	–	± 0.3 mm, ± 0.1 mm	
Permissible shaft load, radial/axial	100 N (radial) [3] 50 N (axial) [3]	–	
Operating speed	6,000 / min [4]	6,000 / min [5]	
Maximum operating speed	9,000 /min [6]		
Rotor moment of inertia	33 gcm²	50 gcm²	
Bearing lifetime	3.6 x 10^9 revolutions		
Max. angular acceleration	500,000 rad/s²	500,000 rad/s² 200,000 rad/s² (shaft isolated)	

[1] Other on request.

[2] Based on an encoder with a connector outlet or a cable with a connector outlet.

[3] Higher values possible by limiting the overall service life.

[4] Take into account self-heating of 3.2 K per 1000 revolutions/min when designing the working temperature range.

[5] Take into account self-heating of 2.6 K per 1,000 revolutions/min when designing the operating temperature range.

[6] Maximum speed which does not lead to any harm to the encoder. Impact on the service life and signal quality is possible. Please note the maximum output frequency.

Electrical data

F

	Solid shaft	Blind hollow shaft	Through hollow shaft
Electrical interface	4.5 V ... 5.5 V, TTL/RS422 [1] 10 V ... 30 V, TTL/RS422 [1] 10 V ... 27 V, HTL/Push Pull [1] 4.5 V ... 30 V, TTL/HTL universal [1] [2]		
Connection type	M23 male connector, 12-pin, radial M12 male connector, 8-pin, radial Cable, 8-wire, universal, 0.5 m [3] Cable, 8-wire, universal, 1.5 m [3] Cable, 8-wire, universal, 3 m [3] Cable, 8-wire, universal, 5 m [3] Cable, 8-wire, universal, 10 m [3] Cable with male connector M12, 8-pin, universal, 0.5 m [3] Cable with male connector M23, 12-pin, universal, 0.5 m [3] [4]		
Operating current without load			
4.5 V...5.5 V, TTL/RS422	≤ 50 mA		
Max. power consumption without load			
10 V ... 30 V, TTL/RS422	≤ 0.5 W		
10 V ... 27 V, HTL/Push Pull	≤ 1 W		
4.5 V ... 30 V, TTL/HTL universal	≤ 0.5 W		
Load current	≤ 30 mA per channel		
Maximum output frequency	300 kHz [5]		

[1] 6 channels unless otherwise specified.

[2] Output level depends on the supply voltage.

[3] The universal cable connection is positioned so that it is possible to lay it without bends in a radial or axial direction.

[4] M23 male connector with central mounting

[5] Up to 450 kHz on request.

[6] Short-circuit of another channel or GND permissible for a maximum of 60 s. No protection in the case of a short-circuit channel of U_s.

[7] Short-circuit of another channel US or GND permissible for a maximum of 30 s.

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

	Solid shaft	Blind hollow shaft	Through hollow shaft
Reference signal, number	1		
Reference signal, position	90° electric, logically gated with A and B		
Reverse polarity protection	✔		
Short-circuit protection of the outputs			
4.5 V–5.5 V, TTL/RS422	✔ [6]		
10 V ... 30 V, TTL/RS422	✔ [7]		
10 V ... 27 V, HTL/Push Pull	✔ [7]		
4.5 V ... 30 V, TTL/HTL universal	✔ [7]		
MTTFd: mean time to dangerous failure [8]	500 years (EN ISO 13849-1)		

[1] 6 channels unless otherwise specified.

[2] Output level depends on the supply voltage.

[3] The universal cable connection is positioned so that it is possible to lay it without bends in a radial or axial direction.

[4] M23 male connector with central mounting

[5] Up to 450 kHz on request.

[6] Short-circuit of another channel or GND permissible for a maximum of 60 s. No protection in the case of a short-circuit channel of U_S.

[7] Short-circuit of another channel US or GND permissible for a maximum of 30 s.

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

Ambient data

	Solid shaft	Blind hollow shaft	Through hollow shaft
EMC	According to EN 61000-6-2 and EN 61000-6-3		
Enclosure rating	IP 67 on housing side (acc. to IEC 60529) [1] IP 65 on shaft side (acc. to IEC 60529)		IP 65 on housing side (acc. to IEC 60529) [1] IP 65 on shaft side (acc. to IEC 60529)
Permissible relative humidity	90% (condensation of optical surfaces not permitted)		
Operating temperature range			
4.5 V–5.5 V, TTL/RS422	–20 °C ... +85 °C		
10 V ... 30 V, TTL/RS422	–30 °C ... +100 °C, at a maximum of 3,000 pulses per revolution –30 °C ... +85 °C, at more than 3,000 pulses per revolution		
10 V ... 27 V, HTL/Push Pull	–20 °C ... +85 °C		
4.5 V ... 30 V, TTL/HTL universal	–30 °C ... +100 °C, at a maximum of 3,000 pulses per revolution –30 °C ... +85 °C, at more than 3,000 pulses per revolution		
Storage temperature range	–40 °C ... +100 °C, without packaging		
Resistance to shocks	250 g, 3 ms (according to EN 60068-2-27)	250 g, 3 ms (according to EN 60068-2-27) 200 g, 3 ms, shaft isolated (according to EN 60068-2-27)	
Resistance to vibrations	30 g/10 Hz ... 2,000 Hz (according to EN 60068-2-6)		

[1] In an assembled male connector.

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Type code

Solid shaft

Mechanical design

1	Servo flange, solid shaft, Ø 6 mm, length 10 mm
3	Face mount flange, solid shaft, Ø 6 mm, length 10 mm
4	Face mount flange, solid shaft, Ø 10 mm, length 19 mm

Electrical interface

A	4.5 ... 5.5 V, TTL/RS-422, 6 channel
C	10 ... 30 V, TTL/RS-422, 6 channel
E	10 ... 27 V, HTL/Push Pull, 6 channel
F	4.5 ... 30 V, TTL/HTL universal, 6 channel

Connection type

A	Male connector M23, 12-pin, radial
C	Male connector M12, 8-pin, radial
J	Cable, 8-wire universal, 0.5 m
K	Cable, 8-wire, universal, 1.5 m
L	Cable, 8-wire, universal, 3 m
N	Cable, 8-wire, universal, 10 m
P	Cable, 8-wire universal, 0.5 m, with male connector M12
Q	Cable, 8-wire, universal, 0.5 m, with male connector M23

Stator coupling/flange design

O	Flange with 3 x M3 3 x M4

Resolution

	0004 ... 5,000 pulses per revolution possible. For pulses see “Pulses per revolution” [1]

D	B	S	6	0	E	-	S								

[1] Other pulse on request.

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Through hollow shaft

Mechanics/flange

T	Through hollow shaft
R	Through hollow shaft clamping at the back (B side)

Mechanical design

B	Through hollow shaft, metal, Ø 8 mm
C	Through hollow shaft, metal, Ø 3/8"
D	Through hollow shaft, metal, Ø 10 mm
E	Through hollow shaft, metal, Ø 12 mm
F	Through hollow shaft, metal, Ø 1/2"
G	Through hollow shaft, metal, Ø 14 mm
H	Through hollow shaft, metal, Ø 15 mm
J	Through hollow shaft, metal, Ø 5/8" [1]
2	Through hollow shaft, Ø 8 mm, isolated
3	Through hollow shaft, Ø 3/8", isolated
4	Through hollow shaft, Ø 10 mm, isolated
5	Through hollow shaft, Ø 1/2", isolated
6	Through hollow shaft, Ø 12 mm, isolated
7	Through hollow shaft, Ø 14 mm, isolated
8	Through hollow shaft, Ø 15 mm, isolated

Electrical interface

A	4.5 ... 5.5 V, TTL/RS-422, 6 channel
C	10 ... 30 V, TTL/RS-422, 6 channel
E	10 ... 27 V, HTL/Push Pull, 6 channel
F	4.5 ... 30 V, TTL/HTL universal, 6 channel

Connection type

A	Male connector M23, 12-pin, radial
C	Male connector M12, 8-pin, radial
J	Cable, 8-wire, universal, 0.5 m
K	Cable, 8-wire, universal, 1.5 m
L	Cable, 8-wire, universal, 3 m
N	Cable, 8-wire, universal, 10 m
P	Cable, 8-wire universal, 0.5 m, with male connector M12
Q	Cable, 8-wire, universal, 0.5 m, with male connector M23

Stator coupling/flange design

0	Two-sided stator coupling, slot, screw hole circle 63 mm - 83 mm
A	Without stator coupling, flange with 4 x M2.5
C	Locating pin assembly
D	Stator coupling, 1-sided, slot, bolt circle 33 mm - 48.5 mm

Resolution

	0004 ... 5,000 pulses per revolution possible. For pulses see “Pulses per revolution”

D	B	S	6	0	E	-									

[1] Order collets for 6 mm (only plastic) 8 mm, 3/8", 10 mm, 12 mm, 1/2", 14 mm and 15 mm separately as accessories (see recommended accessories). No collets are necessary for 5/8" shaft diameter. Also available as isolated design on request.

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Blind hollow shaft

Mechanical design

B	Blind hollow shaft, metal, Ø 8 mm
C	Blind hollow shaft, metal, Ø 3/8"
D	Blind hollow shaft, metal, Ø 10 mm
E	Blind hollow shaft, metal, Ø 12 mm
F	Blind hollow shaft, metal, Ø 1/2"
G	Blind hollow shaft, metal, Ø 14 mm
H	Blind hollow shaft, metal, Ø 15 mm
J	Blind hollow shaft, metal, Ø 5/8" [1]
2	Blind hollow shaft, Ø 8 mm, isolated
3	Blind hollow shaft, Ø 3/8", isolated
4	Blind hollow shaft, Ø 10 mm, isolated
5	Blind hollow shaft, Ø 1/2", isolated
6	Blind hollow shaft, Ø 12 mm, isolated
7	Blind hollow shaft, Ø 14 mm, isolated
8	Blind hollow shaft, Ø 15 mm, isolated

Electrical interface

A	4.5 ... 5.5 V, TTL/RS-422, 6 channel
C	10 ... 30 V, TTL/RS-422, 6 channel
E	10 ... 27 V, HTL/Push Pull, 6 channel
F	4.5 ... 30 V, TTL/HTL universal, 6 channel

Connection type

A	Male connector M23, 12-pin, radial
C	Male connector M12, 8-pin, radial
J	Cable, 8-wire, universal, 0.5 m
K	Cable, 8-wire, universal, 1.5 m
L	Cable, 8-wire, universal, 3 m
N	Cable, 8-wire, universal, 10 m
P	Cable, 8-wire universal, 0.5 m, with male connector M12
Q	Cable, 8-wire, universal, 0.5 m, with male connector M23

Stator coupling/flange design

0	Two-sided stator coupling, slot, screw hole circle 63 mm - 83 mm
A	Without stator coupling, flange with 4 x M2.5
C	Locating pin assembly
D	Stator coupling, 1-sided, slot, bolt circle 33 mm - 48.5 mm

Resolution

	0004 ... 5,000 pulses per revolution possible. For pulses see “Pulses per revolution”

D	B	S	6	0	E	-	B								

[1] Order collets for 6 mm (only plastic) 8 mm, 3/8", 10 mm, 12 mm, 1/2", 14 mm and 15 mm separately as accessories (see recommended accessories). No collets are necessary for 5/8" shaft diameter. Also available as isolated design on request.

Pulses per revolution

	E
Pulses per revolution	0004
	0005
	0010
	0020
	0048
	0050
	0060
	0100
	0125
	0128
	0180
	0250
	0360
	0500
	0512
	0600
	1000
	1024
	1200
	1500
	2000
	2048
	2400
	2500
	3000
	3600
	4096
	5000

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Ordering information

Blind hollow shaft

- **Shaft diameter:** 5/8"
- **Connection type:** cable, 8-wire, universal, 1.5 m

Through hollow shaft

- **Shaft diameter:** 5/8"

Electrical interface	Voltage range	Connection type	Pulses per revolution	Type	Part no.
TTL/RS422	4.5 V ... 5.5 V	Cable with male connector M23, 12-pin, universal, 0.5 m	1,024	DBS60E-TJAQ01024	1069756
			2,048	DBS60E-TJAQ02048	1069757
		Cable, 8-wire, universal, 1.5 m	1,024	DBS60E-TJAK01024	1069746
			2,048	DBS60E-TJAK02048	1069747
			4,096	DBS60E-TJAK04096	1069748
	10 V ... 30 V	Cable, 8-wire, universal, 1.5 m	1,024	DBS60E-TJCK01024	1070615
			2,048	DBS60E-TJCK02048	1070616
HTL/Push Pull	10 V ... 27 V	Cable, 8-wire, universal, 1.5 m	1,024	DBS60E-TJEK01024	1069758
			2,048	DBS60E-TJEK02048	1069759
			4,096	DBS60E-TJEK04096	1069760
TTL/HTL universal	4.5 V ... 30 V	Cable, 8-wire, universal, 1.5 m	1,024	DBS60E-TJFK01024	1070748
			2,048	DBS60E-TJFK02048	1070749
			4,096	DBS60E-TJFK04096	1070750

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Through hollow shaft clamping at the back

- **Shaft diameter:** 5/8"
- **Connection type:** cable, 8-wire, universal, 1.5 m

Electrical interface	Voltage range	Pulses per revolution	Type	Part no.
TTL/RS422	4.5 V ... 5.5 V	1,024	DBS60E-RJAK01024	1069710
		2,048	DBS60E-RJAK02048	1069711
		4,096	DBS60E-RJAK04096	1069712
	10 V ... 30 V	1,024	DBS60E-RJCK01024	1070609
		2,048	DBS60E-RJCK02048	1070610
HTL/Push Pull	10 V ... 27 V	1,024	DBS60E-RJEK01024	1069713
		2,048	DBS60E-RJEK02048	1069714
TTL/HTL universal	4.5 V ... 30 V	1,024	DBS60E-RJFK01024	1070744
		2,048	DBS60E-RJFK02048	1070745

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Solid shaft, servo flange

- **Shaft diameter:** 6 mm (other diameters available on request)

Electrical interface	Voltage range	Connection type	Pulses per revolution	Type	Part no.
TTL/RS422	4.5 V ... 5.5 V	Cable, 8-wire, universal, 1.5 m	1,000	DBS60E-S1AK01000	1069715
			2,000	DBS60E-S1AK02000	1069716
	10 V ... 30 V	Cable, 8-wire, universal, 1.5 m	1,000	DBS60E-S1CK01000	1070611
		Cable, 8-wire, universal, 1.5 m	2,000	DBS60E-S1CK02000	1070612
HTL/Push Pull	10 V ... 27 V	Cable, 8-wire, universal, 1.5 m	1,000	DBS60E-S1EK01000	1069717
			2,000	DBS60E-S1EK02000	1069718

Solid shaft, face mount flange

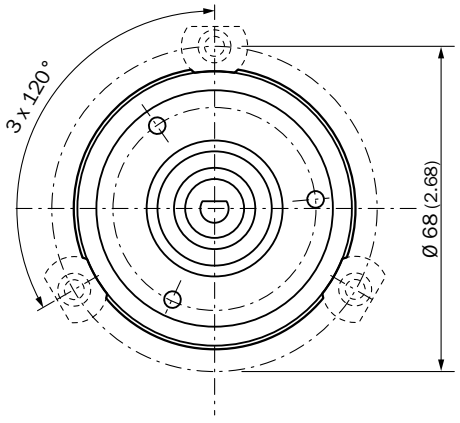
- **Shaft diameter:** 10 mm (other diameters available on request)
- **Connection type:** cable, 8-wire, universal, 1.5 m

Electrical interface	Voltage range	Pulses per revolution	Type	Part no.
TTL/RS422	4.5 V ... 5.5 V	1,000	DBS60E-S4AK01000	1069719
		2,000	DBS60E-S4AK02000	1069720
		5,000	DBS60E-S4AK05000	1069721
	10 V ... 30 V	1,000	DBS60E-S4CK01000	1070613
		2,000	DBS60E-S4CK02000	1070614
HTL/Push Pull	10 V ... 27 V	1,000	DBS60E-S4EK01000	1069722
		2,000	DBS60E-S4EK02000	1069723
		5,000	DBS60E-S4EK05000	1069724
TTL/HTL universal	4.5 V ... 30 V	1,000	DBS60E-S4FK01000	1070746
		2,000	DBS60E-S4FK02000	1070747

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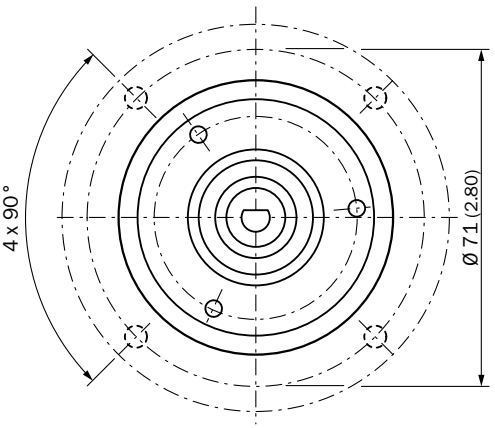
Mounting suggestion for servo flange

Mounting suggestion for small servo clamp (part number 2029166)



All dimensions in mm (inch)

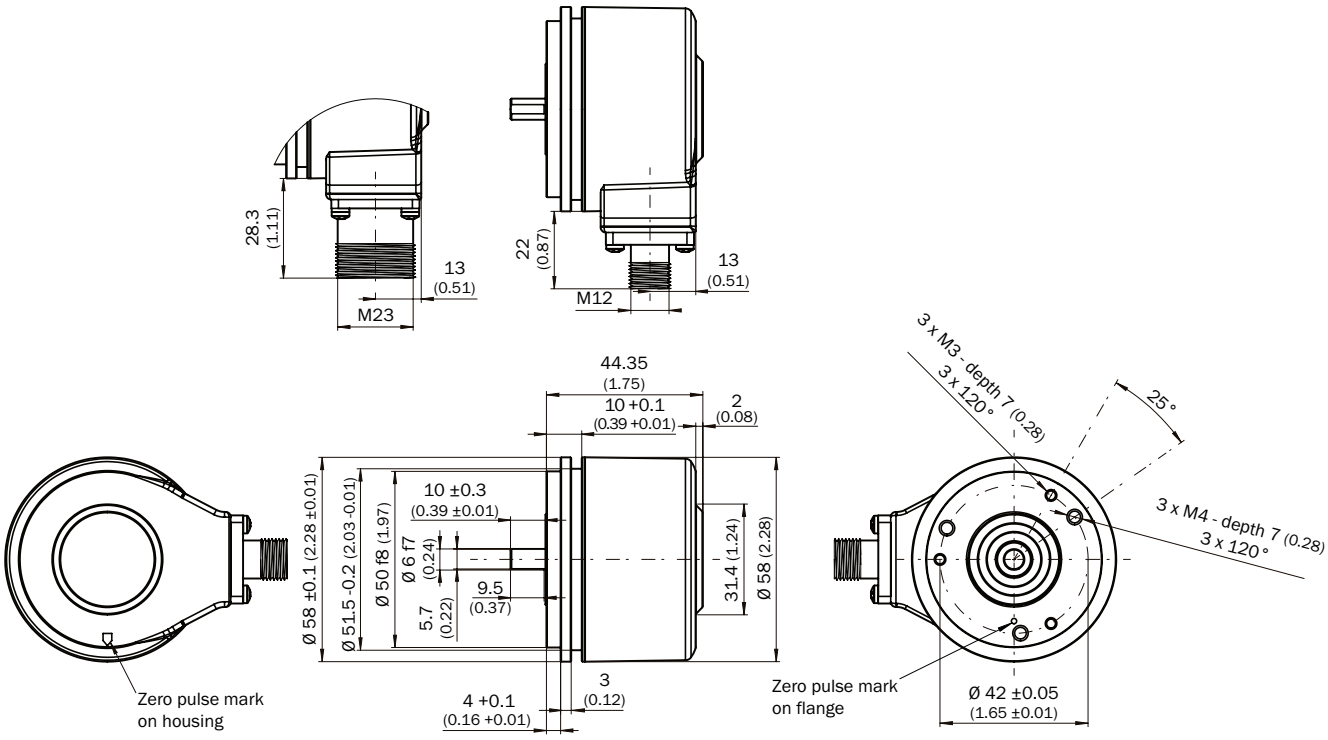
Mounting suggestion for half-shell servo clamp (part number 2029165)



All dimensions in mm (inch)

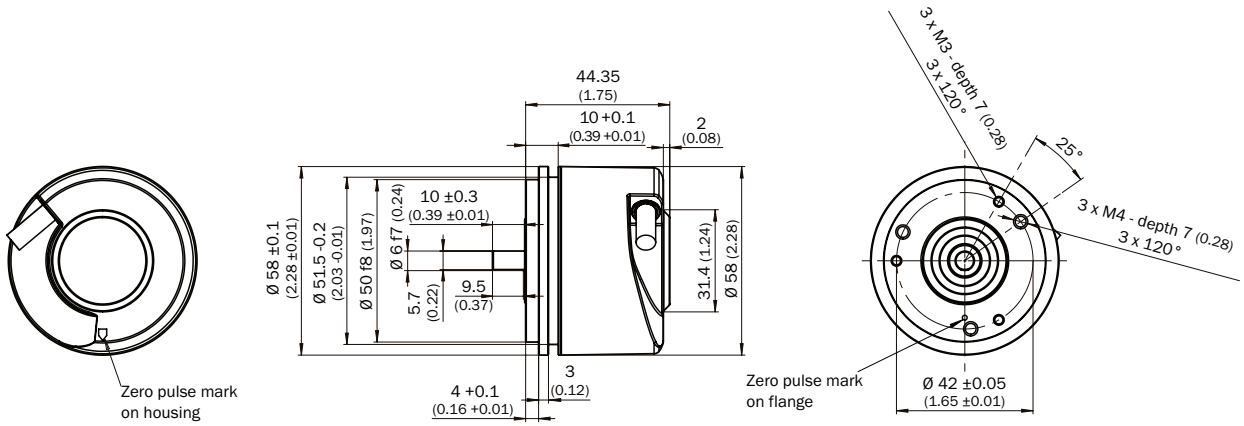
Dimensional drawings (dimensions in mm)

Solid shaft Ø 6 mm, servo flange, male connector connection (S1)



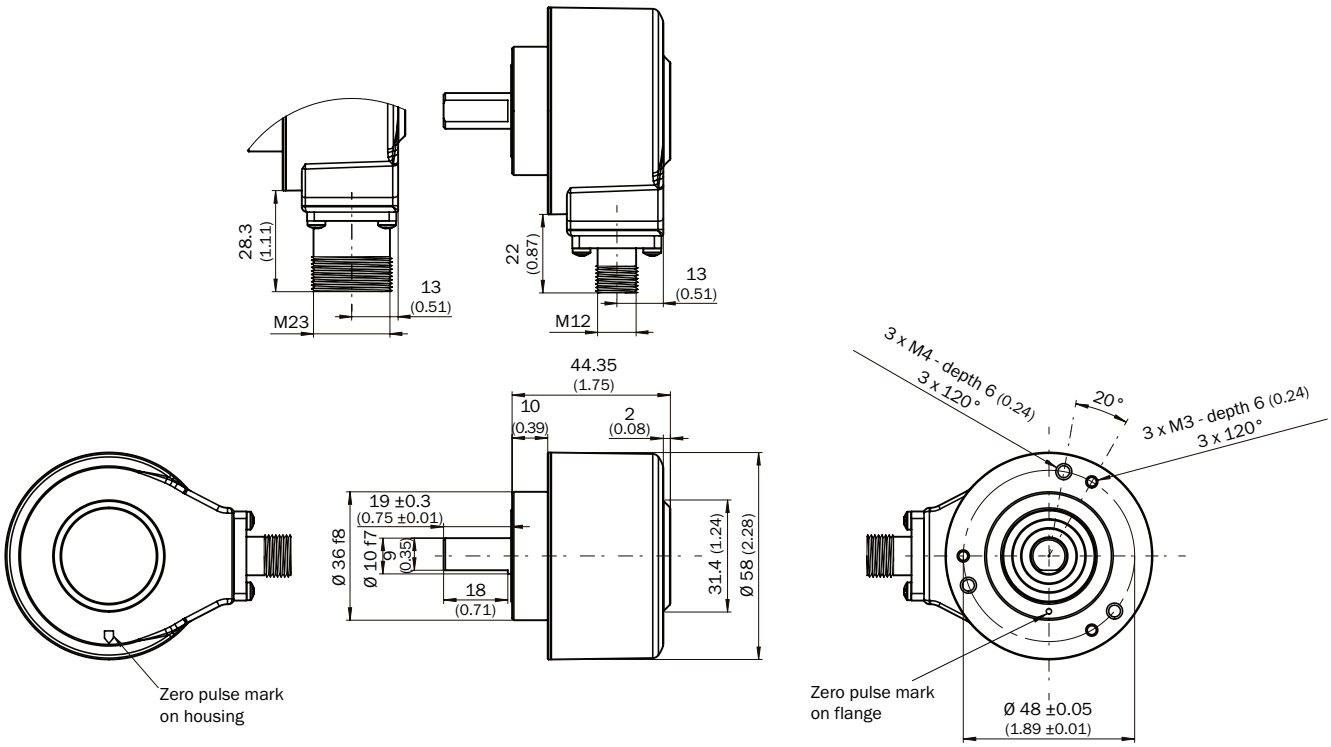
F

Solid shaft Ø 6 mm, servo flange, cable connection

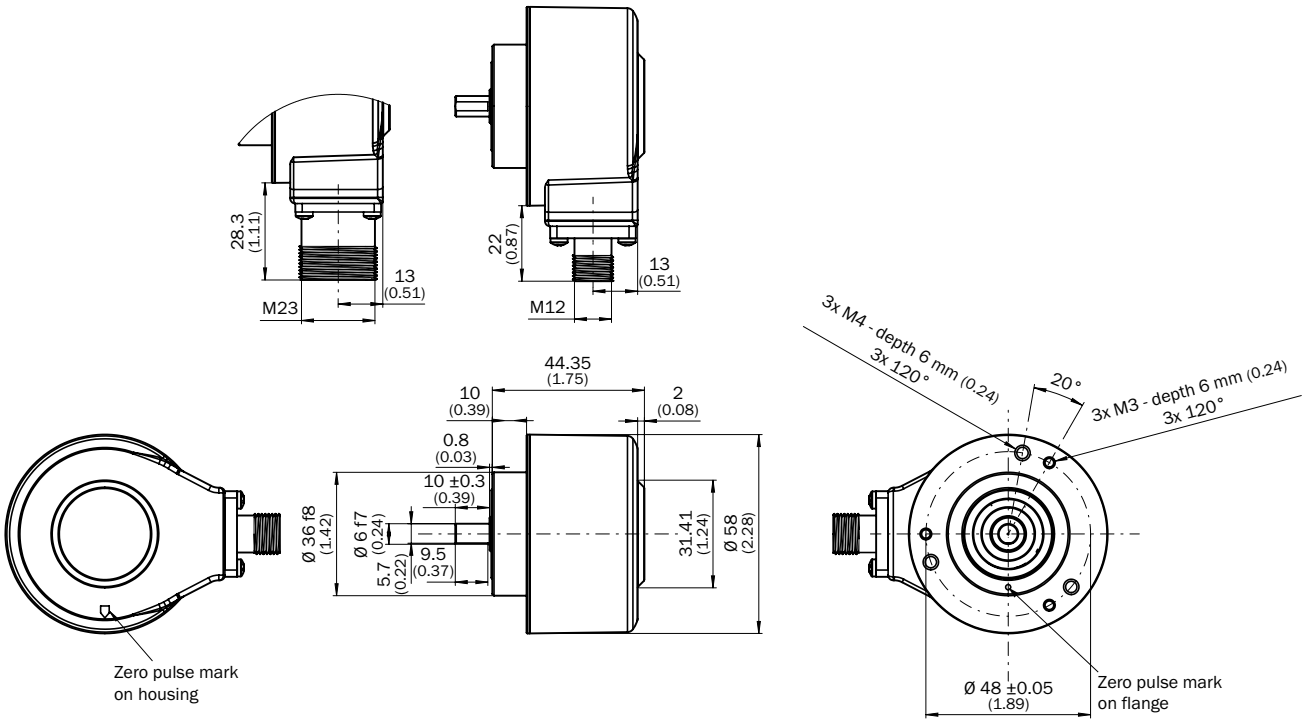


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Solid shaft Ø 10 mm, face mount flange, male connector connection (S4)

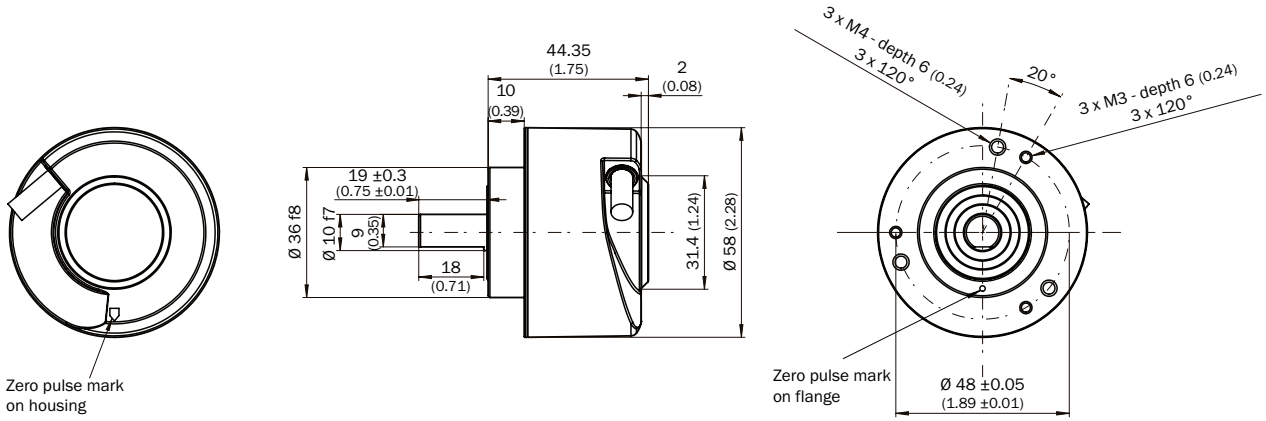


Solid shaft Ø 6 mm, face mount flange, male connector connection (S3)

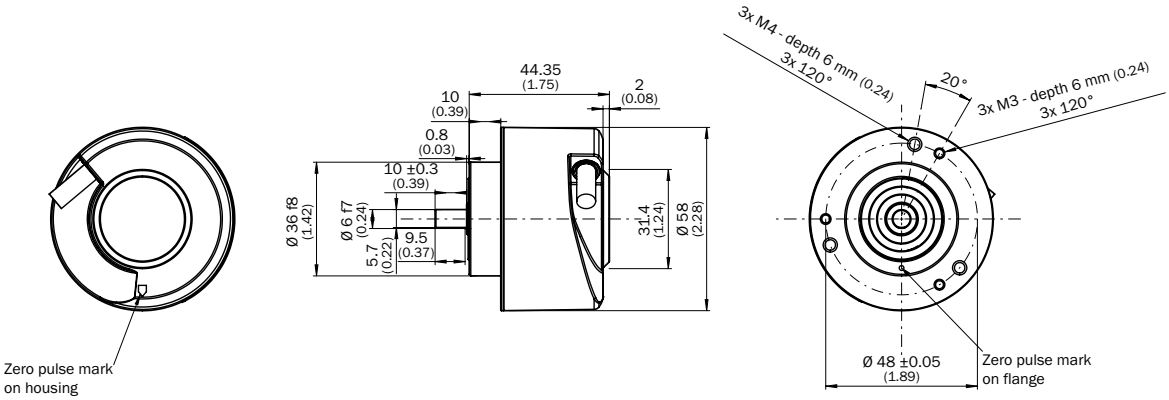


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Solid shaft Ø 10 mm, face mount flange, cable connection (S4)



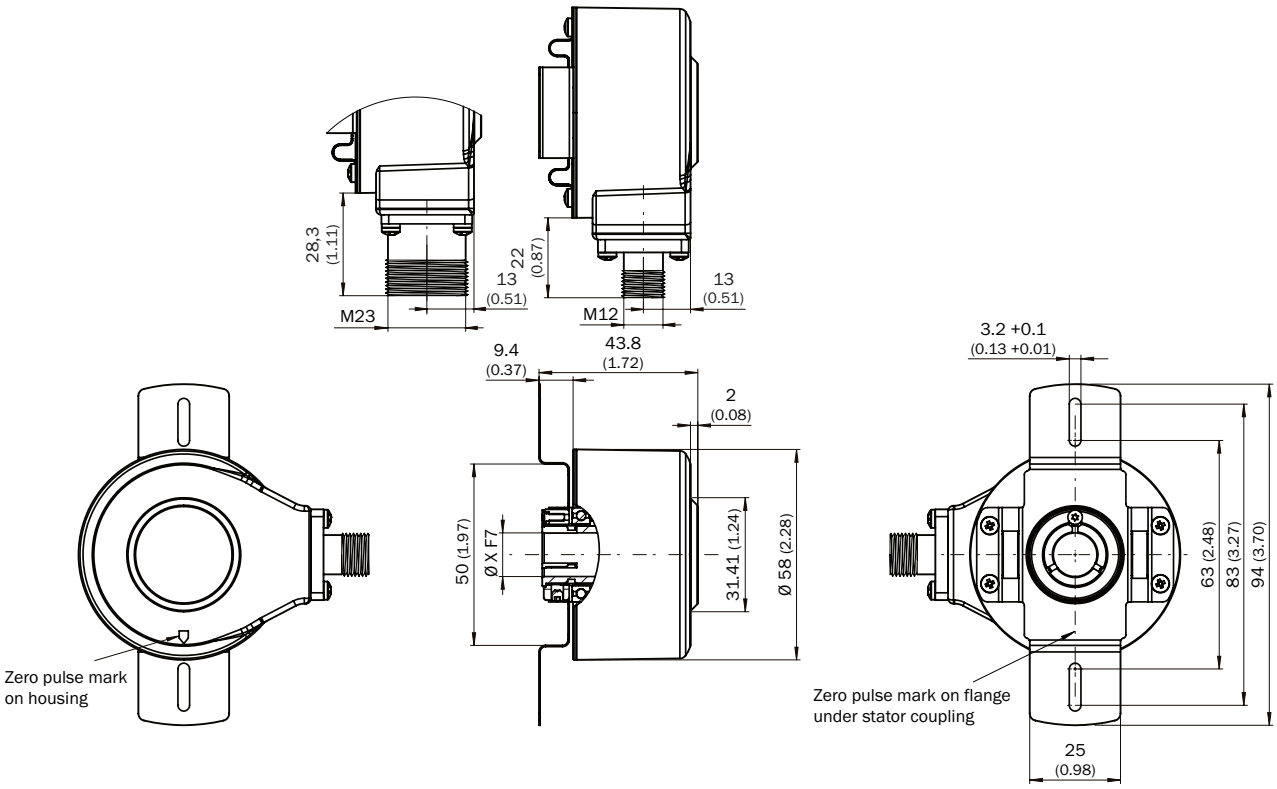
Solid shaft Ø 6 mm, face mount flange, cable connection (S3)



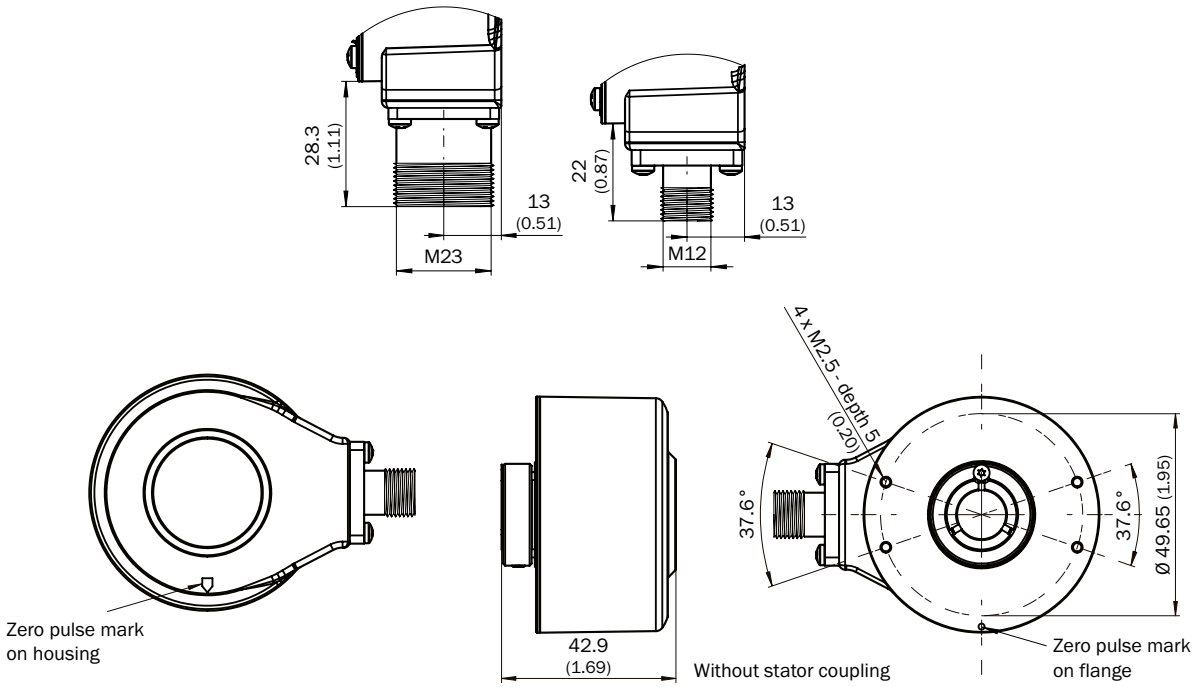
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8015560/2015-09-01
Subject to change without notice

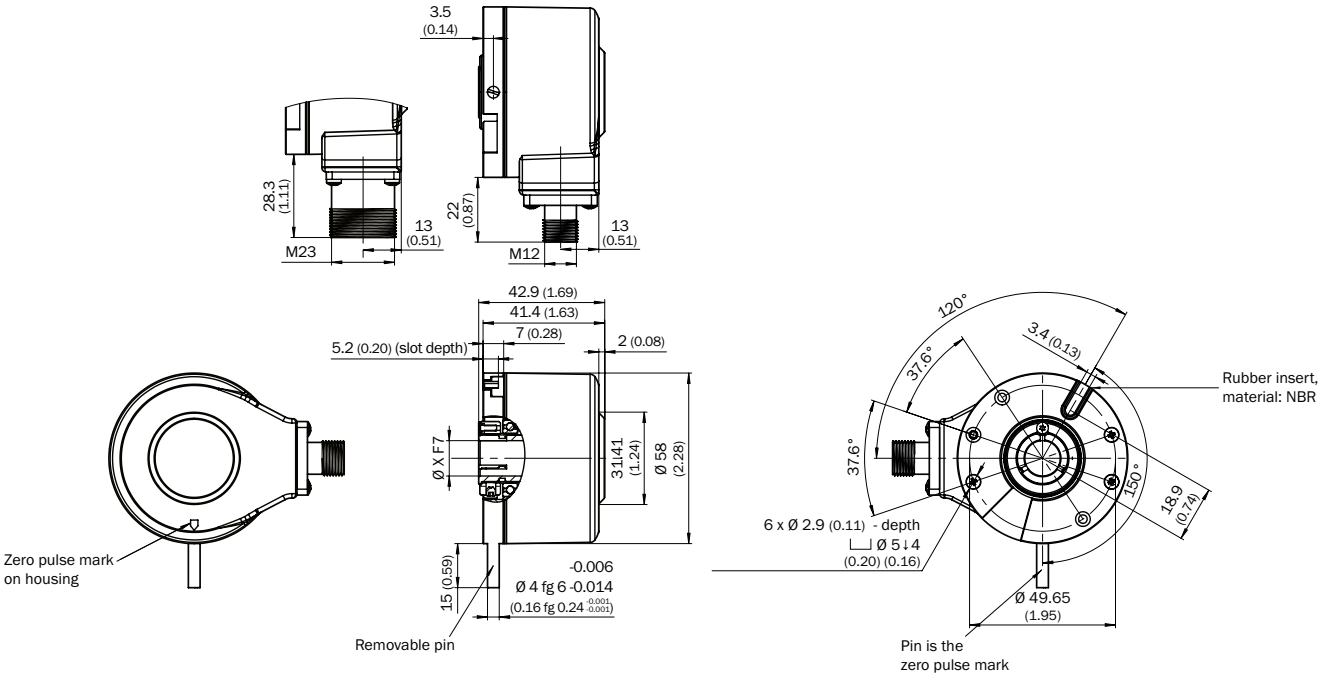
Blind hollow shaft, male connector connection, two-sided stator coupling, slot, screw hole circle 63 mm – 83 mm



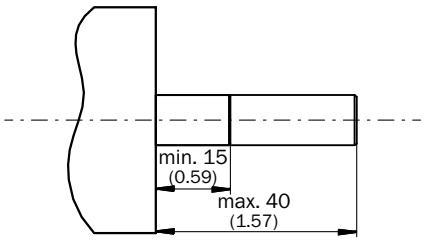
Blind hollow shaft, male connector connection, no stator coupling



Blind hollow shaft, male connector connection, with locating pin assembly

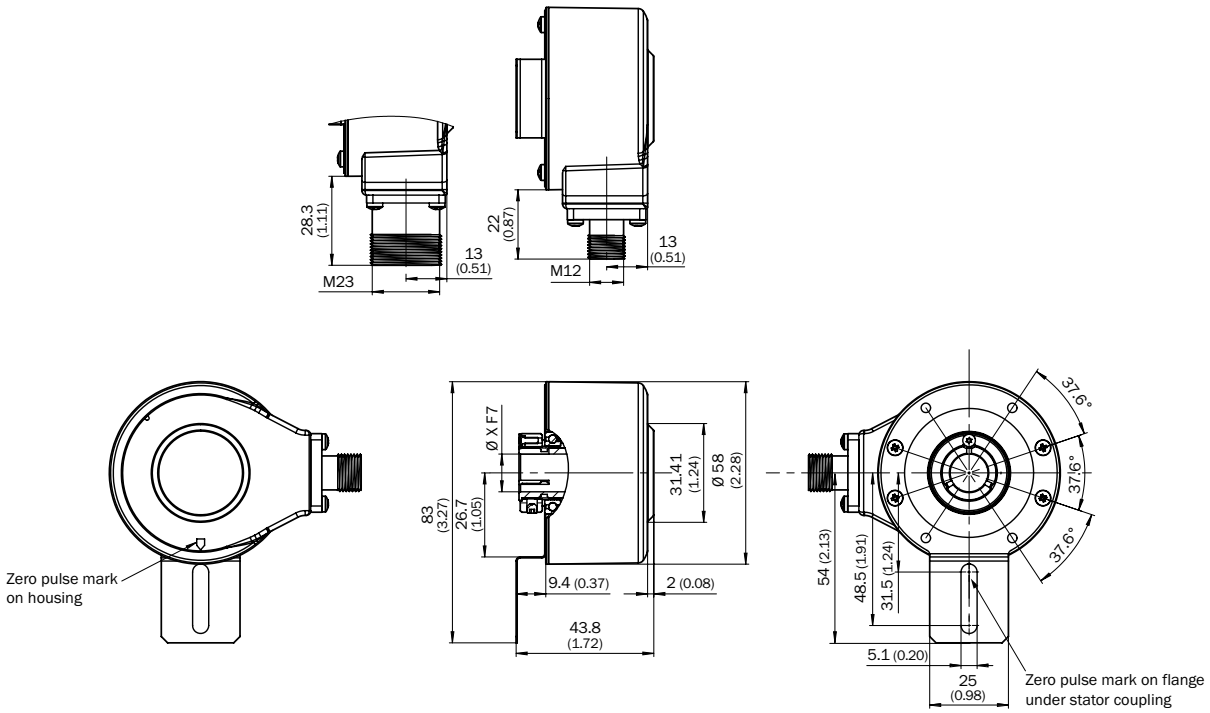


Installation example for blind hollow shaft

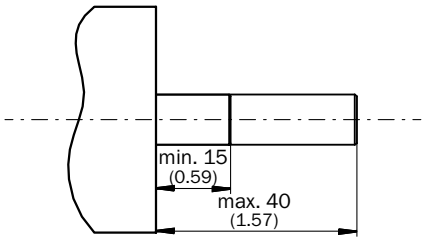


Customer-side

Blind hollow shaft, male connector connection, stator coupling, 1-sided, slot, bolt circle 33 mm – 48.5 mm



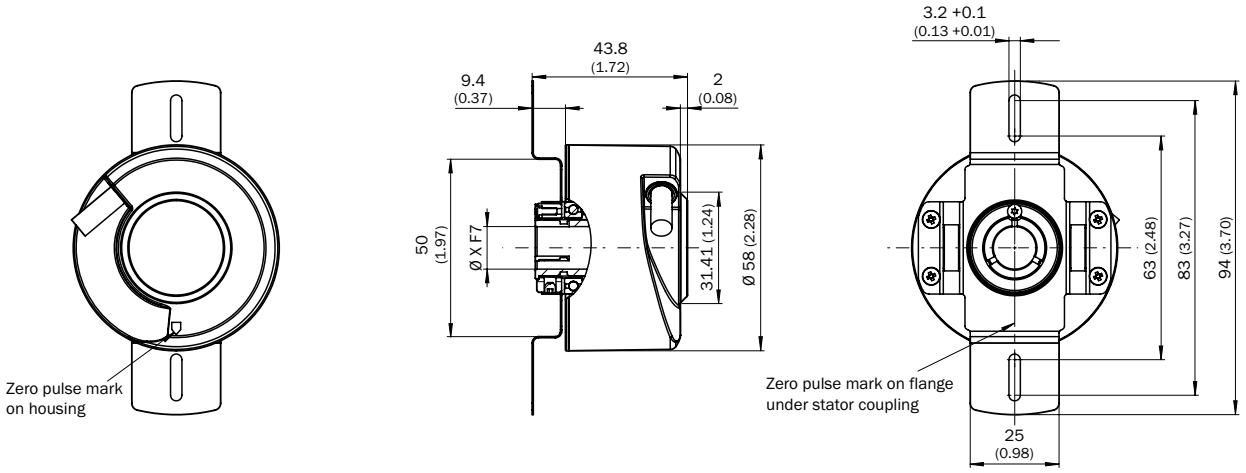
Installation example for blind hollow shaft



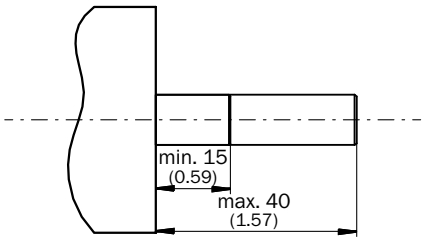
Customer-side

F

Blind hollow shaft, cable connection, two-sided stator coupling, slot, screw hole circle 63 mm – 83 mm



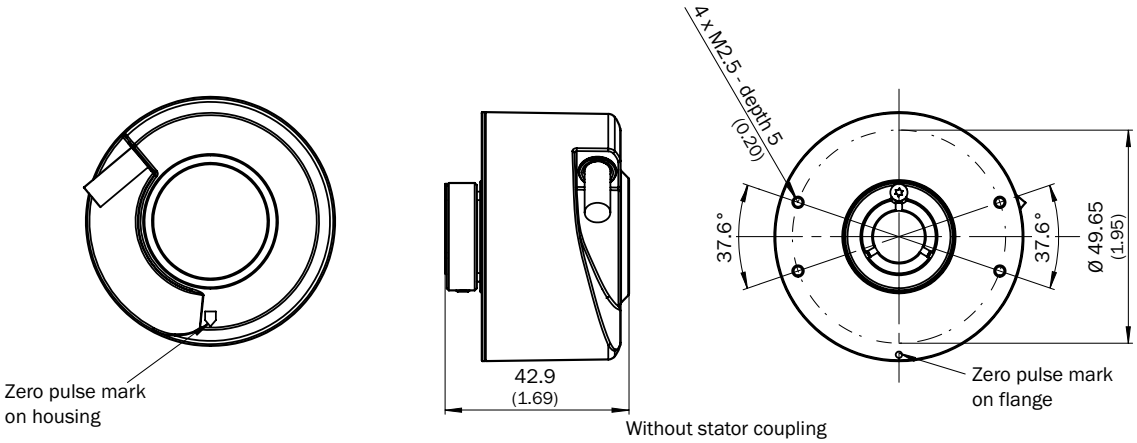
Installation example for blind hollow shaft



Customer-side

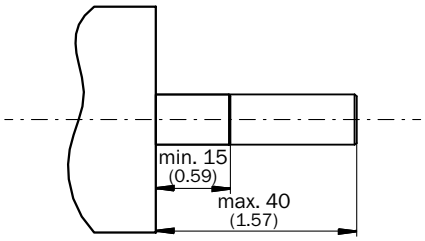
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Blind hollow shaft, cable connection, no stator coupling



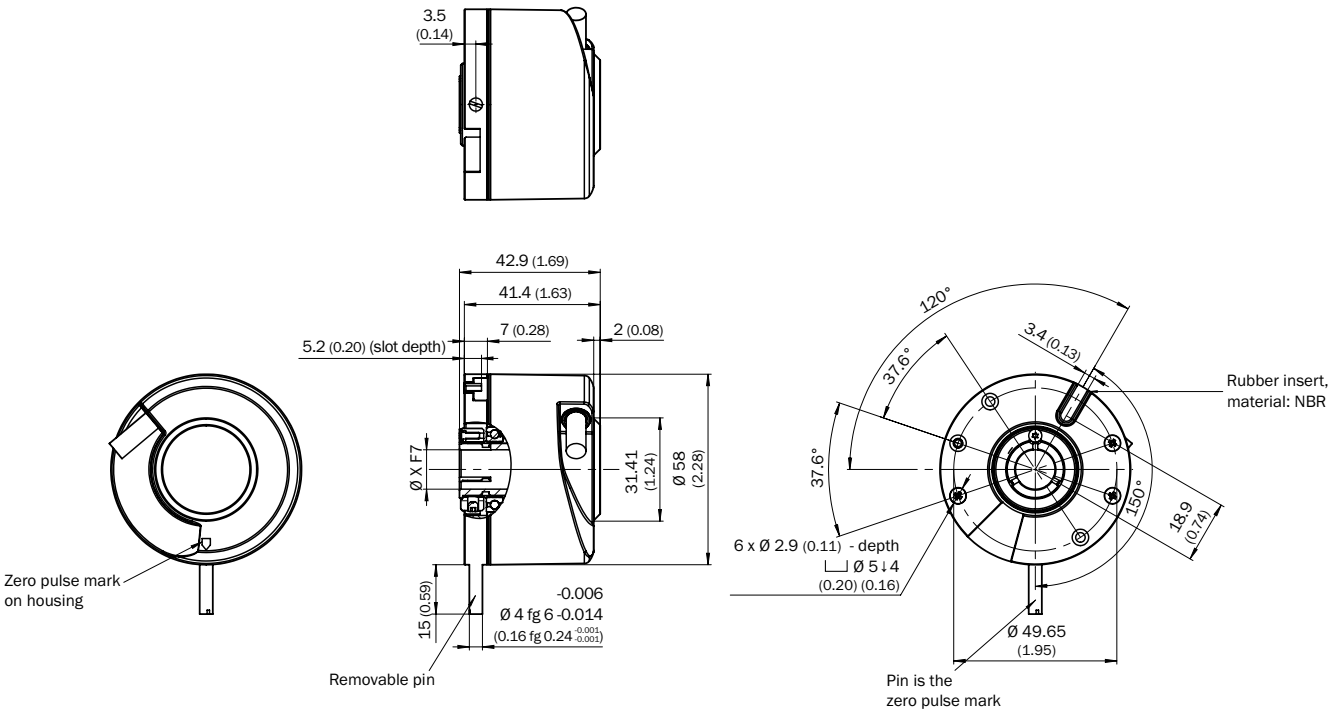
Without stator coupling

Installation example for blind hollow shaft

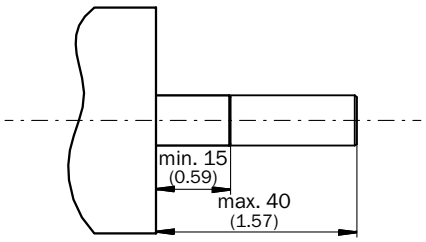


Customer-side

Blind hollow shaft, cable connection, with locating pin assembly



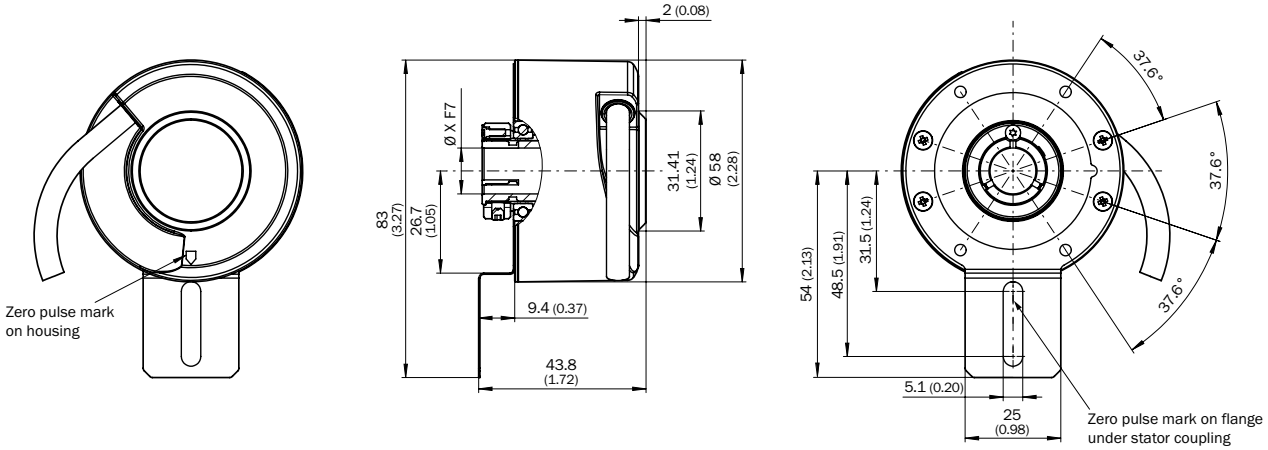
Installation example for blind hollow shaft



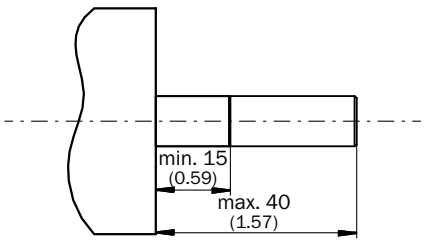
Customer-side

F

Blind hollow shaft, cable connection, stator coupling, 1-sided, slot, bolt circle 33 mm – 48.5 mm



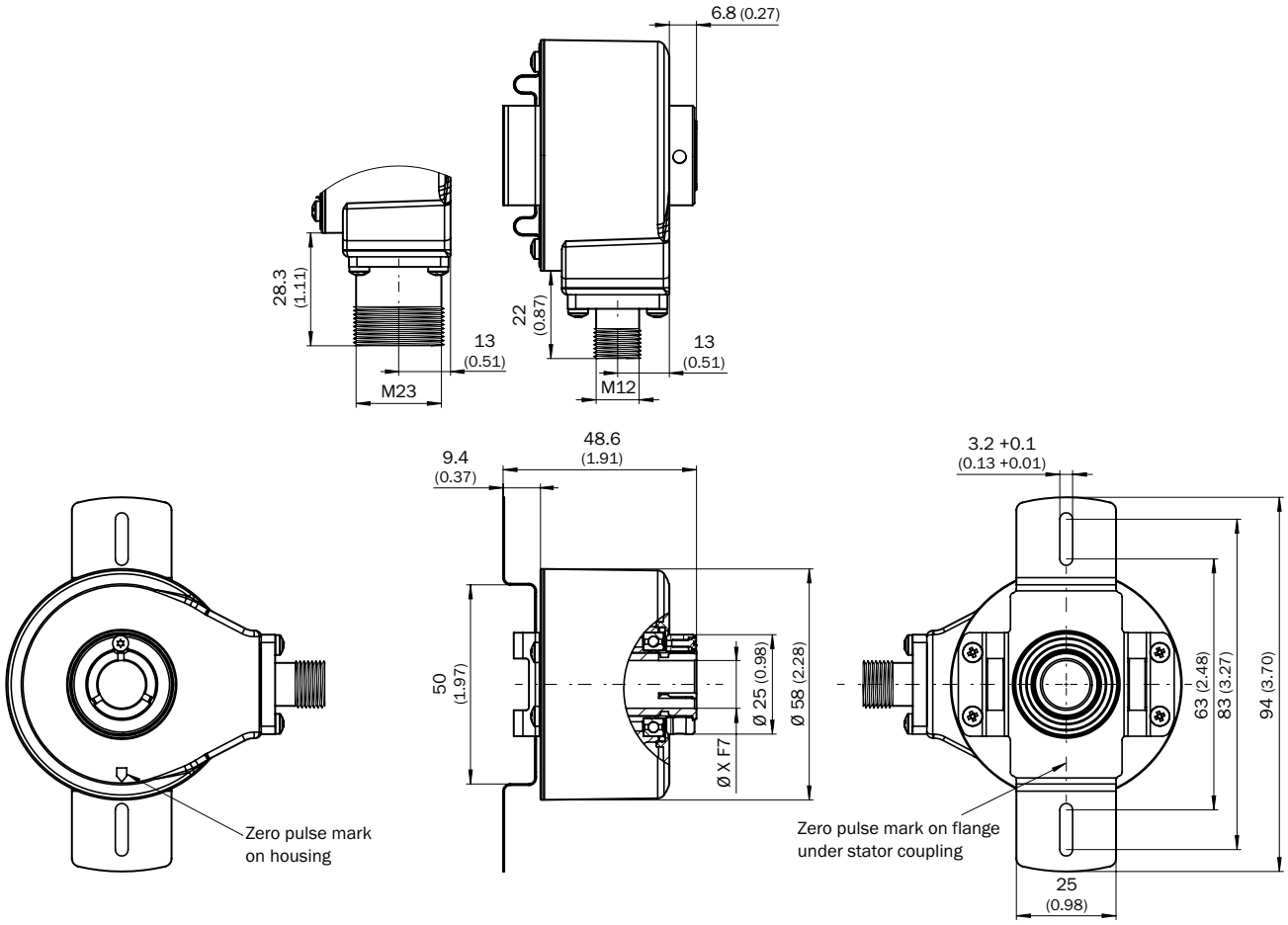
Installation example for blind hollow shaft



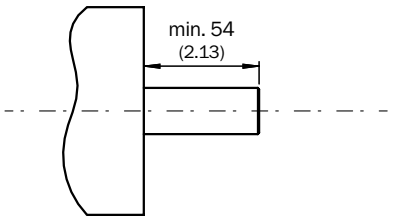
Customer-side

F

Through hollow shaft clamping at the back, male connector connection, two-sided stator coupling, slot, screw hole circle 63 mm – 83 mm



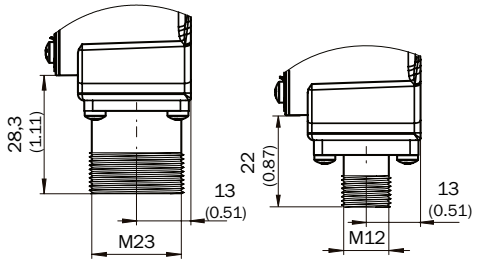
Installation example for through hollow shaft

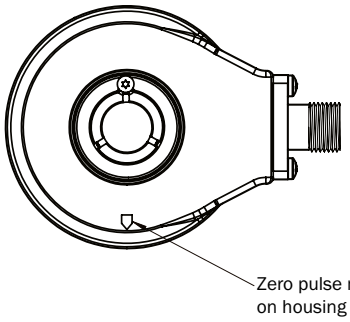


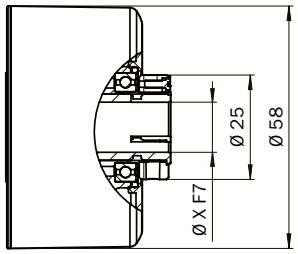
Customer-side

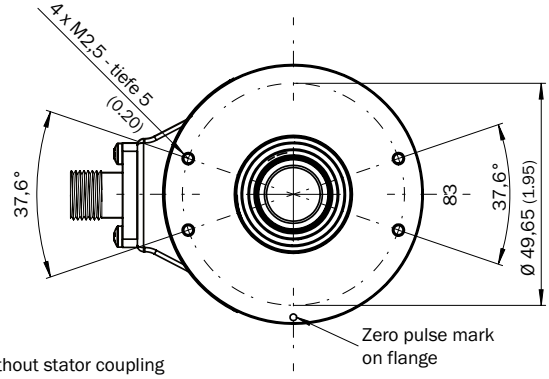
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Through hollow shaft clamping at the back, male connector connection, no stator coupling



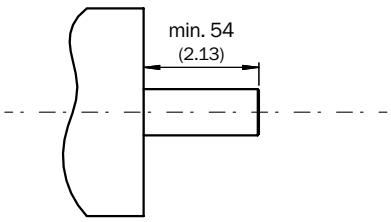






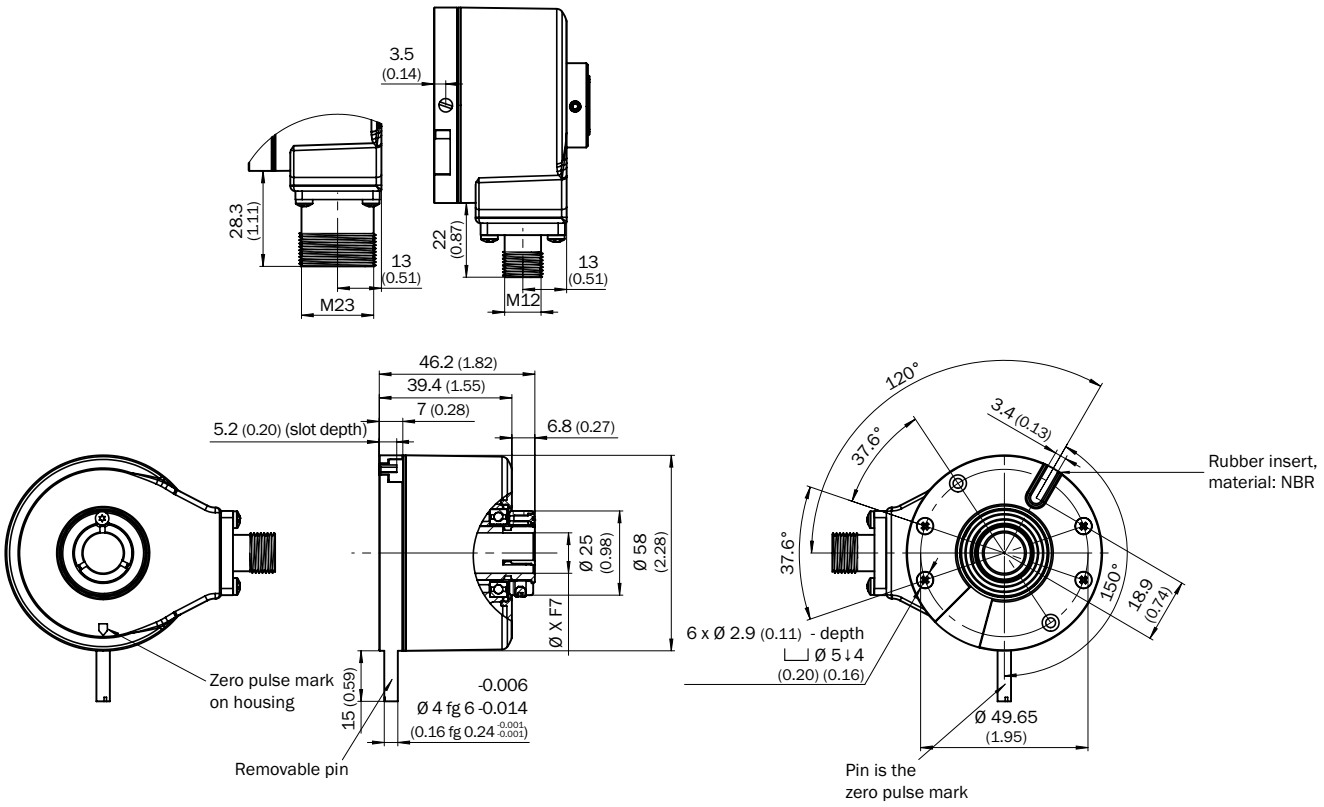
Without stator coupling

Installation example for through hollow shaft

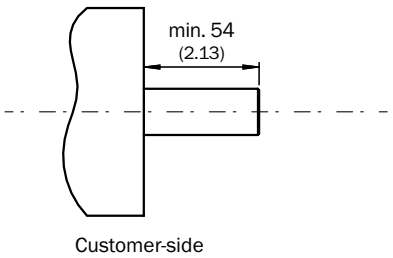


Customer-side

Through hollow shaft clamping at the back, male connector connection, with locating pin assembly

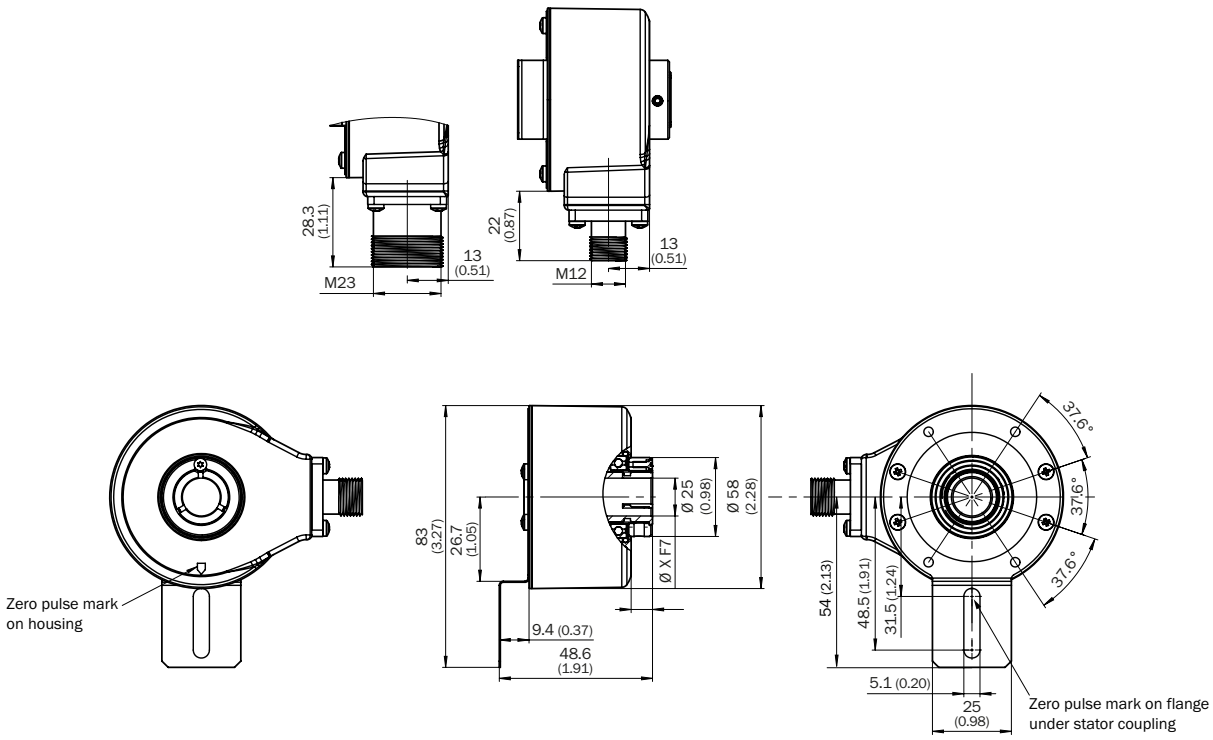


Installation example for through hollow shaft



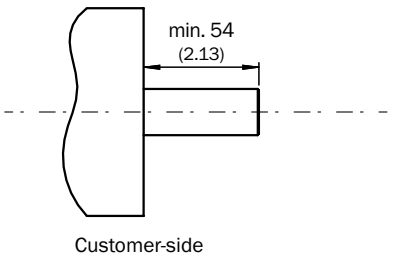
F

Through hollow shaft clamping at the back, male connector connection, one-sided stator coupling, slot, screw hole circle 33 mm – 48.5 mm



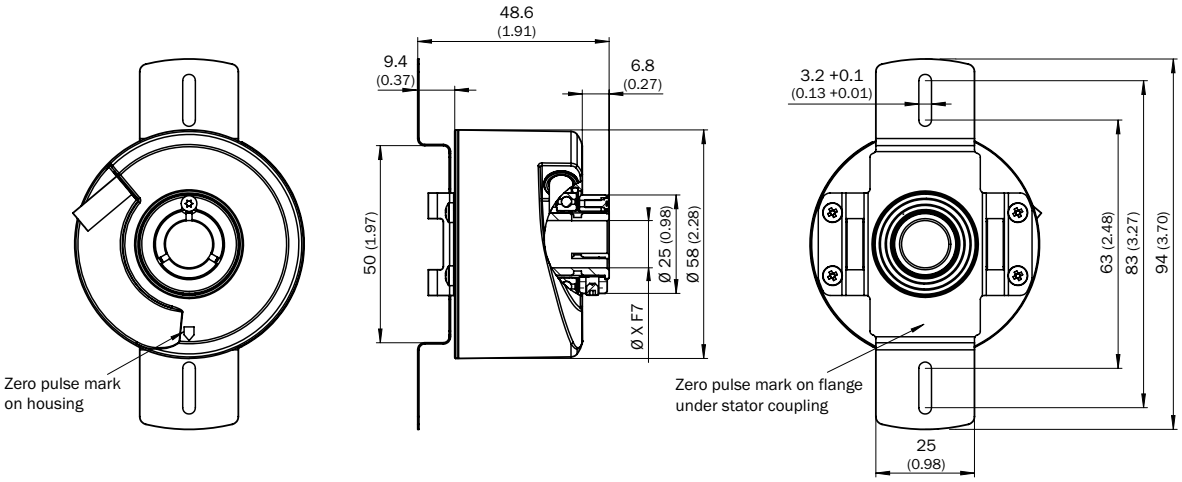
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Installation example for through hollow shaft

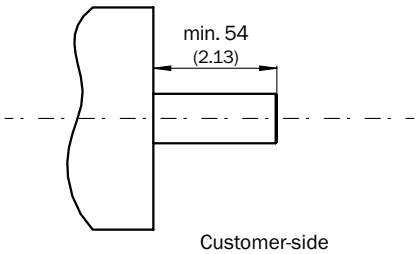


Customer-side

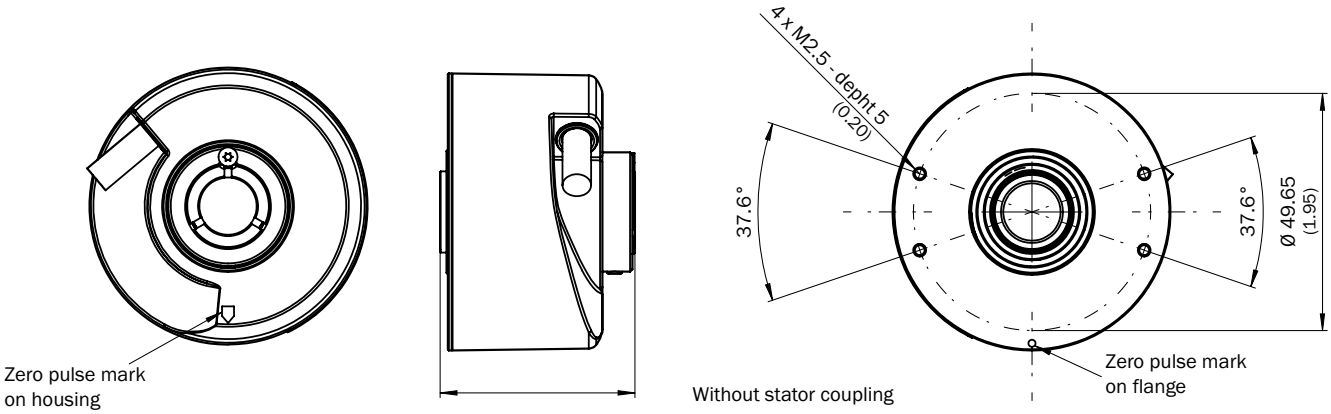
Through hollow shaft clamping at the back, cable connection, two-sided stator coupling, slot, screw hole circle 63 mm – 83 mm



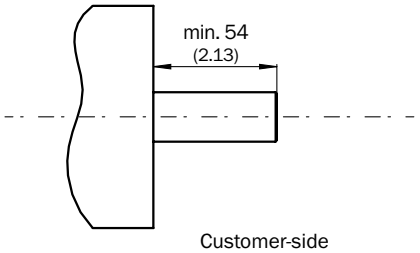
Installation example for through hollow shaft



Through hollow shaft clamping at the back, cable connection, no stator coupling

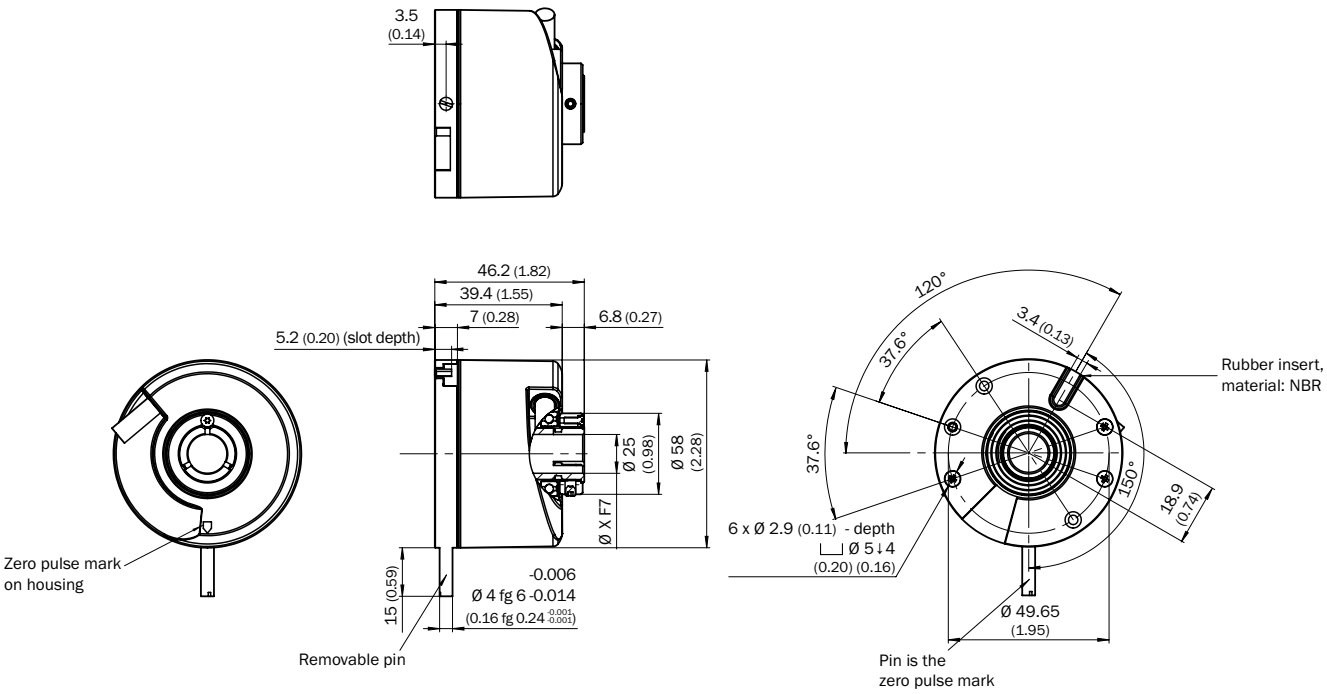


Installation example for through hollow shaft

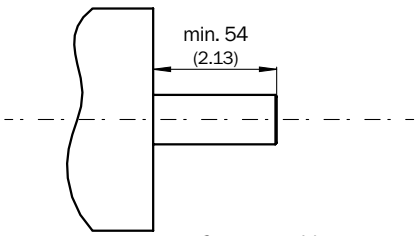


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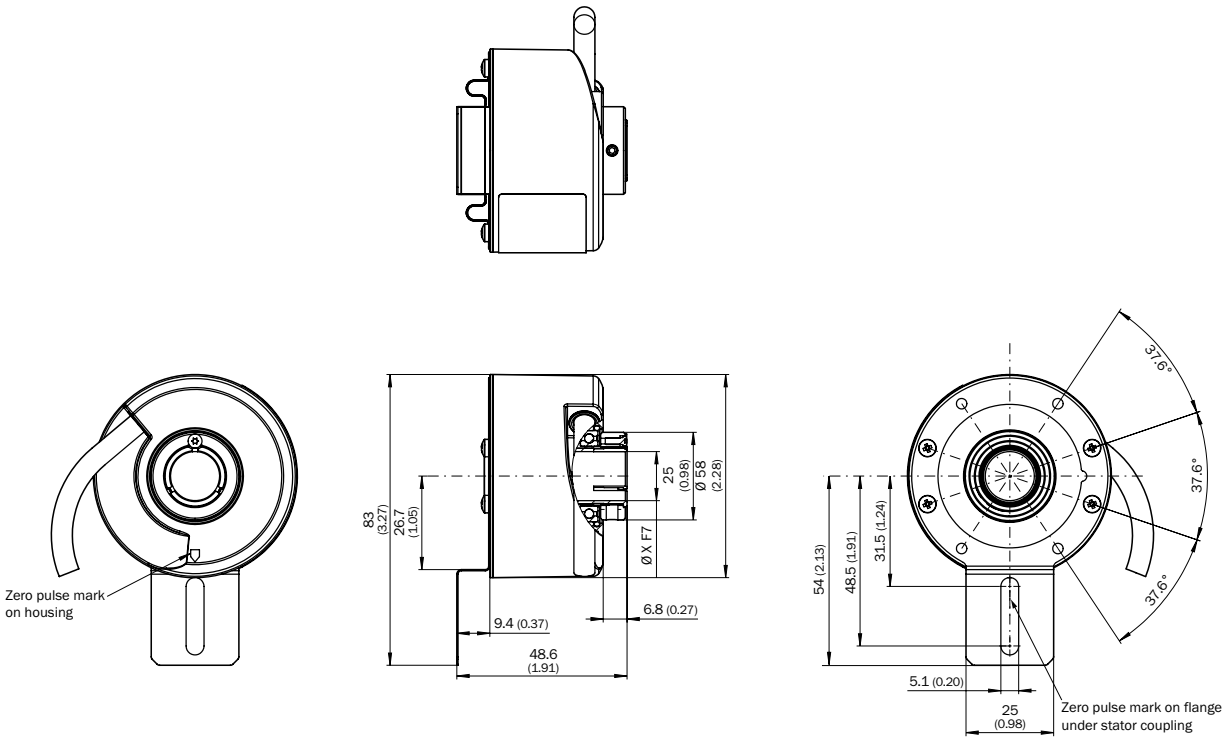
Through hollow shaft clamping at the back, cable connection, with locating pin assembly



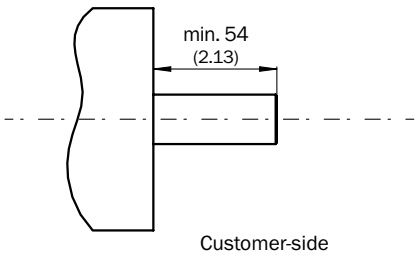
Installation example for through hollow shaft



Through hollow shaft clamping at the back, cable connection, one-sided stator coupling, slot, screw hole circle 33 mm – 48.5 mm

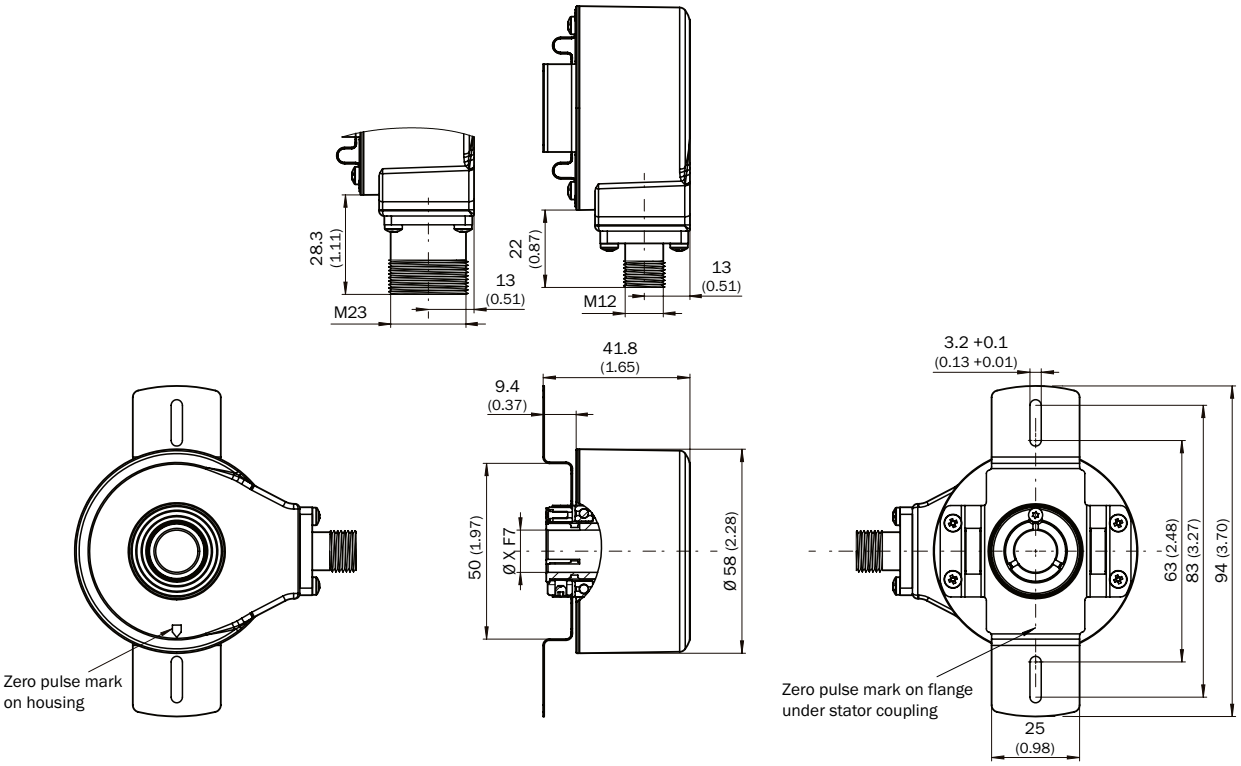


Installation example for through hollow shaft



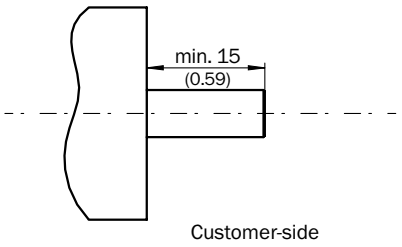
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Through hollow shaft clamping at the front, male connector connection, two-sided stator coupling, slot, screw hole circle 63 mm – 83 mm

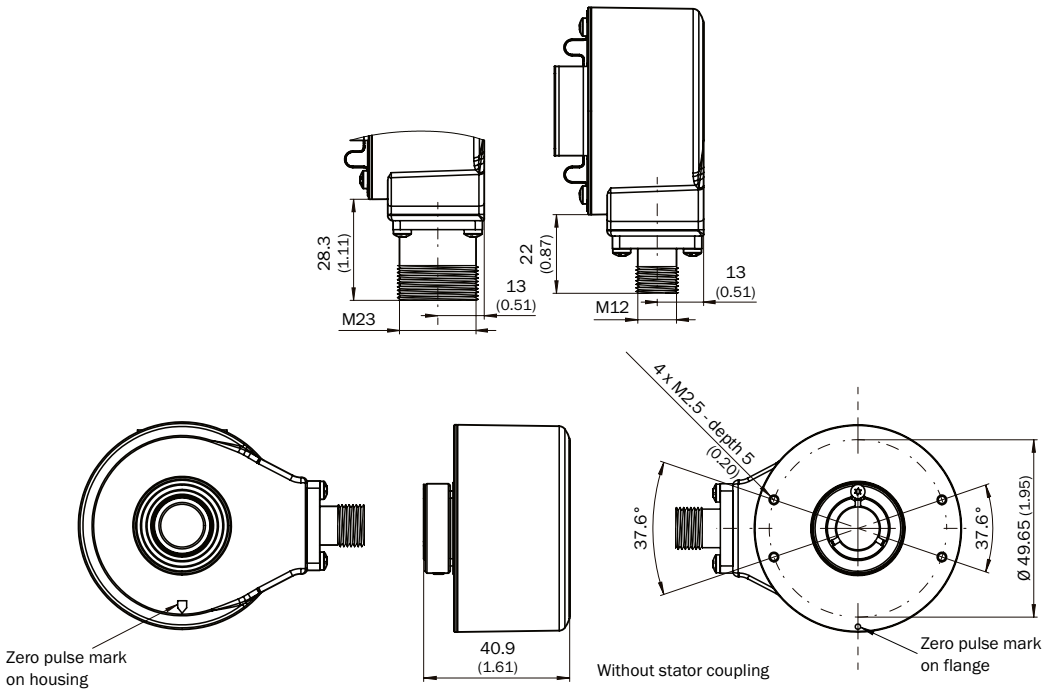


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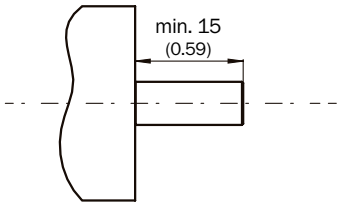
Installation example for through hollow shaft



Through hollow shaft clamping at the front, male connector connection, no stator coupling



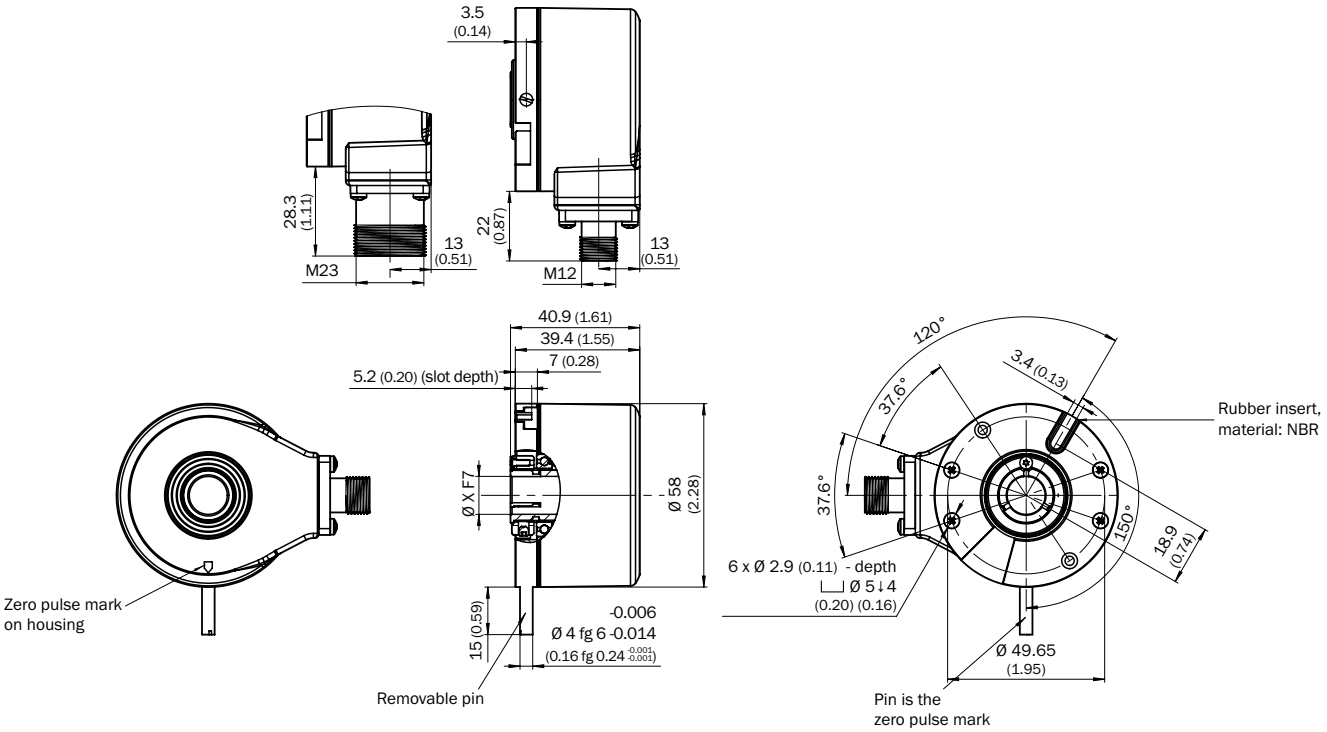
Installation example for through hollow shaft



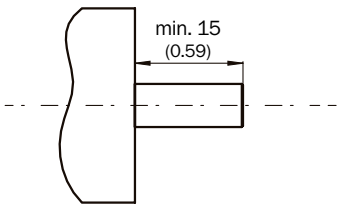
Customer-side

F

Through hollow shaft, male connector connection, with locating pin assembly



Installation example for through hollow shaft

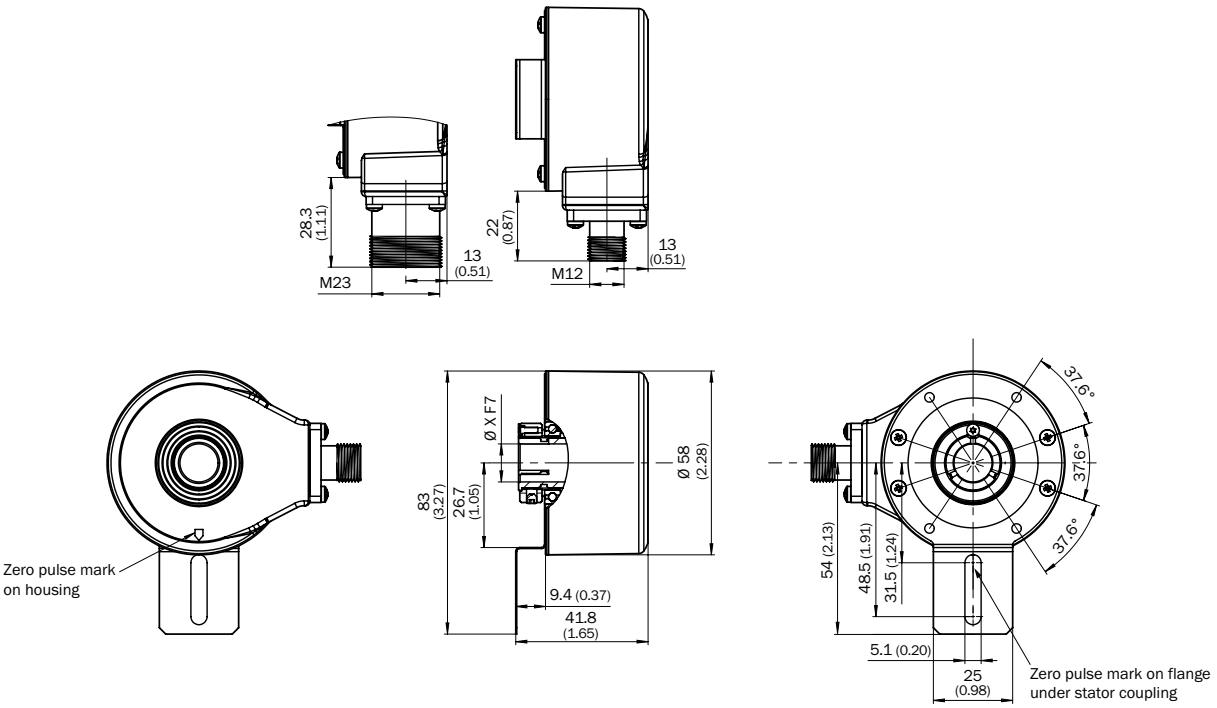


Customer-side

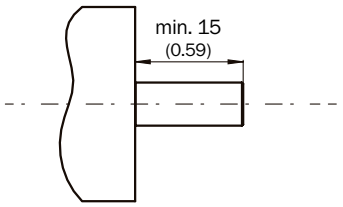
8015560/2015-09-01

Subject to change without notice

Through hollow shaft, male connector connection, stator coupling, 1-sided, slot, bolt circle 33 mm – 48.5 mm



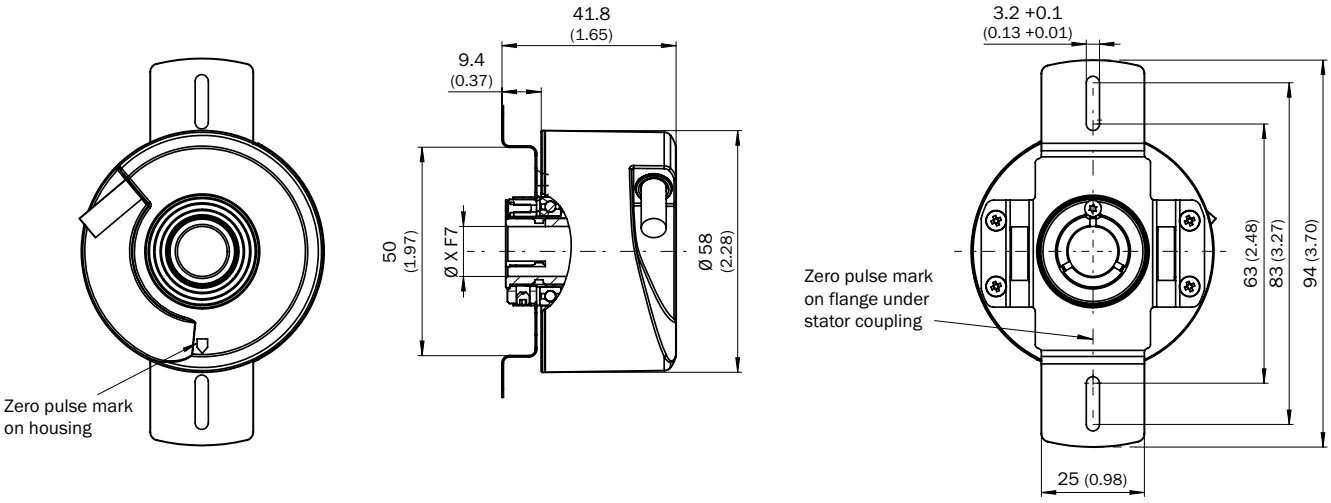
Installation example for through hollow shaft



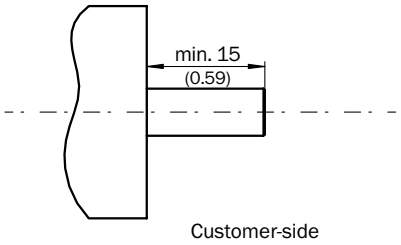
Customer-side

F

Through hollow shaft clamping at the front, cable connection, two-sided stator coupling, slot, screw hole circle 63 mm – 83 mm

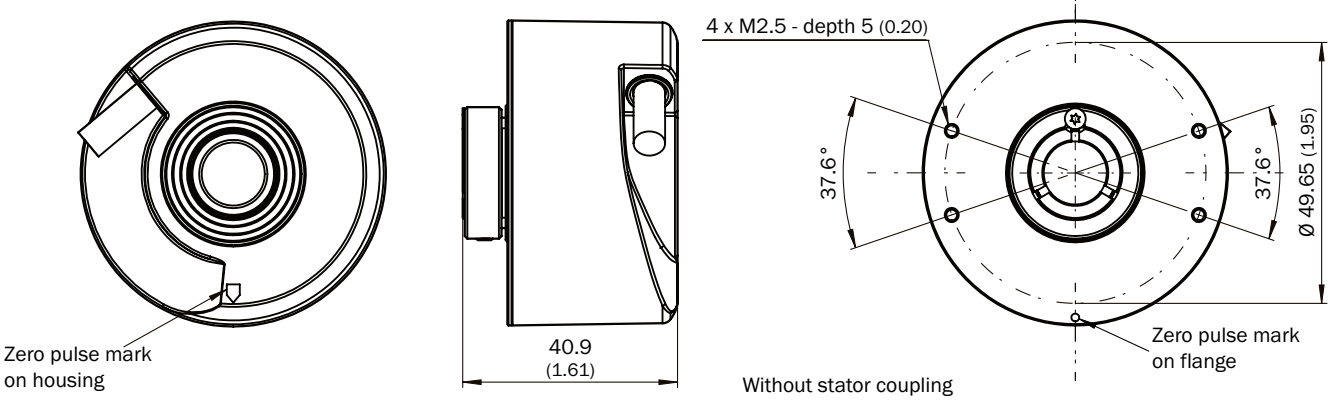


Installation example for through hollow shaft

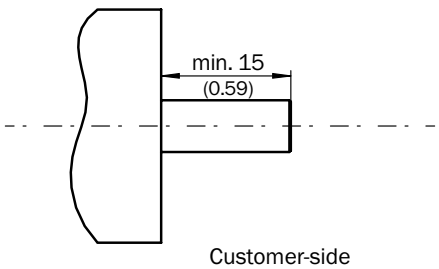


F

Through hollow shaft clamping at the front, cable connection, no stator coupling

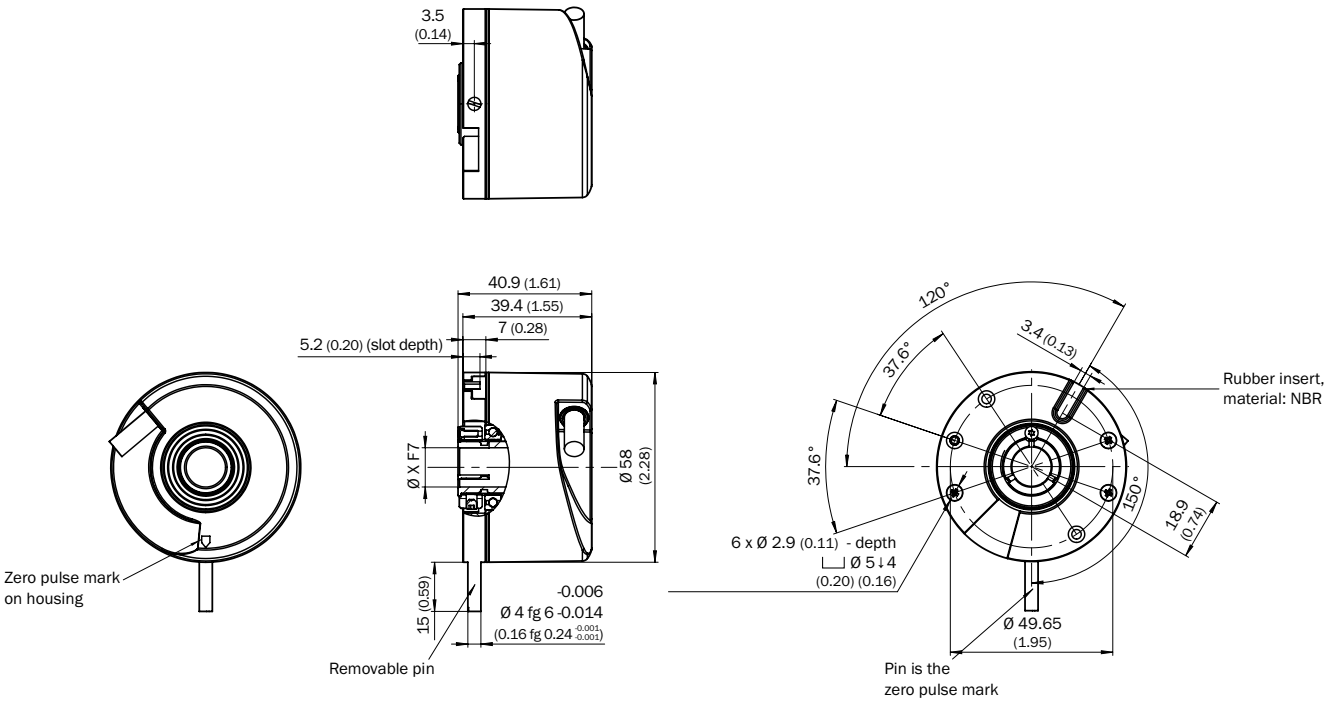


Installation example for through hollow shaft

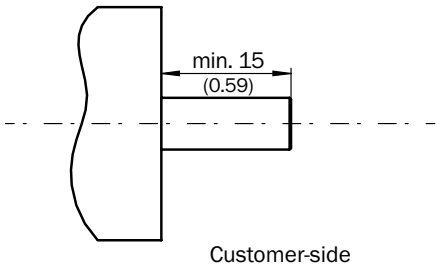


8015560/2015-09-01
Subject to change without notice

Through hollow shaft, cable connection, with locating pin assembly

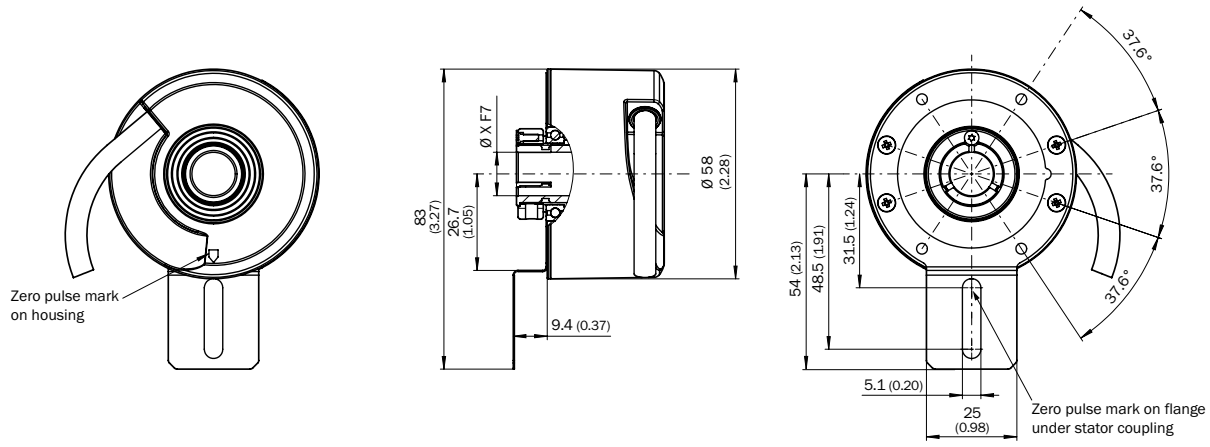


Installation example for through hollow shaft

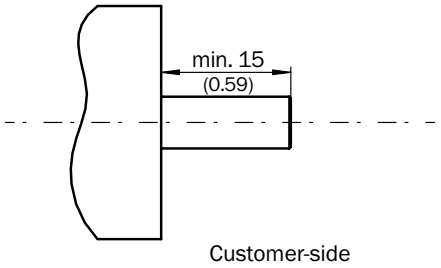


F

Through hollow shaft, cable connection, stator coupling, 1-sided, slot, bolt circle 33 mm – 48.5 mm



Installation example for through hollow shaft



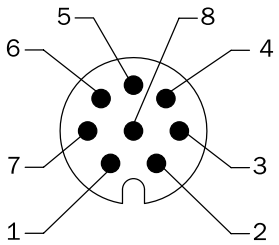
Customer-side

F

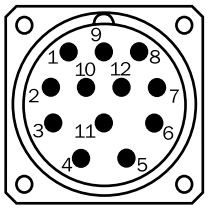
Connection type

8-core cable

View of M12 device connector on cable/housing

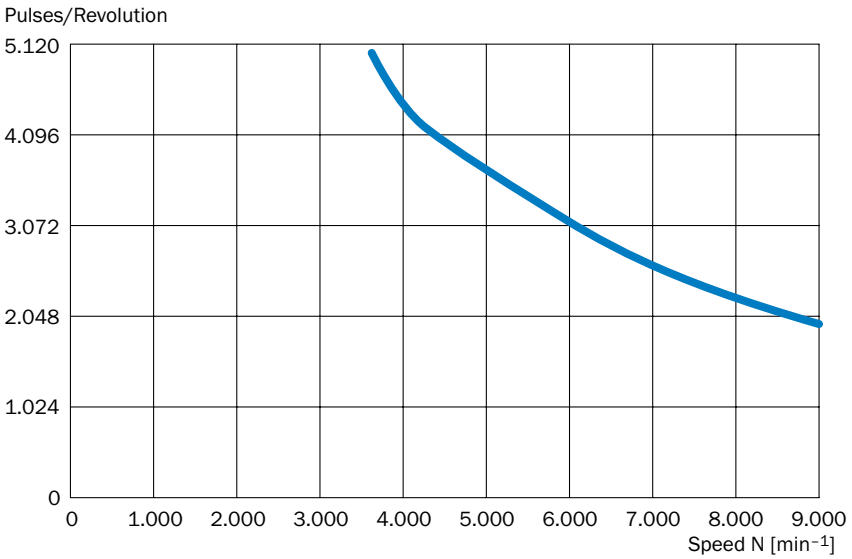


View of M23 device connector on cable cable/housing



Colour of wires	Pin 12-pole in M12	Pin 12-pole in M23	Signal OC	Signal TTL; HTL	Explanation
Brown	1	6	Not connected	A-	Signal line
White	2	5	A	A	Signal line
Black	3	1	Not connected	B-	Signal line
Pink	4	8	B	B	Signal line
Yellow	5	4	Not connected	Z-	Signal line
Lilac	6	3	Z	Z	Signal line
Blue	7	10	GND	GND	Ground connection of the Encoder
Red	8	12	+Us	+Us	Supply voltage
-	-	9	Not connected	Not connected	Not connected
-	-	2	Not connected	Not connected	Not connected
-	-	11	Not connected	Not connected	Not connected
-	-	7	Not connected	Not connected	Not connected
Screen	Screen	Screen	Screen	Screen	Screen (Screen connected to Encoder housing.

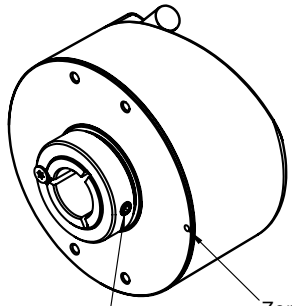
Viewing number of resolutions



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Zero declaration

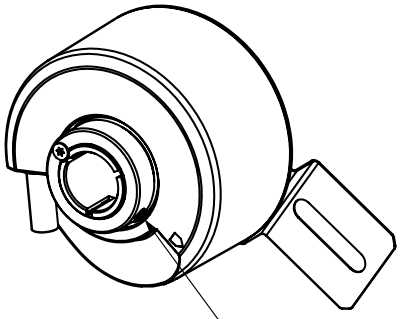
Hollow shaft, clamping at front



Zero pulse mark on flange
Attention!
If stator coupling is mounted, the zero pulse mark can be hidden by the stator coupling

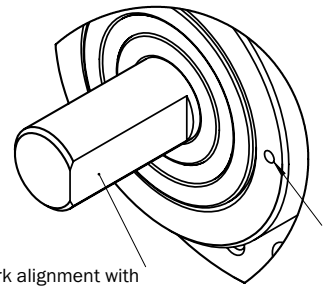
Zero pulse is active when screw of clamping is in line with zero pulse mark on flange or housing mark

Hollow shaft, clamping at back



Zero pulse is active when screw of clamping is in line with zero pulse mark on flange or housing mark

Solid shaft



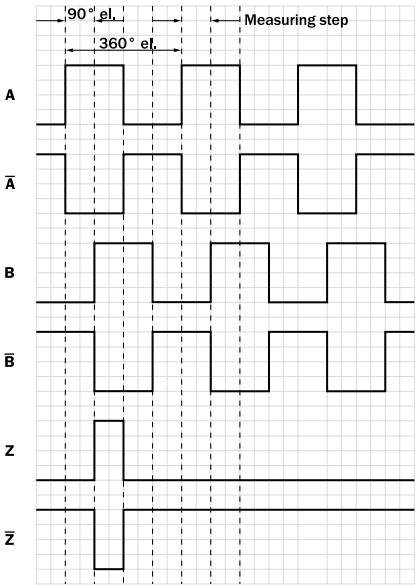
Zero pulse mark on flange

use shaft flat for zero mark alignment with zero mark on flange or housing

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Signal outputs

Signal outputs for electrical interfaces TTL and HTL



Supply voltage	Output
4.5 ... 5.5 V	TTL
10 ... 30 V	TTL
10 ... 27 V	HTL
4.5 ... 30 V	TTL/HTL universal

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

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Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 36 mm, including mounting kit for face mount flange	BEF-WF-36	2029164

Flanges

Flange plate

Figure	Brief description	Type	Part no.
	Two-sided stator coupling, screw hole circle diameter 63 mm, slot width 3.2 mm	BEF-DS-09	2076214
	Two-sided stator coupling, slot, slot radius 63 mm – 83 mm, slot width 3.2 mm	BEF-DS-10	2076215
	One-sided stator coupling, slots, slot radius 32.75 mm – 142.65 mm, slot width 4.5 mm	BEF-DS-11	2076216
	One-sided stator coupling, slot, slot radius 33 mm – 48.5 mm, slot width 5.1 mm	BEF-DS-12	2076217
	Flange adapter (for hollow shaft) for locating pin assembly (PIN 4 mm)	BEF-DS-13	2076218
	One-sided stator coupling, slot, slot radius 32.1 mm – 37.6 mm, slot width 4.5 mm	BEF-DS-14	2076678
	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	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 10	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	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	BEF-FA-036-063REC	2034225

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Other mounting accessories

Measuring wheels and measuring wheel systems

Figure	Brief description	Type	Part no.
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 500 mm	BEF-MR006050R	2055225
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 200 mm	BEF-MR010020R	2055224
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 500 mm	BEF-MR010050R	2055227
	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
	O-ring for measuring wheels (circumference 500 mm)	BEF-OR-145-050	2064074

Mounting bell

Figure	Brief description	Type	Part no.
	Mounting bell for encoders with a servo flange, centering hub 50 mm, including mounting kit	BEF-MG-50	5312987

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	BEF-WK-SF	2029166

Shaft adaptation

Collets and clamping rings

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

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Figure	Brief description	Type	Part no.
	Metal collet for hollow shaft, shaft diameter 15 mm, outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-015-M	2076223
	Plastic isolated collet for hollow shaft, shaft diameter 6 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-006-P	2076228
	Plastic isolated collet for hollow shaft, shaft diameter 8 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-008-P	2076229
	Plastic isolated collet for hollow shaft, shaft diameter 3/8" (9.525 mm), outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-38Z-P	2076226
	Plastic isolated collet for hollow shaft, shaft diameter 10 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-010-P	2076230
	Plastic isolated collet for hollow shaft, shaft diameter 12 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-012-P	2076231
	Plastic isolated collet for hollow shaft, shaft diameter 1/2" (12.7 mm), outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-12Z-P	2076227
	Plastic isolated collet for hollow shaft, shaft diameter 14 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-014-P	2076232
	Plastic isolated collet for hollow shaft, shaft diameter 15 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-015-P	2076233

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	KUP-0606-B	5312981
	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 °C to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	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 °C to +120 °C, max. torque 80 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. revolutions 10,000 rpm, –30 °C to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	KUP-1012-B	5312984
	Bar coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, –10 °C 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, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0608-S	5314179
	Bar coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; max. speed 10,000 rpm, –10 °C to +80 °C, max. torque 80 Ncm; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0610-S	2056407
	Bar coupling, shaft diameter 8 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0810-S	5314178
	Bar coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-1010-S	2056408
	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 °C to +80 °C, max. torque 60 Ncm; material: aluminum flange, fiber-glass reinforced polyamide membrane and tempered steel coupling pin	KUP-0610-F	5312985
	Spring washer coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.4 mm, angular ± 2.5°; max. speed 12,000 rpm, –10 °C to +80° Celsius, max. torque 60 Ncm; material: aluminum flange, glass fiber-reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986

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Connectors

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 mm², 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 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	2 m	DOL-2312-G02MLA3	2030682
		7 m	DOL-2312-G07MLA3	2030685
		10 m	DOL-2312-G10MLA3	2030688
		15 m	DOL-2312-G15MLA3	2030692
		20 m	DOL-2312-G20MLA3	2030695
		25 m	DOL-2312-G25MLA3	2030699
		30 m	DOL-2312-G30MLA3	2030702
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: incremental, suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	1.5 m	DOL-2312-G1M5MA3	2029212
		3 m	DOL-2312-G03MMA3	2029213
		5 m	DOL-2312-G05MMA3	2029214
		10 m	DOL-2312-G10MMA3	2029215
		20 m	DOL-2312-G20MMA3	2029216
		30 m	DOL-2312-G30MMA3	2029217

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

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Female connectors (ready to assemble)

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

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	By the meter	LTG-2308-MWENC	6027529
	Head A: cable Head B: cable Cable: PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm		LTG-2612-MW	6028516

Male connector (ready to assemble)

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

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

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HIGH RESOLUTION, PROGRAMMABLE ENCODER FOR DEMANDING APPLICATIONS



Product description

The DFS60 is a high-resolution incremental encoder with a diameter of 60 mm. It offers a wide variety of mechanical and electric interfaces and can also be programmed by the customer if required. Programming of the output signal and zero pulse is a unique feature for the market. The high enclosure rating, wide temperature range, and large ball bearing distance ensure extreme reliability, making the DFS60 the ideal encoder for industrial applications in harsh environments.

At a glance

- Short installation depth
- High resolution of up to 16 bits
- Optional programming: output voltage, zero pulse position, zero impulse width and pulse count.
- Connection: radial or axial cable outlet, M23 or M12 male connector, axial or radial.
- Electrical interfaces: 5 V & 24 V TTL/RS-422, 24 V HTL/Push Pull
- Mechanical interfaces: face mount flange or servo flange, blind hollow shaft or through hollow shaft
- Remote zero set possible

Your benefits

- Reduction of storage costs and downtimes due to programmability by the customer
- The wide range of different mechanical and electrical interfaces enables the optimum adaptation of the encoder to the application-specific installation situation
- Excellent concentricity even at high speeds
- High resolution of up to 16 bits ensures precise measurements for demanding applications
- Long-term and reliable operation thanks to a high enclosure rating, temperature resistance and bearing lifetime
- The ability to program using the PGT-08-S programming software and the PGT-10-Pro display programming device enables fast and flexible adaptation of the encoder to customer requirements
- Programmable zero pulse position simplifies installation

Additional information

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→ www.mysick.com/en/DFS60

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Applications in factory and logistics automation for measuring position, speed, and distance: e.g., in printing machines, textile machines, wood processing, packaging machinery

Detailed technical data

Performance

	Eco	Basic	Advanced
Pulses per revolution [1) 2)]	100 ... 2,048	1 ... 10,000	1 ... 65,536
Pulses per revolution at sin/cos 1.0 V_{ss}	–	1,024	–
Measurement step	90° electrical/pulses per revolution		
Measuring step deviation at non-binary number of lines			
Pulses 1 ... 99	–	± 0.08°	± 0.04°
Pulses 100 ... 10,000	± 0.2°	± 0.01°	± 0.008°
Pulses > 10,000	–		± 0.002°
Measuring step deviation at binary number of lines			
Pulses 1 ... 64	–	± 0.05°	± 0.03°
Pulses 128 ... 8,192	± 0.15°	± 0.008°	± 0.008°
Pulses 16,384 ... 65,536	–		± 0.0015°
Reference signal			
Number	1		
Location	90°, electric, logically gated with A and B/sine and cosine		
Error limits	± 0.3°	± 0.05°	± 0.03°

[1)] See maximum viewing number of resolutions

[2)] For a detailed list see “Pulses per revolution”

[3)] Under mechanical zero set width.

Electrical data

	Eco	Basic	Advanced
Electrical interface	4.5 V ... 5.5 V, TTL/RS422		
	10 V ... 32 V, HTL/Push Pull		
	10 V ... 32 V, TTL/RS422		
	–	4.5 V ... 5.5 V, sin/cos 1.0 V_{SS}	
	–	4.5 V ... 32 V, HTL/Push Pull, 0-SET on M23 male connector [2)]	
	–	4.5 V ... 5.5 V, TTL/RS422, 0-SET on M23 male connector [2)]	
	–	4.5 V ... 32 V, TTL/RS422, 0-SET on M23 male connector [2)]	
	–	4.5 V ... 32 V, TTL/HTL programmable [1)]	
	–	4.5 V ... 32 V, TTL/HTL programmable, 0-SET on M23 male connector [1) 2)]	

[1)] Factory setting, output level TTL.

[2)] Only with device variants with M23 male connector outlet in conjunction with the electrical interfaces M,U,V and W.

[3)] Under mechanical zero set width.

[4)] The universal cable outlet is positioned so that it is possible to lay it without bends in a radial or axial direction.

[5)] Short-circuit of another channel U_S or GND permissible for a maximum of 30 s.

[6)] Short-circuit of another channel or GND permissible for a maximum of 30 s.

[7)] TTL programming with ≥ 5.5 V: Short-circuit of another channel or GND permissible for a maximum of 30 s.

[8)] HTL or TTL programming with< 5.5 V: Short-circuit of another channel, U_S or GND permissible for a maximum of 30 s.

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

	Eco	Basic	Advanced
Initialization time after power on			
4.5 V ... 5.5 V, TTL/RS422	40 ms		
10 V ... 32 V, HTL/Push Pull	40 ms		
10 V ... 32 V, TTL/RS422	40 ms		
4.5 V ... 5.5 V, sin/cos 1.0 V_{SS}	–	40 ms	–
4.5 V ... 32 V, HTL/Push Pull, 0-SET	–	Max. 30 ms	
4.5 V ... 5.5 V, TTL/RS422, 0-SET	–	Max. 30 ms	
4.5 V ... 32 V, TTL/RS422, 0-SET	–	Max. 30 ms	
4.5 V ... 32 V, TTL/HTL programmable	–	Max. 30 ms/32 ms [3]	
4.5 V ... 32 V, TTL/HTL programmable, 0-SET	–	Max. 30 ms/32 ms [3]	
0-set function		H – active (L = 0 ... 3 V, H = 4 ... U_s V)	
Connection type	Cable, 8-wire, universal, 1.5 m [4] Cable, 8-wire, universal, 3 m [4] Cable, 8-wire, universal, 5 m [4] M12 male connector, 8-pin, radial M12 male connector, 8-pin, axial M23 male connector, 12-pin, radial M23 male connector, 12-pin, axial		
Max. load current	≤ 30 mA		
Operating current without load	40 mA		
Load resistance			
4.5 V ... 5.5 V, sin/cos 1.0 V_{SS}	–	min. 120 Ω	–
Max. power consumption without load			
10 V ... 32 V, HTL/Push Pull	0.5 W		
10 V ... 32 V, TTL/RS422	0.5 W		
4.5 V ... 32 V, HTL/Push Pull, 0-SET	–	0.7 W	
4.5 V ... 5.5 V, TTL/RS422, 0-SET	–	0.7 W	
4.5 V ... 32 V, TTL/RS422, 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	
Maximum output frequency			
TTL/RS422	300 kHz	600 kHz	820 kHz
HTL/Push Pull	300 kHz	600 kHz	820 kHz
HTL/Push Pull, 0-SET	300 kHz	600 kHz	820 kHz
TTL/RS422, 0-SET	300 kHz	600 kHz	820 kHz
TTL/HTL programmable	–	600 kHz	820 kHz
Sin/cos 1.0 V_{SS}	–	200 kHz	–
TTL/HTL programmable, 0-SET	–	600 kHz	820 kHz

[1] Factory setting, output level TTL.

[2] Only with device variants with M23 male connector outlet in conjunction with the electrical interfaces M,U,V and W.

[3] Under mechanical zero set width.

[4] The universal cable outlet is positioned so that it is possible to lay it without bends in a radial or axial direction.

[5] Short-circuit of another channel U_S or GND permissible for a maximum of 30 s.

[6] Short-circuit of another channel or GND permissible for a maximum of 30 s.

[7] TTL programming with ≥ 5.5 V: Short-circuit of another channel or GND permissible for a maximum of 30 s.

[8] HTL or TTL programming with< 5.5 V: Short-circuit of another channel, U_S or GND permissible for a maximum of 30 s.

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

	Eco	Basic	Advanced
Reverse polarity protection			
4.5 V...5.5 V, TTL/RS422	–		
10 V ... 32 V, HTL/Push Pull	✔		
10 V ... 32 V, TTL/RS422	✔		
4.5 V ... 5.5 V, sin/cos 1.0 V_{SS}	–		
4.5 V ... 32 V, HTL/Push Pull, 0-SET	–	✔	
4.5 V ... 5.5 V, TTL/RS422, 0-SET	–	✔	
4.5 V ... 32 V, TTL/RS422, 0-SET	–	✔	
4.5 V ... 32 V, TTL/HTL programmable	–	✔	
4.5 V ... 32 V, TTL/HTL programmable, 0-SET	–	✔	
Short-circuit protection of the outputs			
4.5 V–5.5 V, TTL/RS422	✔ [5]		
10 V ... 32 V, HTL/Push Pull	✔ [5]		
10 V ... 32 V, TTL/RS422	✔ [6]		
4.5 V ... 32 V, HTL/Push Pull, 0-SET	–	✔ [7]	
4.5 V ... 5.5 V, TTL/RS422, 0-SET	–	✔ [7]	
4.5 V ... 32 V, TTL/RS422, 0-SET	–	✔ [8]	
4.5 V ... 32 V, TTL/HTL programmable	–	✔ [7] [8]	
4.5 V ... 5.5 V, sin/cos 1.0 V_{SS}	–	✔ [5]	–
4.5 V ... 32 V, TTL/HTL programmable, 0-SET	–	✔ [7] [8]	
MTTFd: mean time to dangerous failure	300 years (EN ISO 13849-1) [9]		

[1] Factory setting, output level TTL.

[2] Only with device variants with M23 male connector outlet in conjunction with the electrical interfaces M,U,V and W.

[3] Under mechanical zero set width.

[4] The universal cable outlet is positioned so that it is possible to lay it without bends in a radial or axial direction.

[5] Short-circuit of another channel U_s or GND permissible for a maximum of 30 s.

[6] Short-circuit of another channel or GND permissible for a maximum of 30 s.

[7] TTL programming with ≥ 5.5 V: Short-circuit of another channel or GND permissible for a maximum of 30 s.

[8] HTL or TTL programming with< 5.5 V: Short-circuit of another channel, U_s or GND permissible for a maximum of 30 s.

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

F

Mechanical data

	Eco	Basic	Advanced
Shaft diameter			
Face mount flange	6 mm x 10 mm [1]		
Servo flange	10 mm x 19 mm [1]		
Blind hollow shaft, through hollow shaft [2]	6 mm, 8 mm, 10 mm, 12 mm, 14 mm, 15 mm, 3/8", 1/2", 5/8"		
Mass [3]			
Solid shaft	0.3 kg		
Blind hollow shaft, through hollow shaft	0.2 kg		
Shaft material	Stainless steel		
Flange material	Aluminum [4]		
Housing material	Aluminum die cast [4]		

[1] Other diameter, lengths, and spread shafts on request.

[2] Clamping on the back of the shaft on request.

[3] Relates to devices with cable outlet.

[4] Stainless steel on request.

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

	Eco	Basic	Advanced
Start up torque			
Solid shaft	0.5 Ncm (+20 °C)		
Blind hollow shaft, through hollow shaft	0.8 Ncm (+20 °C)		
Operating torque			
Solid shaft	0.3 Ncm (+20 °C)		
Blind hollow shaft, through hollow shaft	0.6 Ncm (+20 °C)		
Permissible shaft movement, axial static/ dynamic			
Blind hollow shaft, through hollow shaft	± 0.5 mm, ± 0.2 mm		± 0.5 mm, ± 0.01 mm
Permissible shaft movement, radial static/ dynamic			
Blind hollow shaft, through hollow shaft	± 0.3 mm, ± 0.1 mm		± 0.3 mm, ± 0.05 mm
Permissible shaft loading			
Solid shaft	80 N (radial) 40 N (axial)		
Maximum operating speed			
Solid shaft	9,000 / min [5]		
Blind hollow shaft, through hollow shaft	6,000 / min [5]		
Rotor moment of inertia			
Solid shaft	6.2 gcm²		
Blind hollow shaft, through hollow shaft	40 gcm²		
Bearing lifetime	3.6 x 10^{10} revolutions		
Max. angular acceleration	5 x 10^{5} rad/s²		

[1] Other diameter, lengths, and spread shafts on request.
[2] Clamping on the back of the shaft on request.
[3] Relates to devices with cable outlet.
[4] Stainless steel on request.
[5] Take into account self-heating of 3.3 K per 1,000 revolutions/min when designing the operating temperature range.

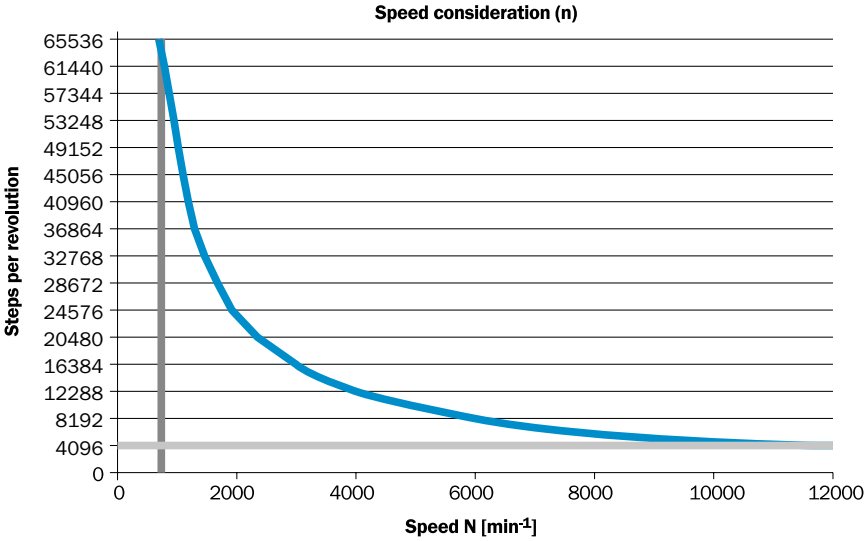
F

Ambient data

	Eco	Basic	Advanced
EMC [1]	According to EN 61000-6-2 and EN 61000-6-3		
Enclosure rating as per IEC 60529			
On the shaft	IP 65 [2]		
On the housing, male connector outlet [3]	IP 67 (IP 65 for through hollow shaft)		
On the housing, cable outlet	IP 67 (IP 65 for through hollow shaft)		
Permissible relative humidity	90% (condensation of optical surfaces not permitted)		
Operating temperature range	0 °C ... +85 °C	–40 °C ... +100 °C [4] –30 °C ... +100 °C [5]	
Storage temperature range	–40 °C ... +100 °C, without packaging		
Resistance to shocks according to EN 60068-2-27	50 g	70 g	100 g
Resistance to vibration according to EN 60068-2-6	20 g, 10 Hz ... 2,000 Hz	30 g, 10 Hz ... 2,000 Hz	

[1] For interfaces 10 ... 32 V, TTL/RS422 and 10 ... 32 V, HTL/Push Pull according to EN 61000-6-2 and EN 61000-6-4, devices in class A
[2] IP 67 on request.
[3] When mating connector is inserted.
[4] When cables are fixed in place.
[5] When cables can be moved.

Viewing number of resolutions



Type code

Solid shaft, programmable

Type
- B: Pulses per revolution, programmable, 1 ... 10,000
- A: Pulses per revolution, programmable, 1 ... 65,536

Mechanical design
- 4: Face mount flange, solid shaft 10 x 19 mm
- 1: Servo flange, solid shaft 6 x 10 mm

Electrical interface (factory setting: output level TTL)
- P: 4.5 V ... 32 V, TTL/HTL programmable
- M: 4.5 ... 32 V, TTL or HTL programmable with 0-set function on PIN 7 on M23 male connector. (Only in combination with connection type A or B)

Connection type
- A: Male connector M23, 12-pin, radial
- B: Male connector M23, 12-pin, axial
- C: Male connector M12, 8-pin, radial
- D: Male connector M12, 8-pin, axial
- K: Cable, 8-wire, universal, 1.5 m [1)]
- L: Cable, 8-wire, universal, 3 m [1)]
- M: Cable, 8-wire, universal, 5 m [1)]
- N: Cable, 8-wire, universal, 10 m [1)]

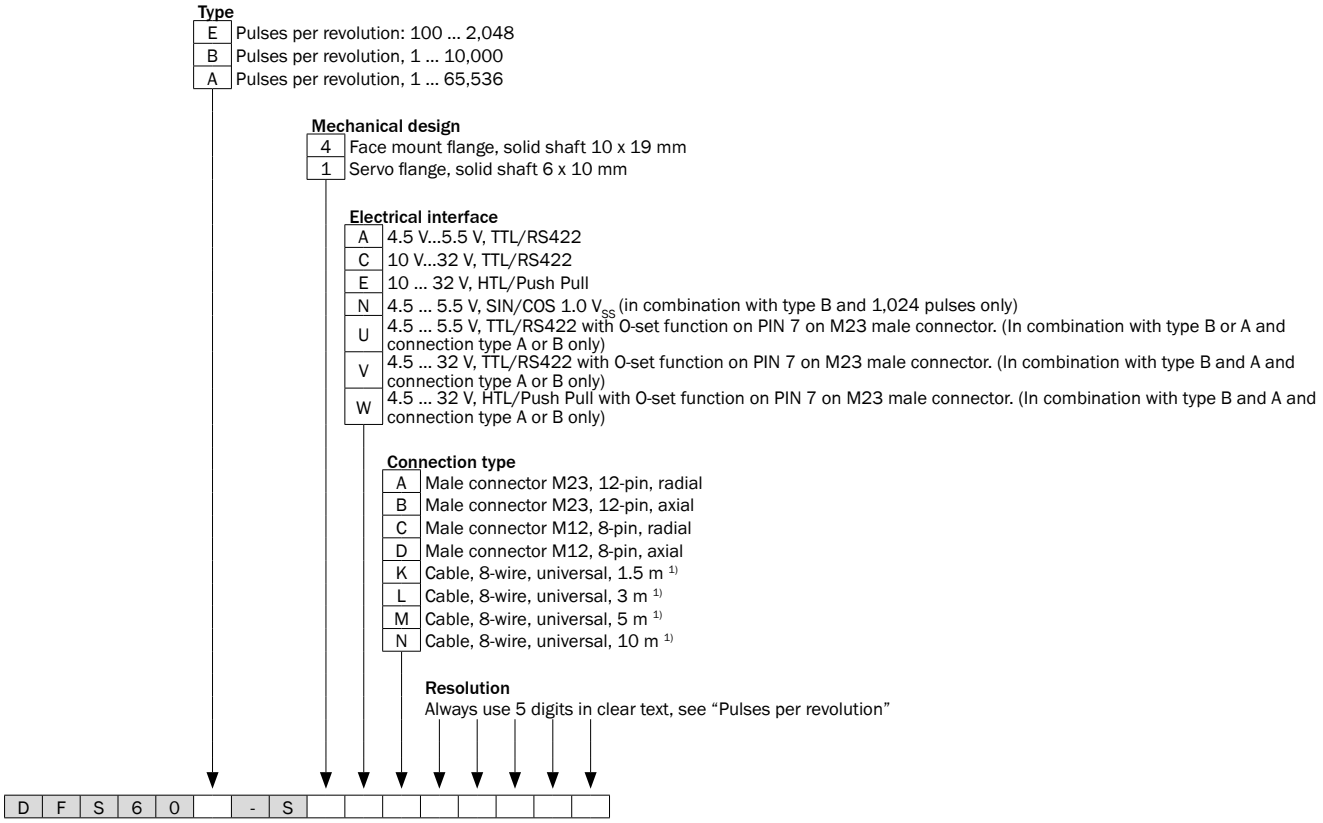
Resolution
(Factory setting for pulses per revolution for type B: 10,000; 65,536 for type A)
Always use 5 digits in clear text, see “Pulses per revolution”

D	F	S	6	0		-	S								

[1)] The universal cable outlet is positioned so that it is possible to lay it without bends in a radial and axial direction.

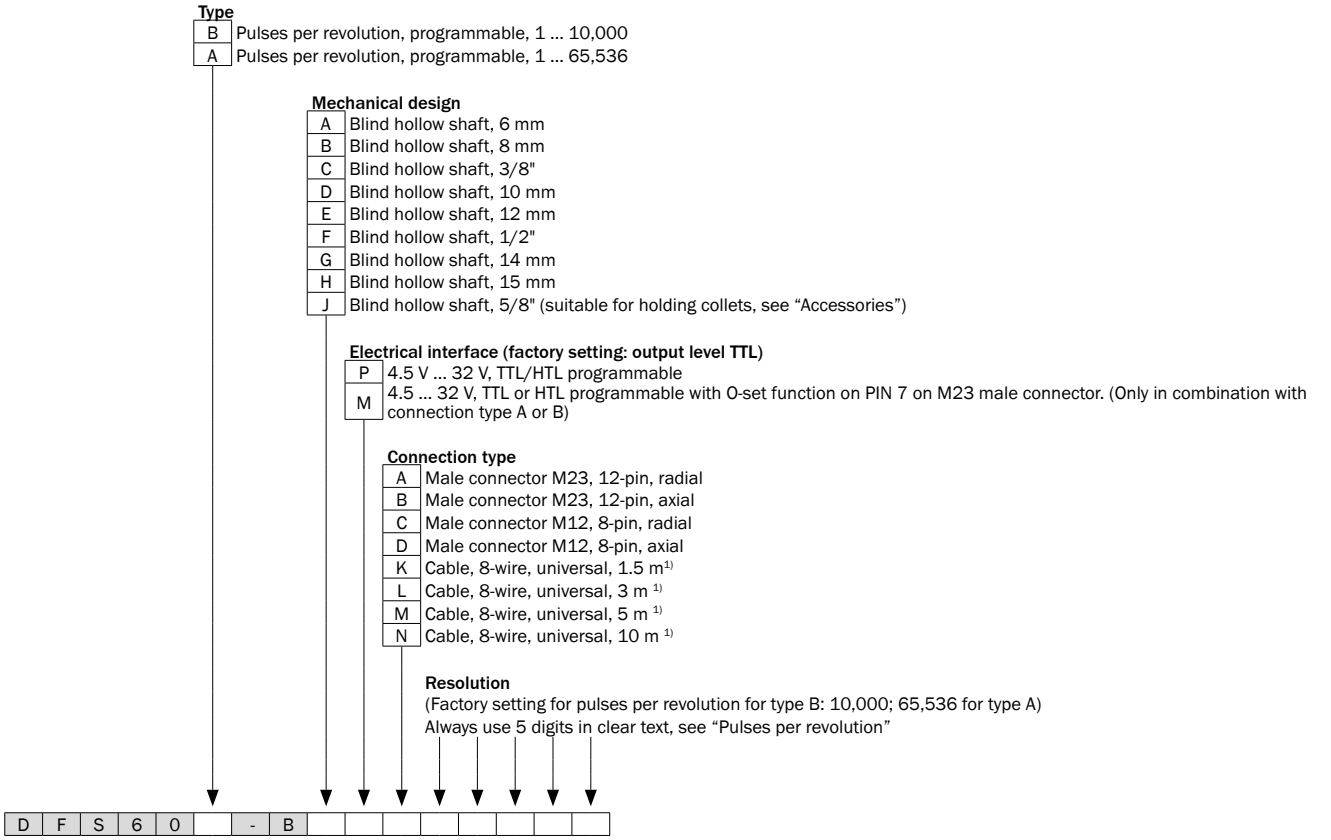
The following features can be programmed:
Pulses per revolution from 1 ... 65,536 using the programming tools PGT-08-S or PGT-10-Pro
Electrical zero-pulse width 90°, 180°, 270° using the programming tools PGT-08-S or PGT-10-Pro
Mechanical zero-pulse width 1° ... 359° using the programming tool PGT-10-Pro
Output voltage levels for TTL or HTL using the programming tools PGT-08-S or PGT-10-Pro
Counting direction CW/CCW using the programming tools PGT-08-S or PGT-10-Pro
0-SET function using the programming tools PGT-08-S or PGT-10-Pro
0-SET function via PIN 7 of the M23 male connector by applying U_s for at least 250 ms.

Solid shaft, not programmable



1) The universal cable outlet is positioned so that it is possible to lay it without bends in a radial and axial direction.

Blind hollow shaft, programmable

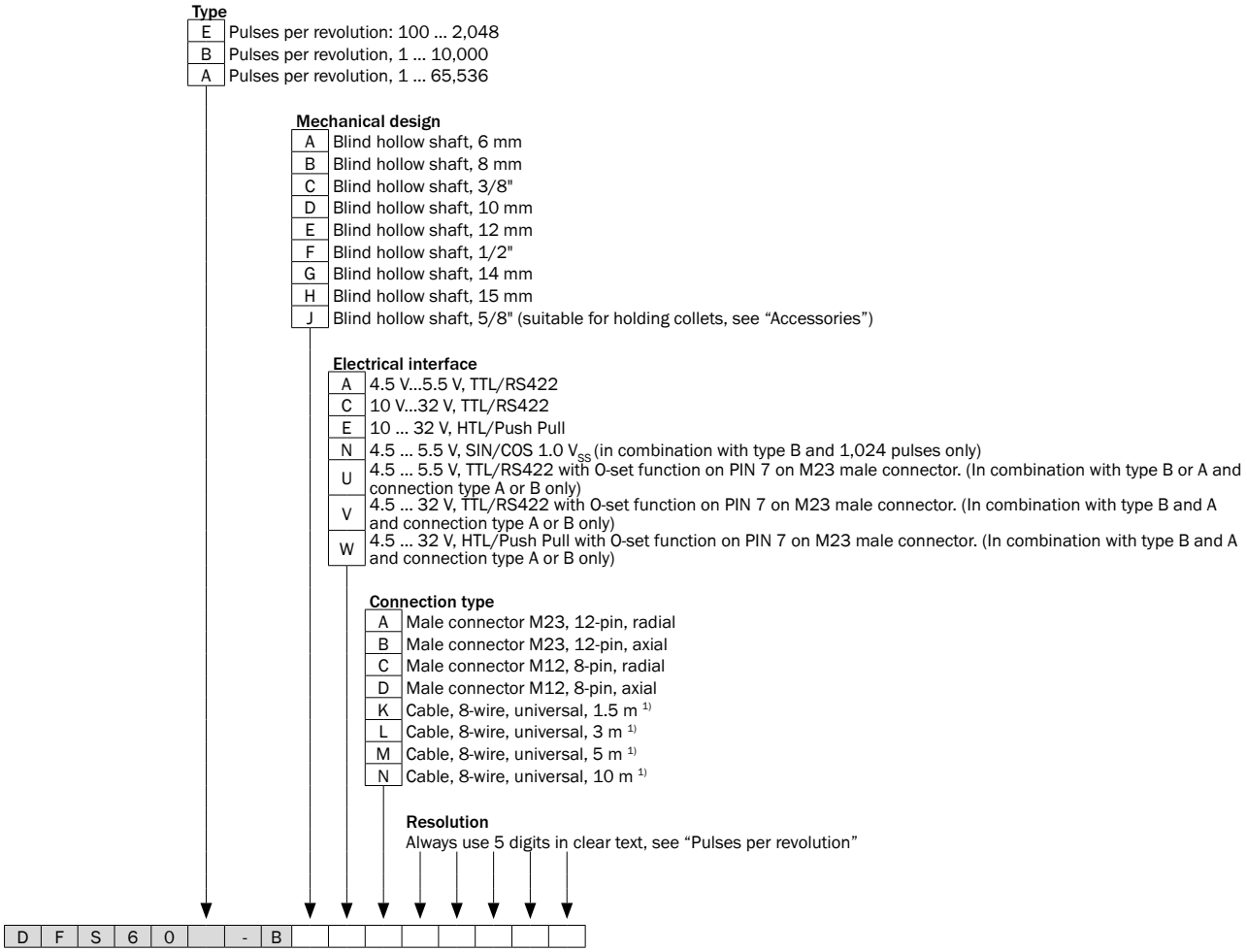


1) The universal cable outlet is positioned so that it is possible to lay it without bends in a radial and axial direction.

The following features can be programmed:
Pulses per revolution from 1 ... 65,536 using the programming tools PGT-08-S or PGT-10-Pro
Electrical zero-pulse width 90°, 180°, 270° using the programming tools PGT-08-S or PGT-10-Pro
Mechanical zero-pulse width 1° ... 359° using the programming tool PGT-10-Pro
Output voltage levels for TTL or HTL using the programming tools PGT-08-S or PGT-10-Pro
Counting direction CW/CCW using the programming tools PGT-08-S or PGT-10-Pro
0-SET function using the programming tools PGT-08-S or PGT-10-Pro
0-SET function via PIN 7 of the M23 male connector by applying U_s for at least 250 ms.

F

Blind hollow shaft, not programmable

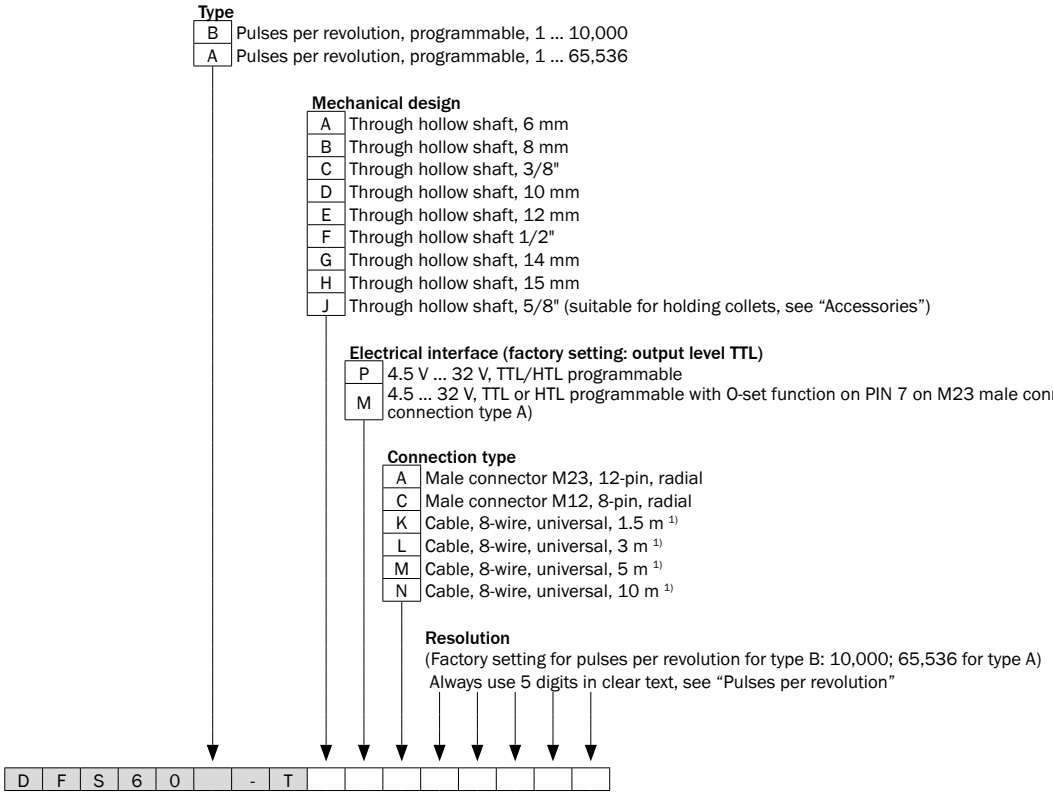


1) The universal cable outlet is positioned so that it is possible to lay it without bends in a radial and axial direction.

F

8015560/2015-09-01
Subject to change without notice

Through hollow shaft, programmable



1) The universal cable outlet is positioned so that it is possible to lay it without bends in a radial and axial direction.

The following features can be programmed:

Pulses per revolution from 1 ... 65,536 using the programming tools PGT-08-S or PGT-10-Pro

Electrical zero-pulse width 90°, 180°, 270° using the programming tools PGT-08-S or PGT-10-Pro

Mechanical zero-pulse width 1° ... 359° using the programming tool PGT-10-Pro

Output voltage levels for TTL or HTL using the programming tools PGT-08-S or PGT-10-Pro

Counting direction CW/CCW using the programming tools PGT-08-S or PGT-10-Pro

0-SET function using the programming tools PGT-08-S or PGT-10-Pro

0-SET function via PIN 7 of the M23 male connector by applying U_s for at least 250 ms

Through hollow shaft, not programmable

Type

E	Pulses per revolution: 100 ... 2,048
B	Pulses per revolution, 1 ... 10,000
A	Pulses per revolution, 1 ... 65,536

Mechanical design

A	Through hollow shaft, 6 mm
B	Through hollow shaft, 8 mm
C	Through hollow shaft, 3/8"
D	Through hollow shaft, 10 mm
E	Through hollow shaft, 12 mm
F	Through hollow shaft, 1/2"
G	Through hollow shaft, 14 mm
H	Through hollow shaft, 15 mm
J	Through hollow shaft, 5/8" (suitable for holding collets, see “Accessories”)

Electrical interface

A	4.5 V...5.5 V, TTL/RS422
C	10 V...32 V, TTL/RS422
E	10 ... 32 V, HTL/Push Pull
N	4.5 ... 5.5 V, SIN/COS 1.0 V_{SS} (in combination with type B and 1,024 pulses only)
U	4.5 ... 5.5 V, TTL/RS422 with 0-set function on PIN 7 on M23 male connector. (In combination with type B or A and connection type A only)
V	4.5 ... 32 V, TTL/RS422 with 0-set function on PIN 7 on M23 male connector. (In combination with type B and A and connection type A only)
W	4.5 ... 32 V, HTL/Push Pull with 0-set function on PIN 7 on M23 male connector. (In combination with type B and A and connection type A only)

Connection type

A	Male connector M23, 12-pin, radial
C	Male connector M12, 8-pin, radial
K	Cable, 8-wire, universal, 1.5 m [1]
L	Cable, 8-wire, universal, 3 m [1]
M	Cable, 8-wire, universal, 5 m [1]
N	Cable, 8-wire, universal, 10 m [1]

Resolution

Always use 5 digits in clear text, see “Pulses per revolution”

D	F	S	6	0		-	T								

[1] The universal cable outlet is positioned so that it is possible to lay it without bends in a radial and axial direction.

Pulses per revolution [1)]

	E	B [2)]	A [2)]
Pulses per revolution	00100	00100	00100
	00200	00200	00200
	00250	00250	00250
	00256	00300	00300
	00314	00314	00314
	00360	00360	00360
	00500	00500	00500
	00512	00512	00512
	00720	00720	00720
	01000	01000	01000
	01024	01024	01024
	01250	01250	01250
	02000	02000	02000
	02048	02048	02048
		02500	02500
		03600	03600
		04000	04000
		04096	04096
		05000	05000
		07200	07200
		08192	08192
		10000	10000
			16384
			32768
			65536

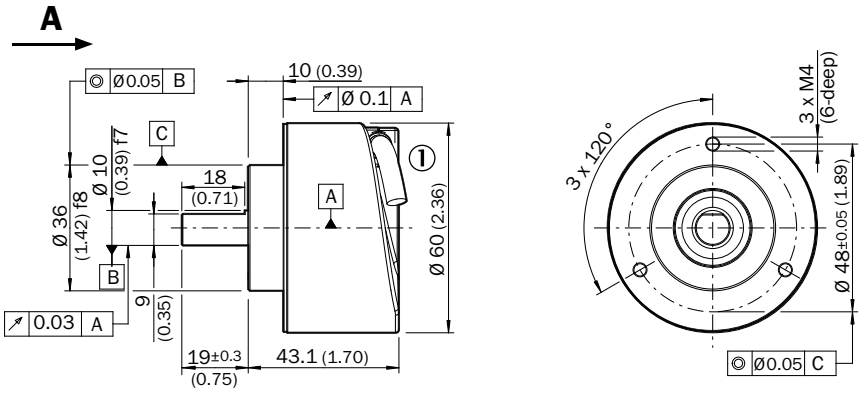
[1)] The electrical interface N (Sin/Cox 1.0 V_{SS}) can only be ordered with 1,024 pulses per revolution.

[2)] Additional available upon request.

F

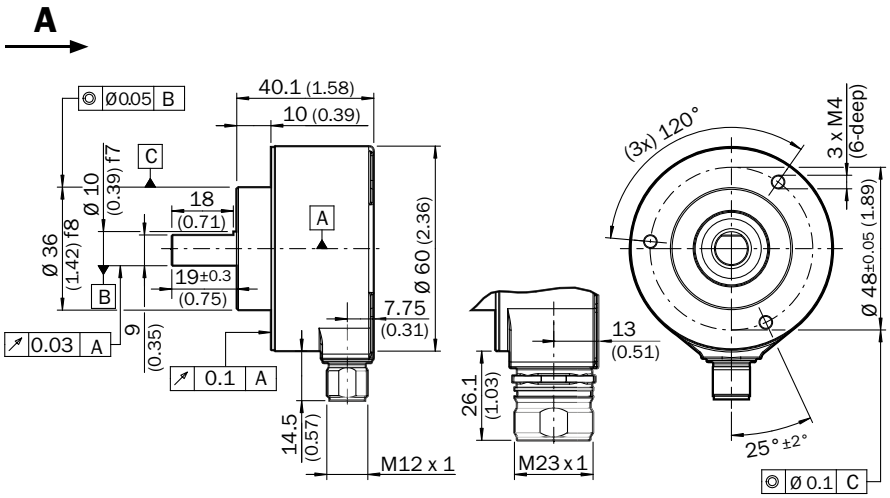
Dimensional drawings (dimensions in mm)

Face mount flange, cable output



General tolerances according to ISO 2768-mk
① Cable diameter = 5.6 mm +/- 0.2 mm bend radius = 30 mm

Face mount flange, radial cable outlet M12 and M23

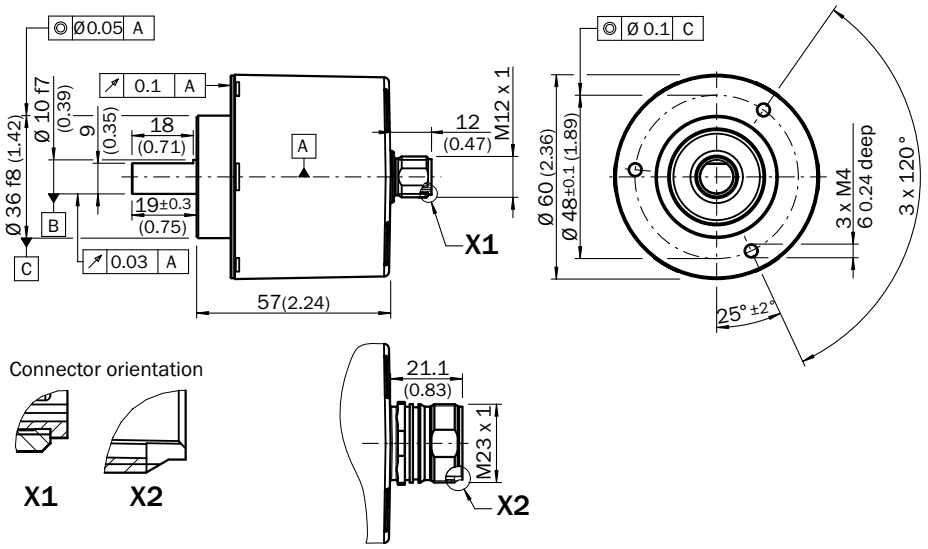


General tolerances according to ISO 2768-mk

F

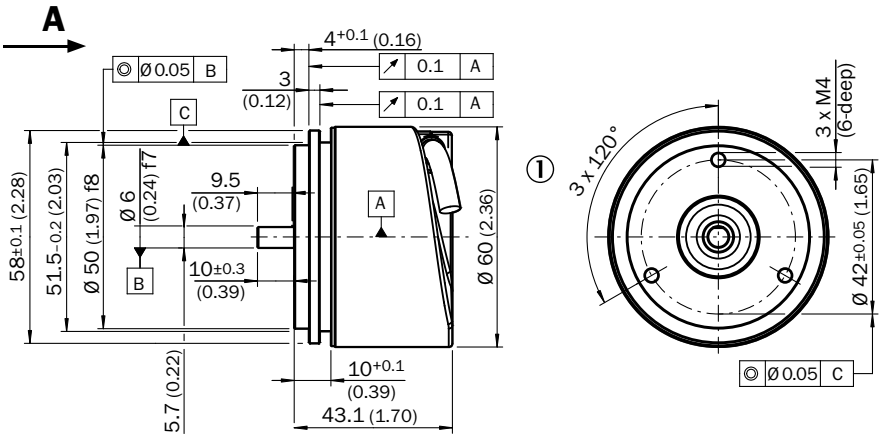
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Face mount flange, axial cable outlet M12 and M23



General tolerances according to ISO 2768-mk

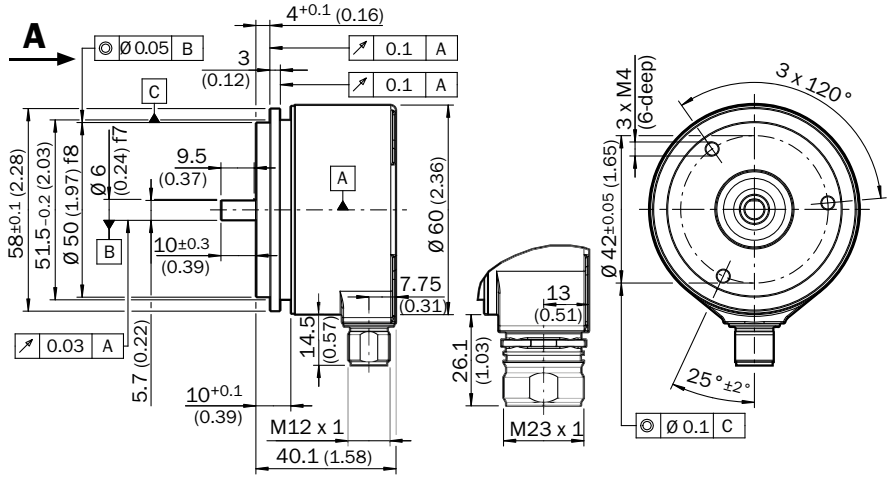
Servo flange, cable outlet



General tolerances according to ISO 2768-mk
① Cable diameter = 5.6 mm +/- 0.2 mm bend radius = 30 mm

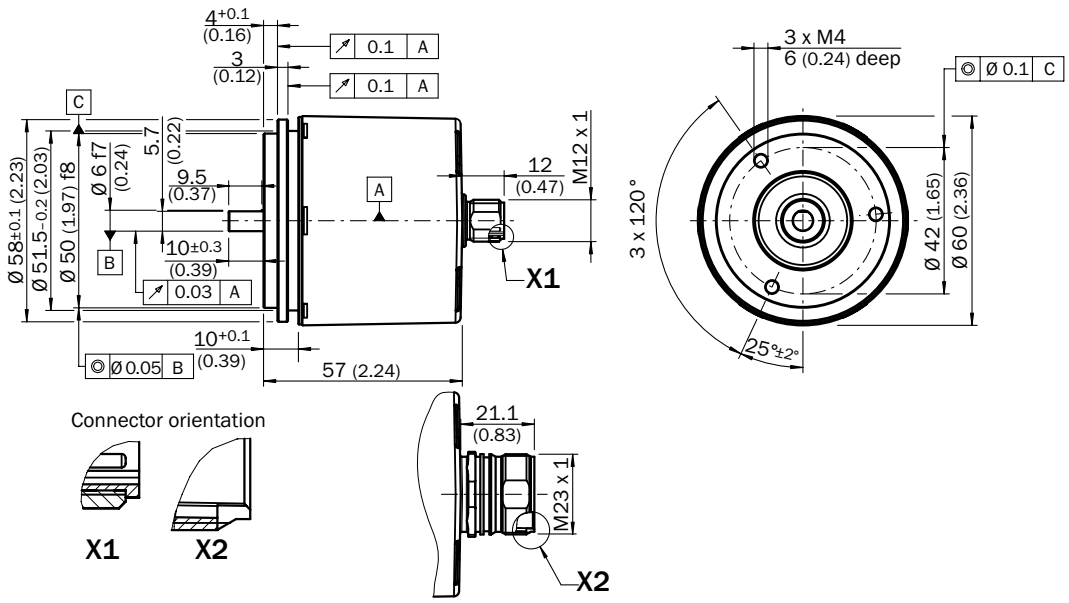
F

Servo flange, radial cable outlet M12 and M23



General tolerances according to ISO 2768-mk

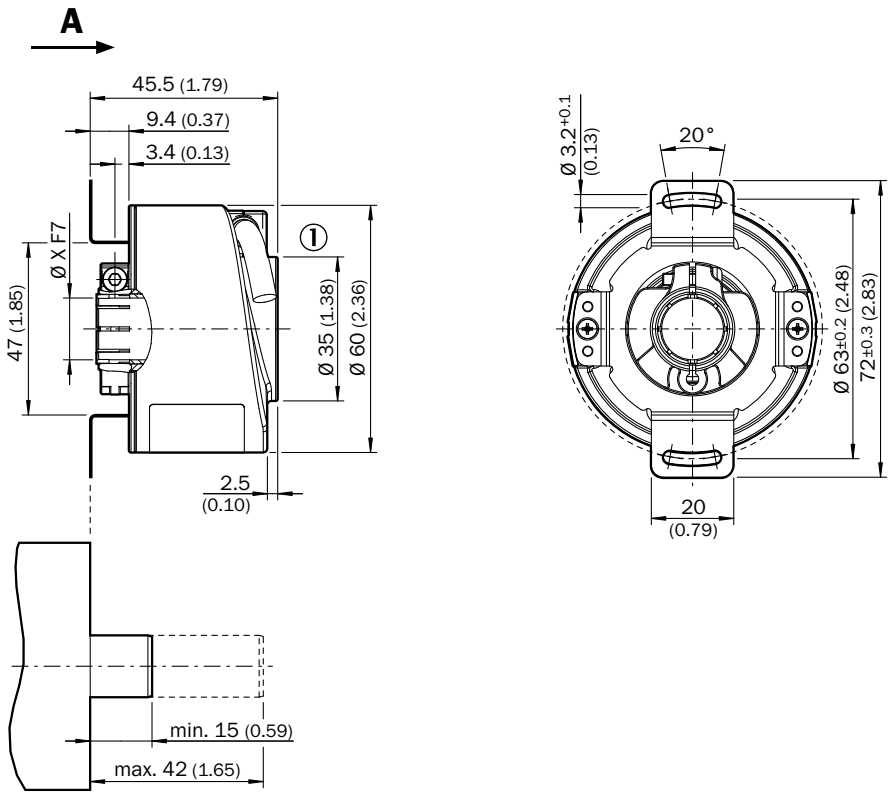
Servo flange, axial cable outlet M12 and M23



General tolerances according to ISO 2768-mk

F

Blind hollow shaft, cable outlet

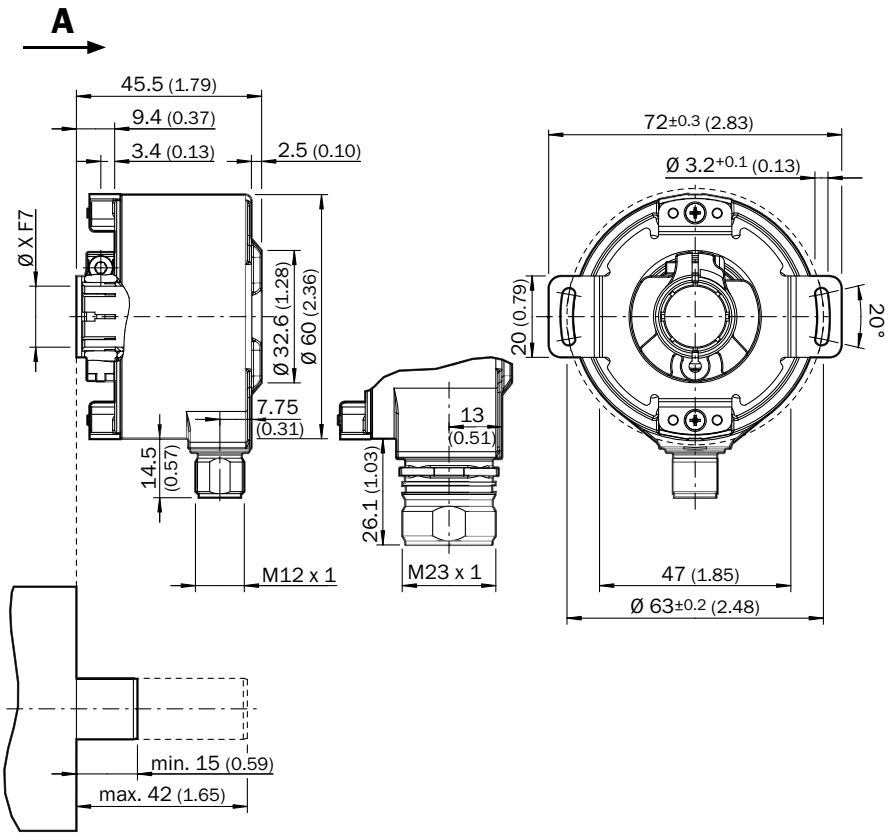


General tolerances according to ISO 2768-mk
① Cable diameter = 5.6 mm +/- 0.2 mm bend radius = 30 mm

Type Blind hollow shaft	XF7 shaft diameter	xj7 shaft diameter
DFS60x-BAxxxxxxxx	6 mm	Provided by customer
DFS60x-BBxxxxxxxx	8 mm	
DFS60x-BCxxxxxxxx	3/8“	
DFS60x-BDxxxxxxxx	10 mm	
DFS60x-BExxxxxxxx	12 mm	
DFS60x-BFxxxxxxxx	1/2“	
DFS60x-BGxxxxxxxx	14 mm	
DFS60x-BHxxxxxxxx	15 mm	
DFS60x-BJxxxxxxxx	5/8“	

F

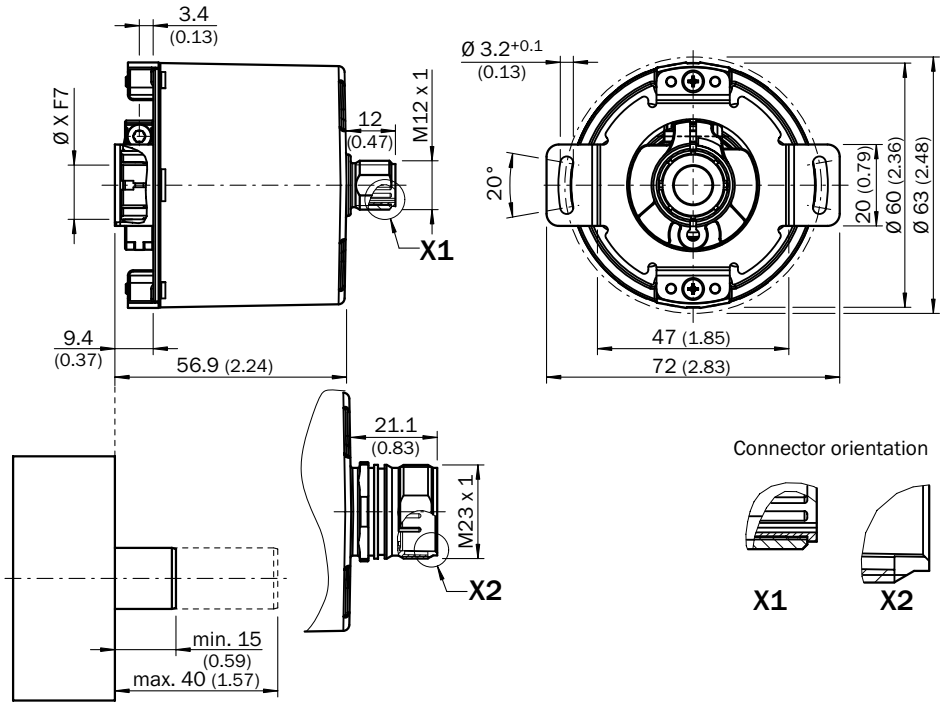
Blind hollow shaft, radial cable outlet M12 and M23



General tolerances according to ISO 2768-mk

Type Blind hollow shaft	XF7 shaft diameter	xj7 shaft diameter
DFS60x-BAxxxxxxxx	6 mm	Provided by customer
DFS60x-BBxxxxxxxx	8 mm	
DFS60x-BCxxxxxxxx	3/8“	
DFS60x-BDxxxxxxxx	10 mm	
DFS60x-BExxxxxxxx	12 mm	
DFS60x-BFxxxxxxxx	1/2“	
DFS60x-BGxxxxxxxx	14 mm	
DFS60x-BHxxxxxxxx	15 mm	
DFS60x-BJxxxxxxxx	5/8“	

Blind hollow shaft, axial cable outlet M12 and M23

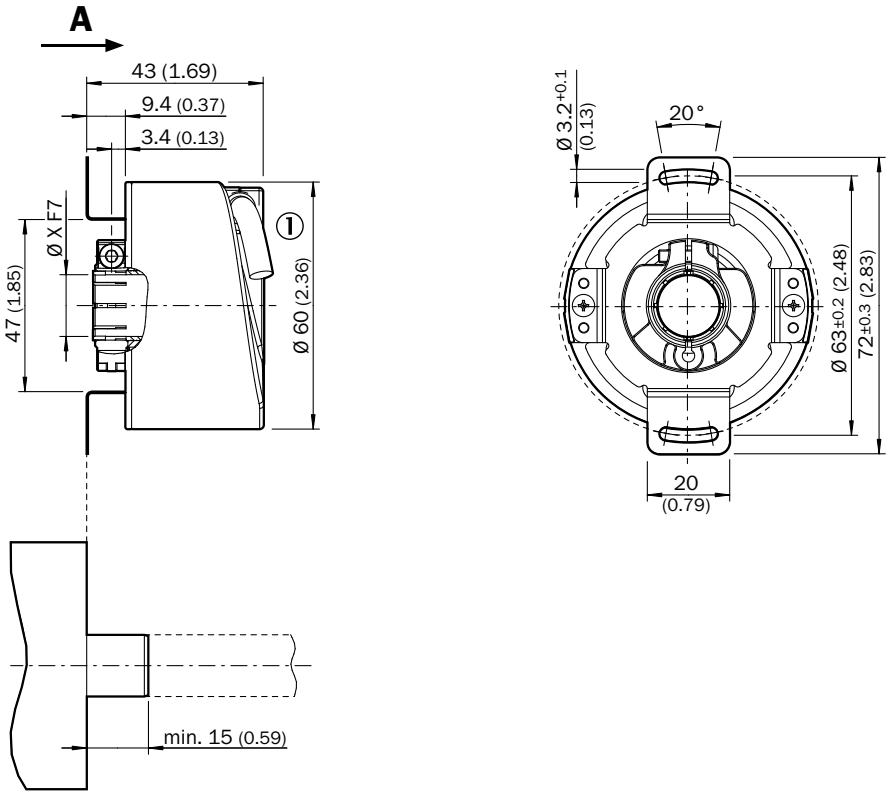


General tolerances according to ISO 2768-mk

Type Blind hollow shaft	XF7 shaft diameter	xj7 shaft diameter
DFS60x-BAxxxxxxxx	6 mm	Provided by customer
DFS60x-BBxxxxxxxx	8 mm	
DFS60x-BCxxxxxxxx	3/8“	
DFS60x-BDxxxxxxxx	10 mm	
DFS60x-BExxxxxxxx	12 mm	
DFS60x-BFxxxxxxxx	1/2“	
DFS60x-BGxxxxxxxx	14 mm	
DFS60x-BHxxxxxxxx	15 mm	
DFS60x-BJxxxxxxxx	5/8“	

F

Through hollow shaft, cable outlet

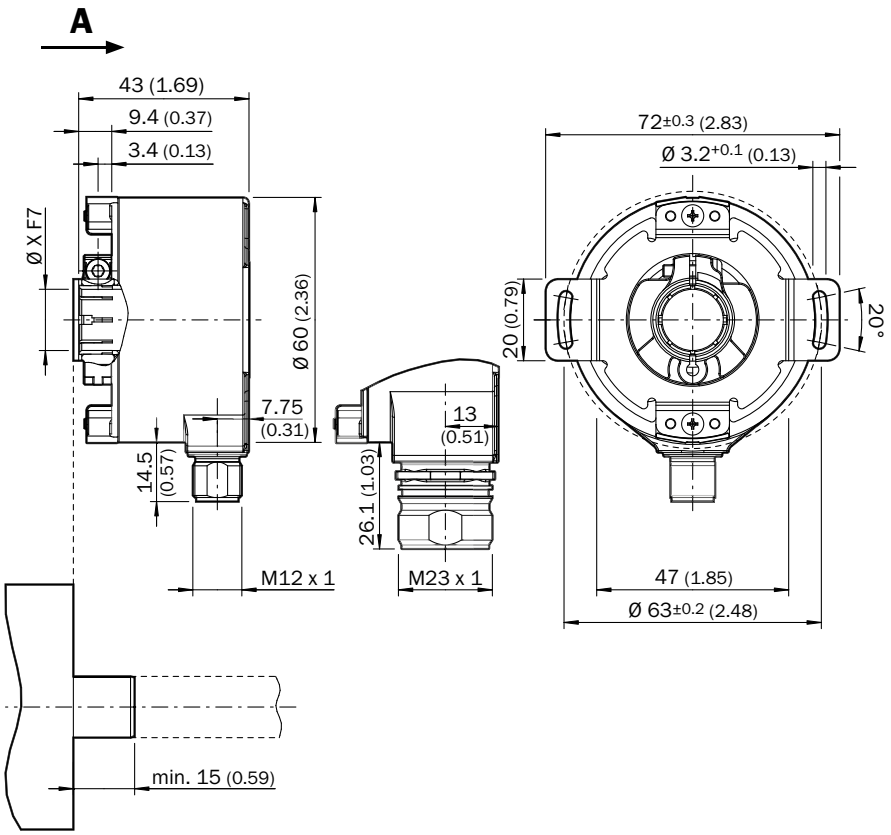


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General tolerances according to ISO 2768-mk
① Cable diameter = 5.6 mm +/- 0.2 mm bend radius = 30 mm

Type Through hollow shaft	XF7 shaft diameter	xj7 shaft diameter
DFS60x-TAxxxxxxxx	6 mm	Provided by customer
DFS60x-TBxxxxxxxx	8 mm	
DFS60x-TCxxxxxxxx	3/8“	
DFS60x-TDxxxxxxxx	10 mm	
DFS60x-TExxxxxxxx	12 mm	
DFS60x-TFxxxxxxxx	1/2“	
DFS60x-TGxxxxxxxx	14 mm	
DFS60x-THxxxxxxxx	15 mm	
DFS60x-TJxxxxxxxx	5/8“	

Through hollow shaft, radial cable outlet M12 and M23



General tolerances according to ISO 2768-mk

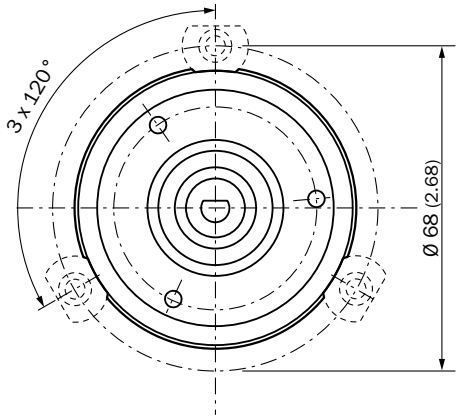
① Cable diameter = 5.6 mm +/- 0.2 mm bend radius = 30 mm

Type Through hollow shaft	XF7 shaft diameter	xj7 shaft diameter
DFS60x-TAxxxxxxxx	6 mm	Provided by customer
DFS60x-TBxxxxxxxx	8 mm	
DFS60x-TCxxxxxxxx	3/8“	
DFS60x-TDxxxxxxxx	10 mm	
DFS60x-TExxxxxxxx	12 mm	
DFS60x-TFxxxxxxxx	1/2“	
DFS60x-TGxxxxxxxx	14 mm	
DFS60x-THxxxxxxxx	15 mm	
DFS60x-TJxxxxxxxx	5/8“	

F

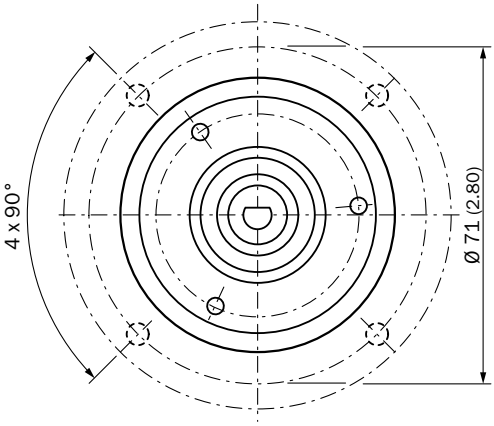
Proposed fitting

Mounting suggestion for small servo clamp (part number 2029166)



All dimensions in mm (inch)

Mounting suggestion for half-shell servo clamp (part number 2029165)

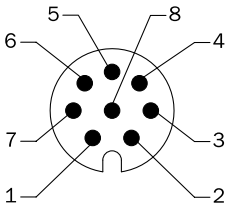


All dimensions in mm (inch)

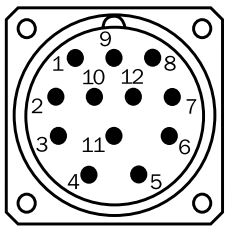
PIN assignment

Cable, 8-wire

View of M12 male device connector on encoder



View of M23 male device connector on encoder

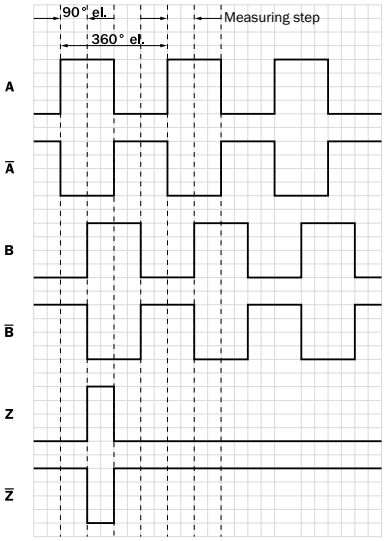


PIN, 8-pin, M12 male connector	PIN, 12-pin, M23 male connector	Color of the wires for encoders with cable outlet	TTL/HTL signal	Sin/cos 1.0 V_{ss}	Explanation
1	6	Brown	$\overline{A}$	COS–	Signal wire
2	5	White	A	COS+	Signal wire
3	1	Black	$\overline{B}$	SIN–	Signal wire
4	8	Pink	B	SIN+	Signal wire
5	4	Yellow	$\overline{Z}$	$\overline{Z}$	Signal wire
6	3	Violet	Z	Z	Signal wire
7	10	Blue	GND	GND	Ground connection of the encoder
8	12	Red	$+U_S$	$+U_S$	Supply voltage (volt-free to housing)
–	9	–	n.c.	n.c.	Not assigned
–	2	–	n.c.	n.c.	Not assigned
–	11	–	n.c.	n.c.	Not assigned
–	7 [1]	–	0-SET [1]	n.c.	Set zero pulse [1]
Screen	Screen	Screen	Screen	Screen	Screen connected to housing on encoder side. Connected to ground on control side.

[1] For electrical interfaces only: M, U, V, W with 0-SET function on PIN 7 on M23 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_S 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".

Interfaces

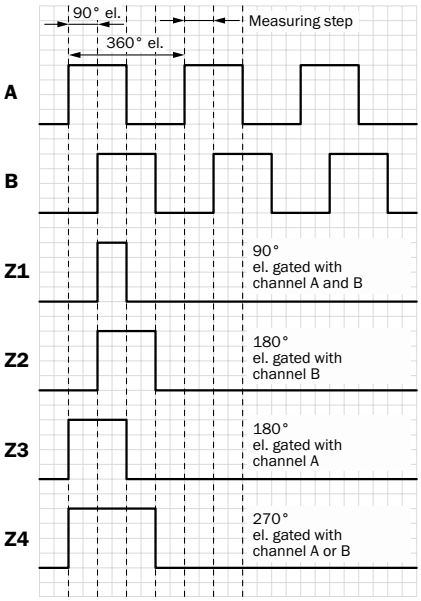
Signal outputs for electrical interfaces TTL and HTL



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.

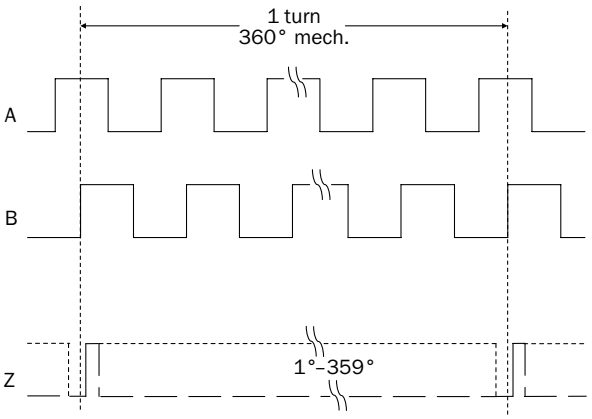
Electrical zero pulse width 90°, 180° or 270°, programmable Width of the zero pulse in relation to a pulse period.



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

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

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



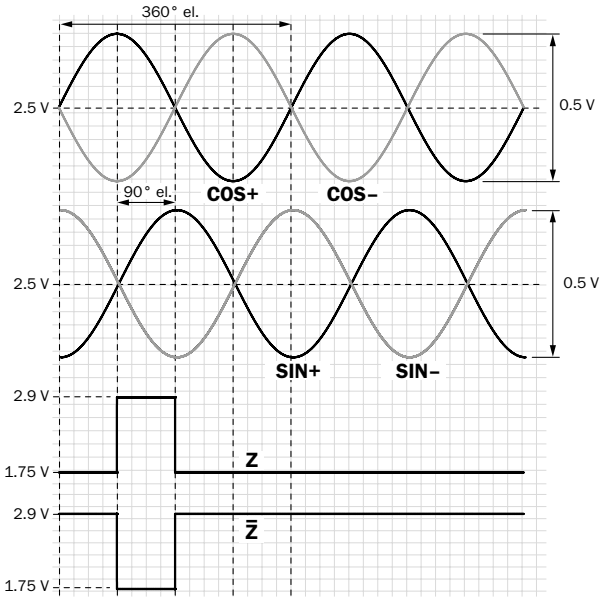
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Electrical interfaces sin/cos 1.0 V_{SS}

Supply voltage	Output
4.5 ... 5.5 V	Sin/cos 1.0 V_{SS}

Signals **before** difference at 120 Ω load and U_S = 5 V

Signal diagram for clockwise shaft rotation, looking in direction "A" (shaft)



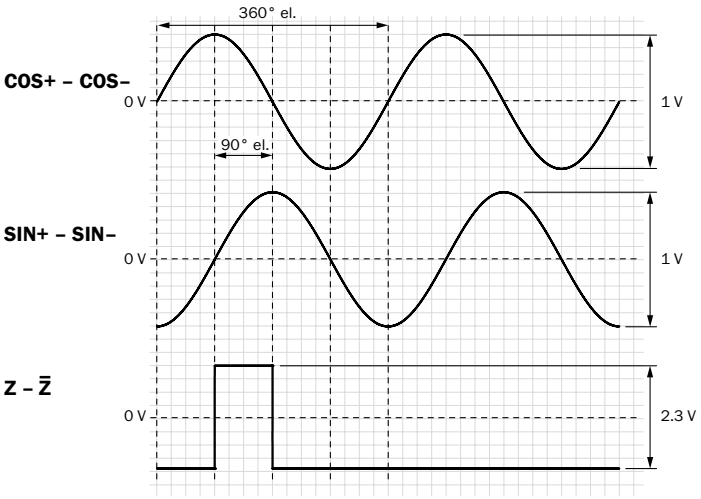
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Interface signals Sin+, SIN–, COS+, COS–	Signals before difference at 120 Ω load	Signal offset
Differential analog	0.5 V_{SS} ± 20%	2.5 V ± 10%

Interface signals Z, $\overline{Z}$	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_S = 5 V

Signal diagram for clockwise shaft rotation, looking in direction "A" (shaft)



Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 36 mm, including mounting kit for face mount flange	BEF-WF-36	2029164

Flanges

Flange plate

Figure	Brief description	Type	Part no.
	Standard two-sided stator coupling, with screw hole circle diameter 63 mm, slot width 3.2 mm, 10.4 mm high	BEF-DS00XFX	2056812
	One-sided stator coupling, slot, slot radius 33 mm – 48.5 mm, slot width 5.1 mm	BEF-DS01DFS/VFS	2047428
	One-sided stator coupling, slot, slot radius 32.25 mm – 141.75 mm, slot width 5.1 mm	BEF-DS02DFS/VFS	2047430
	One-sided stator coupling, slot, slot radius 33 mm – 211.9 mm, slot width 5.1 mm	BEF-DS03DFS/VFS	2047431
	Two-sided stator coupling, with screw hole circle diameter 72 mm, slot width 3.2 mm, 16.5 mm high	BEF-DS05XFX	2057423
	Two-sided stator coupling, with screw hole circle diameter 72 mm, slot width 3.2 mm, 10.4 mm high	BEF-DS07XFX	2059368
	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	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 10	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	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	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	BEF-FA-036-100	2029161

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Other mounting accessories

Measuring wheels and measuring wheel systems

Figure	Brief description	Type	Part no.
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 500 mm	BEF-MR006050R	2055225
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 200 mm	BEF-MR010020R	2055224
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 500 mm	BEF-MR010050R	2055227
	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
	O-ring for measuring wheels (circumference 500 mm)	BEF-OR-145-050	2064074

Modular measuring wheel system

Brief description	Type	Part no.
Measuring wheel system, desired mounting position: left, for DBS60-S4, DFS60-S4, AFS60-S4, and AFM60-S4	BEF-MRS-10-1	2071958
Measuring wheel system, desired mounting position: right, for DBS60-S4, DFS60-S4, AFS60-S4, and AFM60-S4	BEF-MRS-10-2	2071957

Mounting bell

Figure	Brief description	Type	Part no.
	Mounting bell for encoders with a servo flange, centering hub 50 mm, including mounting kit	BEF-MG-50	5312987

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	BEF-WK-SF	2029166

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Miscellaneous

Figure	Brief description	Type	Part no.
	Clamping ring for metal hollow shaft, metal	BEF-KR-M	2064709
	Bearing block for hollow shaft encoder, including fixing screws	BEF-FA-B12-010	2042728
	Bearing block for servo and face mount flange encoder	BEF-FA-LB1210	2044591
	Mounting kit for servo flange encoder on the bearing block, 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

Shaft adaptation

Collets and clamping rings

Figure	Brief description	Type	Part no.
	PEEK conductor insulation (shaft diameter 8 mm, outer diameter 10 mm)	PEEK CONDUCTOR INSULATION	2065642
	PEEK conductor insulation (shaft diameter 10 mm, outer diameter 12 mm)	PEEK CONDUCTOR INSULATION	2064571
	PEEK conductor insulation (shaft diameter 11 mm, outer diameter 12.7 mm)	PEEK CONDUCTOR INSULATION	2077319
	PEEK conductor insulation (shaft diameter 12 mm, outer diameter 14 mm)	PEEK CONDUCTOR INSULATION	2064573
	PEEK conductor insulation (shaft diameter 1/2"(12.7 mm), outer diameter 15 mm)	PEEK CONDUCTOR INSULATION	2064572
	Metal collet for hollow shaft, shaft diameter 8 mm, outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-008-M	2076219
	Metal collet for hollow shaft, shaft diameter 3/8 " (9.525 mm), outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-38Z-M	2076224
	Metal collet for hollow shaft, shaft diameter 10 mm, outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-010-M	2076220
	Metal collet for hollow shaft, shaft diameter 12 mm, outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-012-M	2076221
	Metal collet for hollow shaft, shaft diameter 1/2" (12.7 mm), outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-12Z-M	2076225
	Metal collet for hollow shaft, shaft diameter 14 mm, outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-014-M	2076222
	Metal collet for hollow shaft, shaft diameter 15 mm, outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-015-M	2076223
	Plastic isolated collet for hollow shaft, shaft diameter 6 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-006-P	2076228
	Plastic isolated collet for hollow shaft, shaft diameter 8 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-008-P	2076229
	Plastic isolated collet for hollow shaft, shaft diameter 3/8" (9.525 mm), outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-38Z-P	2076226
	Plastic isolated collet for hollow shaft, shaft diameter 10 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-010-P	2076230
	Plastic isolated collet for hollow shaft, shaft diameter 12 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-012-P	2076231
	Plastic isolated collet for hollow shaft, shaft diameter 1/2" (12.7 mm), outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-12Z-P	2076227
	Plastic isolated collet for hollow shaft, shaft diameter 14 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-014-P	2076232
	Plastic isolated collet for hollow shaft, shaft diameter 15 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-015-P	2076233

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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	KUP-0606-B	5312981
	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 °C to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	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 °C to +120 °C, max. torque 80 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. revolutions 10,000 rpm, –30 ° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	KUP-1012-B	5312984
	Bar coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, –10 °C 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, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0608-S	5314179
	Bar coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; max. speed 10,000 rpm, –10 °C to +80 °C, max. torque 80 Ncm; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0610-S	2056407
	Bar coupling, shaft diameter 8 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0810-S	5314178
	Bar coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-1010-S	2056408
	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 °C to +80 °C, max. torque 60 Ncm; material: aluminum flange, fiber-glass reinforced polyamide membrane and tempered steel coupling pin	KUP-0610-F	5312985
	Spring washer coupling, shaft diameter 10 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° Celsius, max. torque 60 Ncm; material: aluminum flange, glass fiber-reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986
	Double-loop coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C to +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0610-D	5326697
	Double-loop coupling, shaft diameter 8 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C to +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0810-D	5326704
	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 °C 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 °C to +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-1012-D	5326702

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Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, JST, 8-pin, straight Head B: cable Cable: incremental, suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	0.5 m	DOL-0J08-G0M5AA3	2046873
		1.5 m	DOL-0J08-G1M5AA3	2046874
		3 m	DOL-0J08-G03MAA3	2046875
		5 m	DOL-0J08-G05MAA3	2046876
		10 m	DOL-0J08-G10MAA3	2046877
	Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm², 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 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	2 m	DOL-2312-G02MLA3	2030682
		7 m	DOL-2312-G07MLA3	2030685
		10 m	DOL-2312-G10MLA3	2030688
		15 m	DOL-2312-G15MLA3	2030692
		20 m	DOL-2312-G20MLA3	2030695
		25 m	DOL-2312-G25MLA3	2030699
		30 m	DOL-2312-G30MLA3	2030702
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: incremental, suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	1.5 m	DOL-2312-G1M5MA3	2029212
		3 m	DOL-2312-G03MMA3	2029213
		5 m	DOL-2312-G05MMA3	2029214
		10 m	DOL-2312-G10MMA3	2029215
		20 m	DOL-2312-G20MMA3	2029216
		30 m	DOL-2312-G30MMA3	2029217
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: incremental, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [2]	2 m	DOL-2312-G02MLD1	2062202
		7 m	DOL-2312-G07MLD1	2062203
		10 m	DOL-2312-G10MLD1	2062204
		15 m	DOL-2312-G15MLD1	2062205
		20 m	DOL-2312-G20MLD1	2062206
		25 m	DOL-2312-G25MLD1	2062207
		30 m	DOL-2312-G30MLD1	2062208
	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 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [2]	1.5 m	DOL-2312-G1M5MD1	2062240
		3 m	DOL-2312-G03MMD1	2062243
		5 m	DOL-2312-G05MMD1	2062244
		10 m	DOL-2312-G10MMD1	2062245
		20 m	DOL-2312-G20MMD1	2062246
		30 m	DOL-2312-G30MMD1	2062247

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

[2] Warning! Only in combination with electrical interfaces U, V, W and M.

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Female connector (ready to assemble)

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

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	By the meter	LTG-2308-MWENC	6027529
	Head A: cable Head B: cable Cable: PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm		LTG-2612-MW	6028516

Male connector (ready to assemble)

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

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Connection cables with female and male connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, JST, 8-pin, straight Head B: male connector, M23, 12-pin, straight Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	0.35 m	STL-2312-GM35AA3	2061621
		1 m	STL-2312-G01MAA3	2061622
		2 m	STL-2312-G02MAA3	2061504
	Head A: female connector, connector system, 8-pin, straight Head B: male connector, D-Sub, 9-pin, straight Cable: PVC, shielded, can be used for encoders with cable outlet in conjunction with PGT-10-Pro	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: shielded, 4 x 2 x 0.08 mm²	0.5 m	DSL-2D08-G0M5AC3	2046579
	Head A: female connector, M23, 12-pin, straight Head B: male connector, D-Sub, 9-pin, straight Cable: shielded, 4 x 2 x 0.08 mm²	0.5 m	DSL-3D08-G0M5AC3	2046580

Other accessories

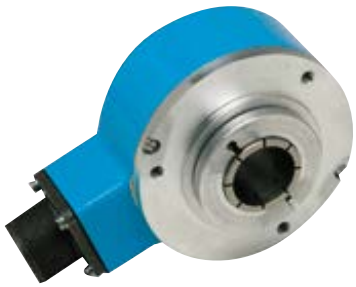
Programming and configuration tools

Figure	Brief description	Type	Part no.
	Programming unit USB, for programmable SICK Encoders AFS60, AFM60, DFS60, VFS60, DFV60 and wire draw encoders with programmable encoder.	PGT-08-S	1036616
	Programming unit display for programmable SICK DFS60, VFS60, DFV60, AFS/AFM60, AHS/AHM36 encoders, and wire draw encoders with DFS60, AFS/AFM60, and AHS/AHM36. Compact dimensions, low weight, and intuitive operation.	PGT-10-Pro	1072254

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

F

ENCODER WITH A LARGE HOLLOW SHAFT FOR HARSH AMBIENT CONDITIONS



Product description

The high-resolution DGS34/DGS35 hollow shaft incremental encoder family is a reliable solution for extremely demanding encoder applications. With a large hollow shaft diameter of up to 1 to 1/8" or 30 mm, they are very well suited for direct assembly on the motor shaft

At a glance

- Incremental encoder with 3.5" diameter
- Electrical interface
- 5 V TTL / RS422
- 8 ... 24 V TTL / RS422
- 8 ... 24 V, HTL/Push Pull
- 8 ... 24 V, Open Collector
- Blind hollow shaft for shaft diameters of 30 mm; 1", ½",5/8", ¾", 7/8"
- Cable outlet with length of 1 m, 1.5 m, 3 m, 5 m, 10 m
- Number of lines: 120 ... 16,384

Your benefits

- The high output frequency means that no mechanical reduction is required
- Hollow shaft design requires no couplings or mounting brackets
- Large selection of stator couplings available for almost every AC asynchronous motor

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Additional information

Fields of application F-193
Detailed technical data. F-193
Type code. F-192
Ordering information. F-196
Dimensional drawings F-197
PIN assignment. F-199
Recommended accessories. F-199

→ www.mysick.com/en/DGS35

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Crane winches
- Stages and theater
- Steel industry
- Elevators
- Packaging industry

Detailed technical data

Performance

Pulses (Z) per revolution [1), 2)]	120 ... 16,384 [2)]
Measurement step	90° electrical/pulses per revolution
Reference signal	
Number	1
Location	90° electrical, logically gated with A and B or 180° electrical, logically gated with B- (see electrical interface)
Error limits	45/Z°
Measurement step deviation	45/Z°

[1)] 3,000 rpm (2,200 rpm for 8,192 and 16,384 pulses per revolution).

[2)] For a detailed list of pulses per revolution, see table “Pulses per revolution”

Mechanical data

Shaft diameter	
DGS34 blind hollow shaft DGS35 through hollow shaft	1" 30 mm; other shaft diameters possible using collets, see Accessories
Shaft material	Brass
Flange material	Aluminum
Housing material	Aluminum
Mass [1)]	1.1 kg
Start up torque at 20 °C	9.0 Ncm
Operating torque at 20 °C	7.0 Ncm
Permissible shaft movement of the drive element, static/dynamic	0.5 mm / 0.1 mm radial 0.5 mm / 0.5 mm axial
Max. angular acceleration	1 x 10^5 rad/s^2
Max. operating speed [2)]	3,000 rpm
Rotor moment of inertia	490 gcm^2
Bearing lifetime	4.5 x 10^9 revolutions

[1)] Relates to devices with cable outlet.

[2)] 3,000 rpm (2,200 rpm for 8,192 and 16,384 pulses per revolution).

Electrical data

Electrical interfaces	4.5 ... 5.5 V, TTL/RS422, 3487, zero pulse width, 180° 8 ... 24 V, TTL/RS422, 3487, zero pulse width, 180° 8 ... 24 V, HTL/Push Pull, 7272, zero pulse width, 180° 8 ... 24 V, Open Collector, 7273, zero pulse width, 180° 4.5 ... 5.5 V, TTL/RS422, 3487, zero pulse width, 90° (only 10,000 and 16,384 pulses possible) 8 ... 24 V, TTL/RS422, 3487, zero pulse width, 90° (only 10,000 and 16,384 pulses possible) 8 ... 24 V, HTL/Push Pull, 7272, zero pulse width, 90° (only 10,000 and 16,384 pulses possible) 8 ... 24 V, Open Collector, 7273, zero pulse width, 90° (only 10,000 and 16,384 pulses possible)
Connection type	Cable, 11-wire, radial, 1.0 m Cable, 11-wire, radial, 1.5 m Cable, 11-wire, radial, 3.0 m Cable, 11-wire, radial, 5 m Cable, 11-wire, radial, 10 m (not possible with Open Collector outputs) MS male connector, 10-pin, radial

Maximum output frequency	≤300 kHz (1 to 8,192 pulses); ≤600 kHz (>8,192 pulses)
Load current	
4.5 V...5.5 V, TTL/RS422	40 mA
8 ... 24 V, TTL/RS422; 8 ... 24 V, HTL/Push Pull	40 mA
8 ... 24 V, Open Collector	20 mA
Operating current without load	
8 ... 24 V	100 mA
4.5 ... 5.5 V	120 mA
Reverse polarity protection	Yes
Short-circuit protection of the outputs	
4.5 V...5.5 V, TTL/RS422, 3487	No
8 V...24 V, TTL/RS422, 3487	No
8 ... 24 V, HTL/Push Pull, 7272	Yes
8 ... 24 V, Open Collector, 7273	Yes
4.5 V...5.5 V, TTL/RS422, 3487	No
8 V...24 V, TTL/RS422, 3487	No
8 ... 24 V, HTL/Push Pull, 7272	Yes
8 ... 24 V, Open Collector, 7273	Yes

Ambient data

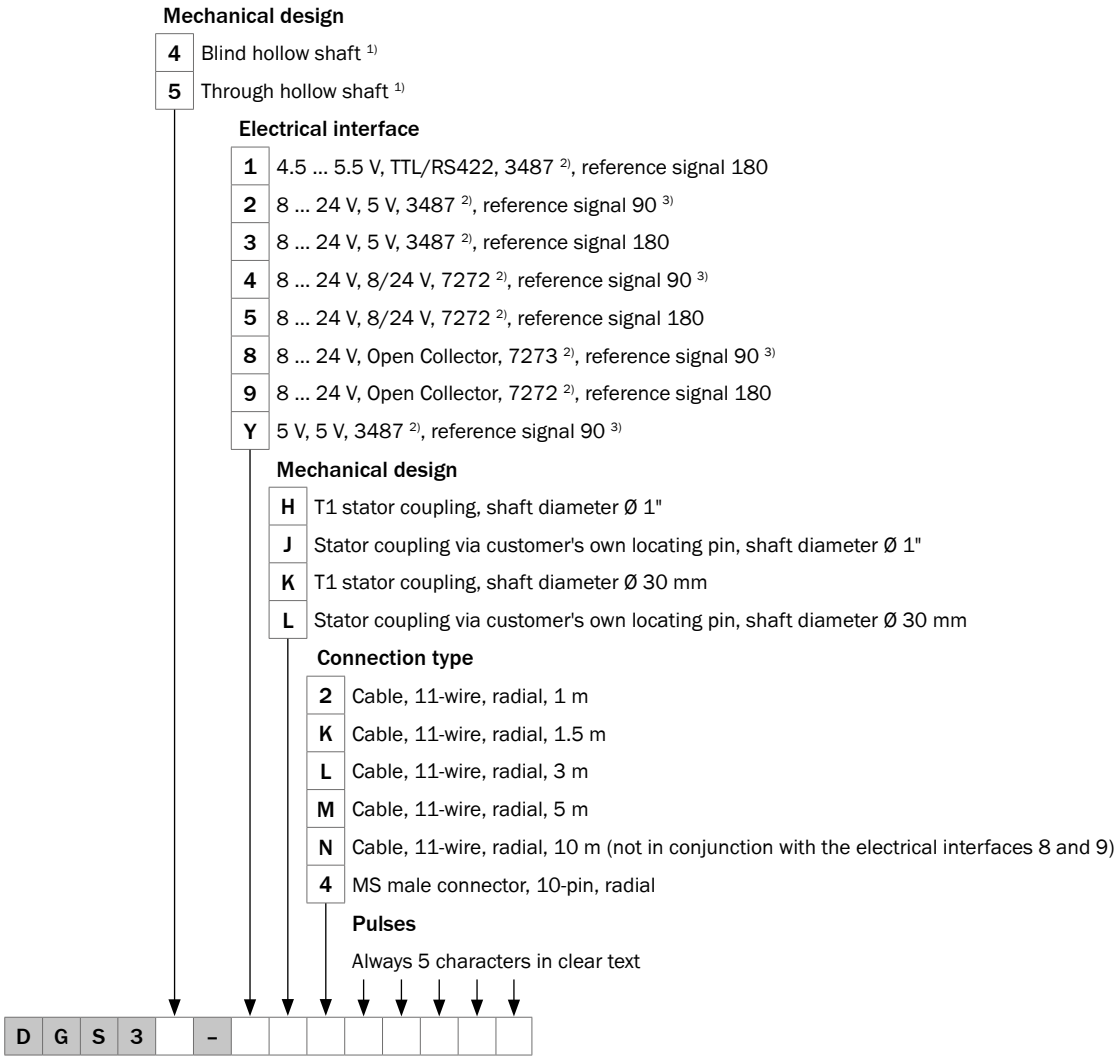
EMC	EN 61000-6-2, 61000-6-3
Enclosure rating	
On the housing, male connector outlet [1]	IP 66
On the housing, cable outlet	IP 66
Permissible relative humidity	95%, condensation of optical surfaces not permitted
Operating temperature range	–20 ...+70 °C
Storage temperature range	–30 ... +85 °C
Resistance	
To shocks	50 g/11 ms
To vibrations	20 g/ 5 ... 2,000 Hz

[1] When mating connector is inserted.

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Type code



[1] Order collets for 7/8", 24 mm, 25 mm, 18 mm, 20 mm and 22 mm as an additional accessory, see “Recommended accessories” on page F-199.

[2] IC module.

[3] 10,000 and 16,384 pulses per revolution only available with 90° reference signal.

Pulses per revolution

Pulses per revolution	120	3,600
	360	4,096
	600	5,000
	1,024	8,192
	2000	10,000
	2,048	16,384
	2,500	

Ordering information

DGS34 blind hollow shaft

Electrical interface	Mechanical design	Connection type	Type	Part no.
4.5 ... 5.5 V, TTL/RS422, 3487, reference signal 180	Stator coupling via customer's own locating pin, shaft diameter Ø 30 mm	MS male connector, 10-pin, radial	DGS34-1L402048	7101744
8 ... 24 V, 8/24 V, 7272, reference signal 180	Stator coupling via customer's own locating pin, shaft diameter Ø 1"	MS male connector, 10-pin, radial	DGS34-5J404096	7102201
	Stator coupling via customer's own locating pin, shaft diameter Ø 30 mm	Cable, 12-wire, radial, 1.5 m	DGS34-5LK02048	7101764

DGS35 through hollow shaft

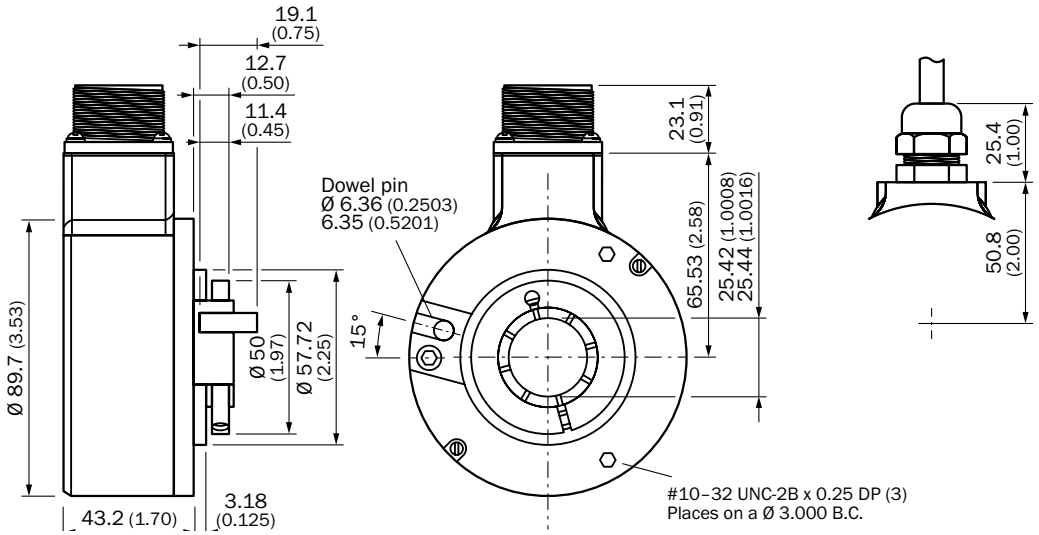
Electrical interface	Mechanical design	Connection type	Type	Part no.
4.5 ... 5.5 V, TTL/RS422, 3487, reference signal 180	Stator coupling via customer's own locating pin, shaft diameter Ø 1"	Cable, 12-wire, radial, 3 m	DGS35-1JL01024	7134504
	T1 stator coupling, shaft diameter Ø 30 mm	MS male connector, 10-pin, radial	DGS35-1K402048	7130548
		Cable, 12-wire, radial, 1.5 m	DGS35-1KK01024	1049552
			DGS35-1KK02500	1055330
	Stator coupling via customer's own locating pin, shaft diameter Ø 30 mm	MS male connector, 10-pin, radial	DGS35-1L401024	7101683
			DGS35-1L402048	7101684
		Cable, 12-wire, radial, 1.5 m	DGS35-1LK01024	7101698
			DGS35-1LK02048	7101699
			DGS35-1LK08192	7101701
8 ... 24 V, 5 V, 3487, reference signal 180	Stator coupling via customer's own locating pin, shaft diameter Ø 1"	MS male connector, 10-pin, radial	DGS35-3J401024	7126765
	T1 stator coupling, shaft diameter Ø 30 mm	MS male connector, 10-pin, radial	DGS35-3K401024	1058110
			DGS35-3K402048	1060264
		Cable, 12-wire, radial, 1.5 m	DGS35-3KK01024	1057039
			DGS35-3KK02048	1062810
	Stator coupling via customer's own locating pin, shaft diameter Ø 30 mm	MS male connector, 10-pin, radial	DGS35-3L402048	1062795
		Cable, 12-wire, radial, 1.5 m	DGS35-3LK02048	1062354
		Cable, 12-wire, radial, 3 m	DGS35-3LL01024	1055112
8 ... 24 V, 8/24 V, 7272, reference signal 180	T1 stator coupling, shaft diameter Ø 1"	Cable, 12-wire, radial, 1.5 m	DGS35-5HK00120	7130703
	T1 stator coupling, shaft diameter Ø 30 mm	MS male connector, 10-pin, radial	DGS35-5K401024	7134312
			DGS35-5K402048	1062811
			DGS35-5K402500	7134638
			DGS35-5K405000	7130624
		Cable, 12-wire, radial, 1.5 m	DGS35-5KK01024	1058301
	Stator coupling via customer's own locating pin, shaft diameter Ø 30 mm	MS male connector, 10-pin, radial	DGS35-5L401024	7101688
		Cable, 12-wire, radial, 1.5 m	DGS35-5LK04096	7101705
			DGS35-5LK08192	7101706

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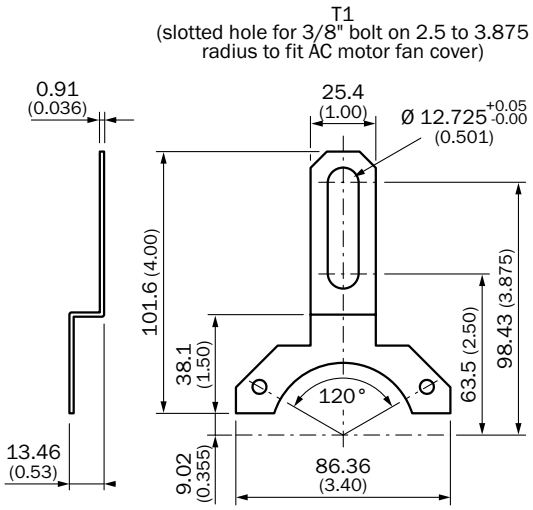
Dimensional drawings (dimensions in mm)

Through hollow shaft

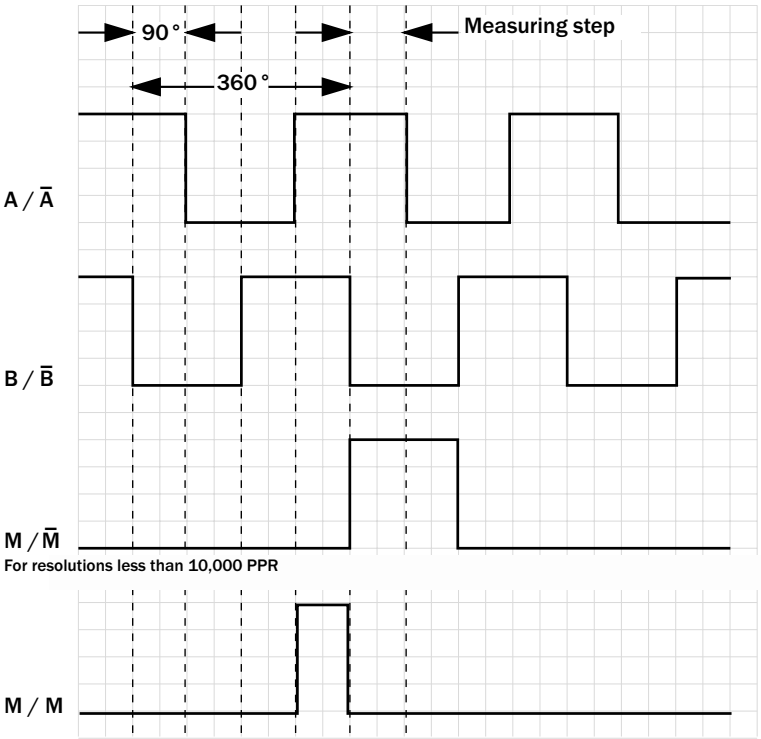


Hollow shaft	Shaft diameter	Min. shaft insertion depth
1/2"	12.67 mm / 12.7 mm	25.4 mm
5/8"	15.85 mm / 15.88 mm	25.4 mm
3/4"	19.02 mm / 19.05 mm	25.4 mm
7/8"	22.2 mm / 22.23 mm	25.4 mm
1.0"	25.37 mm / 25.4 mm	25.4 mm
1 1/8"	28.55 mm / 28.58 mm	45.47 mm
M30	29.96 mm / 29.98 mm	46 mm

Spring plate stator coupling



Signal outputs



For resolutions less than 10,000 PPR

For resolutions greater than or equal to 10,000 PPR and push-pull driver option

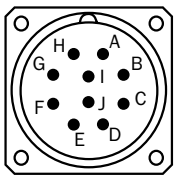
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Electrical interfaces

Supply voltage
4.75 ... 5.25 V
8.0 ... 24.0 V
8.0 ... 24.0 V

PIN assignment

MS3102, 10-pin



PIN, 10-pin	Wire colors	Explanation
A	White	A
B	Pink	B
C	Violet	M
H	Brown	$\overline{A}$
I	Black	$\overline{B}$
J	Yellow	$\overline{M}$
D	Red	$+V_S$
F	Blue	GND
G	N/A	Housing grounding
N/A	N/A	Screen

Recommended accessories

Mounting systems

Shaft adaptation

Collets and clamping rings

Brief description	Shaft diameter	Type	Part no.
For T1 stator couplings with 1" hollow shaft diameters (mechanical interfaces H, J)	7/8"	SPZ-7E8-DD35-AD	7102158
For 30 mm stator couplings with 30 mm hollow shaft diameters (mechanical interfaces K, I)	24 mm	SPZ-024-MD35-AD	7130587
	25 mm	SPZ-025-MD35-AD	7130588
For T1 stator couplings with 1" hollow shaft diameters (mechanical interfaces H, J)	18 mm	SPZ-018-DD35-AD	7130585
	20 mm	SPZ-020-DD35-AD	7130529
	22 mm	SPZ-022-DD35-AD	7130586

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Connectivity

Plug connectors and cables

Brief description	Length of cable	Type	Part no.
Female cable connector, MS 3105, 10-pin, straight	–	DOS-MS10-G	7102129
Cable, MS 3105, 10-pin, straight, 11-wire, 4 x 2 x 0.25 + 2 x 0.5 + 1 x 0.14 mm², with shielding, cable diameter 7.5 mm	1.5 m	DOL-MS10-G1M5MA2	7102130
	3.0 m	DOL-MS10-G03MMA2	7102131
	5.0 m	DOL-MS10-G05MMA2	7102132
	10.0 m	DOL-MS10-G10MMA2	7102133
	20.0 m	DOL-MS10-G20MMA2	7102134
	30.0 m	DOL-MS10-G30MMA2	7102135
Data cable by the meter 4 x 2 x 0.15 mm² with shielding, Ø 5.6 mm	–	LTG-2308-MWENC	6027529
Data cable by the meter 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm² with shielding, Ø 7.5 mm	–	LTG-2411-MW	6027530
Data cable by the meter 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm² with shielding, suitable for drag chain, Ø 7.8 mm	–	LTG-2512-MW	6027531

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

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RUGGED, HIGH-PERFORMANCE MEASURING WHEEL INCREMENTAL ENCODER



Product description

The DKV60 compact measuring wheel encoder is a low-cost solution for determining position and speed directly on conveyor belts or rollers. The DKV60 consists of an incremental encoder, a measuring roller, an installation plate, and a cable guide and it is pre-assembled upon delivery. Two different measuring wheel surfaces ensure the encoder can adapt to the surface to be measured.

At a glance

- Complete, pre-assembled measuring system
- Measuring wheel with knurl or O-ring for adaptation to the measuring surface
- Mounting bracket made from anti-corrosive spring steel
- High resolution up to 0.1 mm (1 ... 2,000 pulses/revolution)
- Electrical interfaces: Open Collector NPN, TTL/RS-422 or HTL/Push Pull
- Connection via cable outlet, for radial or axial use with open ends or fitted with an M12 connector

Your benefits

- Complete system with universal mounting clamps and integrated cable guidance enables simple and quick mounting
- Spring steel mounting clamps allow high level of measurement accuracy when deflecting the measuring wheel in X and Y directions
- Low-cost encoder with outstanding quality
- Withstands harsh environments due to a high IP protection class, a non-corrosive mounting bracket and a rugged housing
- Compact dimensions enable simple installation even where space is cramped

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Additional information

Fields of application F-203
Detailed technical data. F-203
Type code. F-204
Ordering information. F-204
Dimensional drawings F-205
PIN assignment. F-206
Signal outputs F-206
Proposed fitting. F-207
Recommended accessories. F-208

→ www.mysick.com/en/DKV60_measuring_wheel_encoder

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Measurement of position and speed directly on conveyor belts in wood processing machines, steel and metal processing machines, storage and conveyors, sorting systems and conveyor belts, textile machines, printing and paper machines

Detailed technical data

Performance

Pulses per revolution	1 ... 2,000 [1]
Error limits knurled surface	±0.5 mm
Error limits O-ring surface	± 4 mm
Initialization time	40 s
Resolution	0.1 mm ... 200 mm
Smallest measuring step	0.025 mm ... 50 mm

[1] Pulses per 200 mm

Mechanical data

Mechanical design	Measuring drum, knurled surface Measuring drum, O ring surface
Mass	0.42 kg
Maximum operating speed	1,500 rpm
Bearing lifetime	2 x 10^9 revolutions

Electrical data

Electrical interface	4.5 ... 5.5 V, TTL/RS 422, 6 channel 10 ... 30 V, HTL/Push Pull, 6 channel
Connection type	Cable, 1.5 m Cable with male connector, M12, 8-pin, 1.5 m
Operating current without load	40 mA
Supply voltage	4.5 V ... 5.5 V 10 V ... 30 V
Max. load current	≤ 30
Reference signal, number	1
Reference signal, position	90° electric, logically gated with A and B
MTTFd: mean time to dangerous failure	600 years (EN ISO 13849-1) [1]

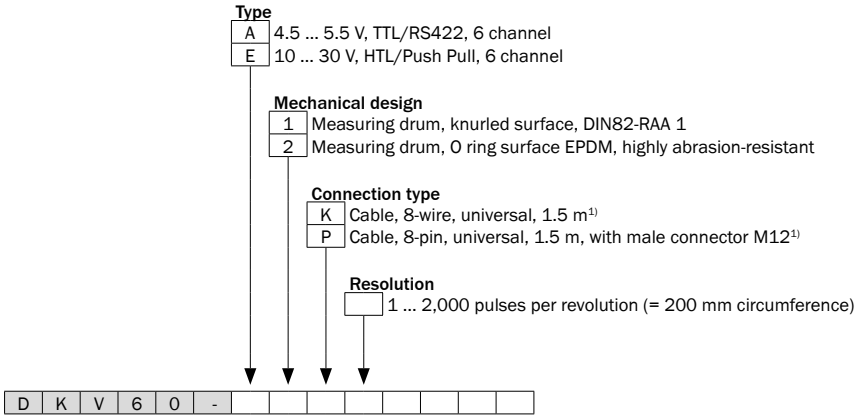
[1] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of devices, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information,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

Ambient data

EMC	EN 61000-6-3, EN 61000-6-2
Enclosure rating (IEC 60529)	IP 65
Air humidity	90% [1]
Operating temperature range	–10 °C ... +60 °C
Storage temperature range	–40 °C ... +70 °C, without packaging
Resistance to shocks	50 g/ 7 ms (EN 60068-2-27)
Resistance to vibrations	20 g / 10 Hz ... 2,000 Hz (EN 60068-2-6)

[1] Condensation of optical surfaces not permitted.

Type code



1) The universal cable outlet is positioned so that it is possible to lay it without bends in a radial and axial direction.

Ordering information

Measuring drum, knurled surface

Electrical interface	Connection type	Range of pulses per revolution	Type	Part no.
HTL/Push Pull	Cable, 1.5 m	3 1)	DKV60-E1K00003	1035767
	Cable, M12, 8-pin, 1.5 m	200 1)	DKV60-E1P00200	1036071
		1,000 1)	DKV60-E1P01000	1050657
TTL/RS422	Cable, 1.5 m	20 1)	DKV60-A1K00020	1035039
	Cable, M12, 8-pin, 1.5 m	200 1)	DKV60-A1P00200	1035745

1) Pulses per 200 mm

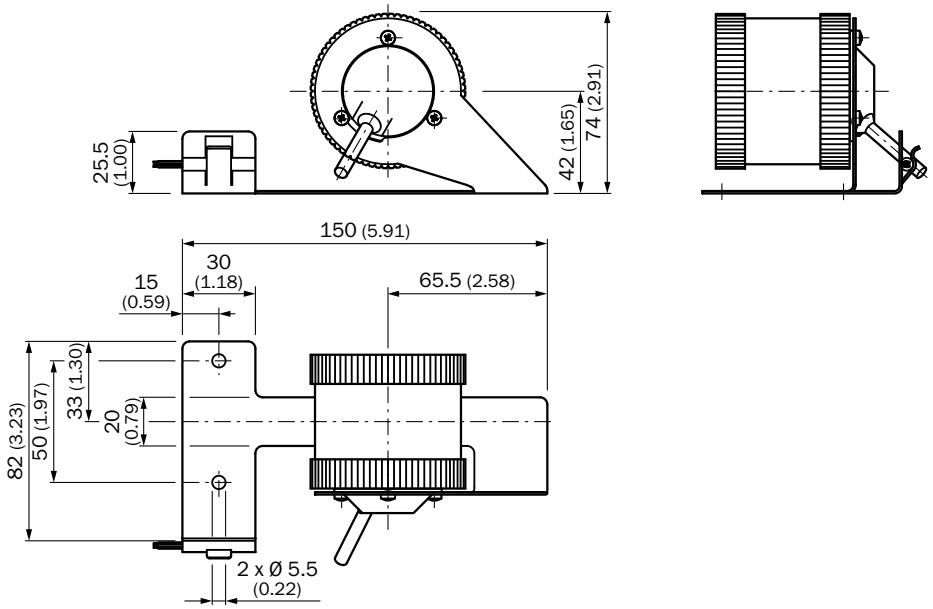
Measuring drum, O-ring surface

Electrical interface	Connection type	Range of pulses per revolution	Type	Part no.
HTL/Push Pull	Cable, 1.5 m	200 1)	DKV60-E2K00200	1035052
	Cable, M12, 8-pin, 1.5 m	200 1)	DKV60-E2P00200	1037803
TTL/RS422	Cable, 1.5 m	200 1)	DKV60-A2K00200	1035044
	Cable, M12, 8-pin, 1.5 m	2,000 1)	DKV60-A2P02000	1036587

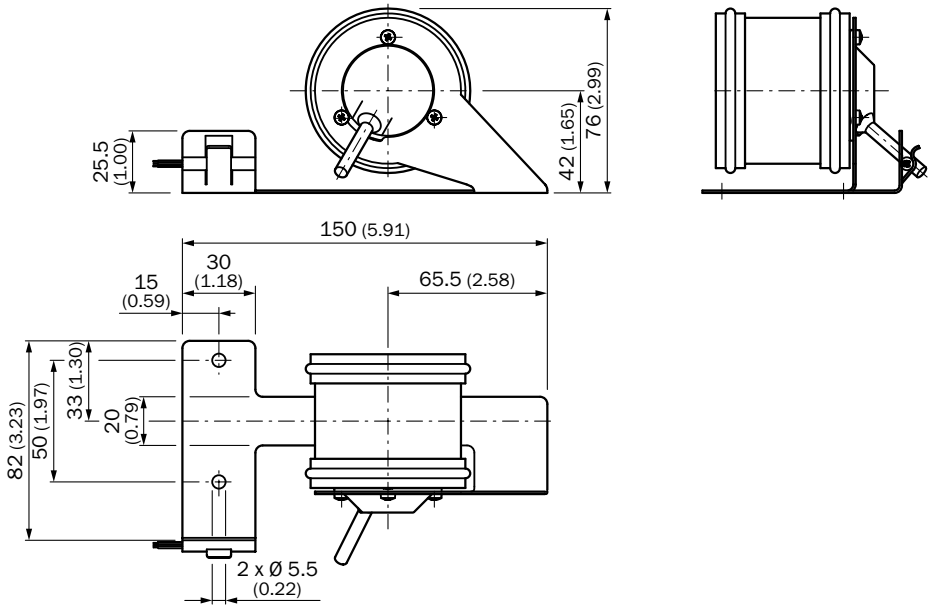
1) Pulses per 200 mm

Dimensional drawings (dimensions in mm)

Measuring drum, knurled surface



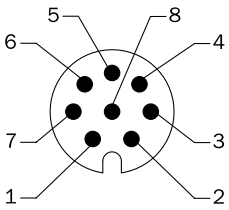
Measuring drum, O ring surface



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PIN assignment

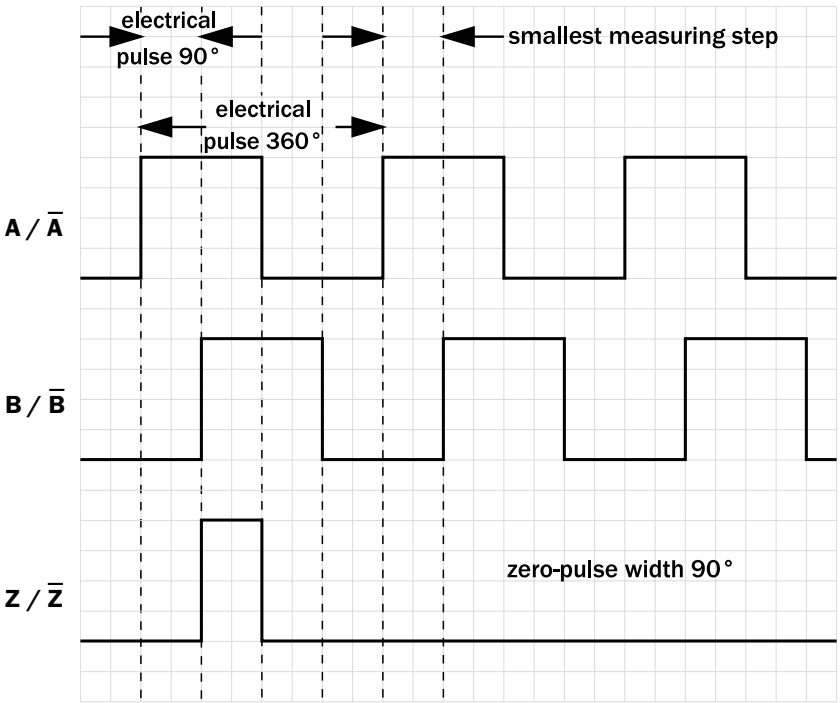
View of male connector, device side



PIN, 8-pin, M12 male connector	Wire colors	TTL/HTL signal	Explanation
1	Brown	$\overline{A}$	Signal wire
2	White	A	Signal wire
3	Black	$\overline{B}$	Signal wire
4	Pink	B	Signal wire
5	Yellow	$\overline{Z}$	Signal wire
6	Violet	Z	Signal wire
7	Blue	GND	Ground connection of the encoder
8	Red	$+U_S$	Supply voltage, volt-free to housing
Screen	Screen	Screen	Screen connected to housing on encoder side.

Signal outputs

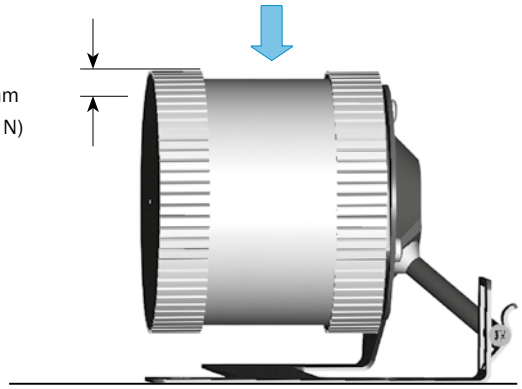
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Proposed fitting

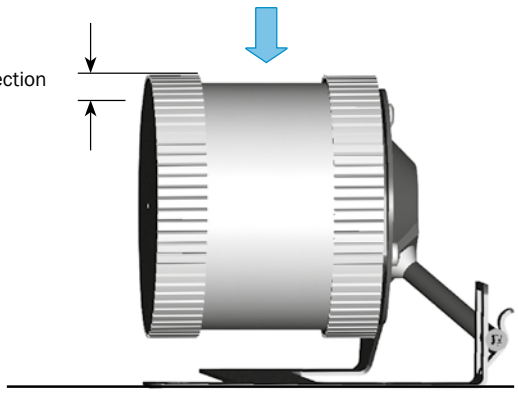
Preload spring arm

Working position/
force = 2 ... 5 mm
(5 ... 10 N)

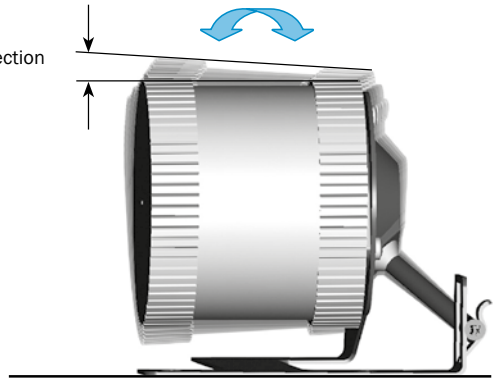


Maximum deflection

Max. deflection
Y = 3 mm



Max. deflection
X = ± 10°



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Recommended accessories

Mounting systems

Other mounting accessories

Measuring wheels and measuring wheel systems

Brief description	Type	Part no.
O-ring set for DKV60 encoder	O-RING SET DKV60	6032709

Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm², 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

Female connector (ready to assemble)

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

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Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	By the meter	LTG-2308-MWENC	6027529
	Head A: cable Head B: cable Cable: PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm		LTG-2612-MW	6028516

Male connector (ready to assemble)

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

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

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HIGH-RESOLUTION, PROGRAMMABLE MEASURING WHEEL INCREMENTAL ENCODER



Product description

The DFV60 high-resolution measuring wheel encoder is an extremely rugged solution for determining position and speed directly on the conveyor belt, even in applications where the measuring surface is subject to high levels of vibrations. The DFV60 consists of an incremental encoder with a mounting arm and two measuring wheels. The spring arm is available as an accessory. Extensive programmability of output signal, zero pulse and line numbers from 1 to 65,536 enable customer-specific adaptations.

At a glance

- Rotating spring arm for universal use
- 300 mm wheel circumference with O ring made from NBR70
- Mounting arm and measuring wheels made from aluminum
- Programmable output voltage, zero pulse position, zero pulse width and number of pulses
- Connection: radial M12 connector outlet or radial/axial cable outlet
- Electrical interfaces: 5 V & 24 V TTL/RS-422, 24 V HTL/Push Pull
- Remote zero set possible

Your benefits

- Universal-use spring arm ensures fast and simple mounting
- The high level of spring tension enables use in harsh ambient conditions
- Reduction of storage costs and downtimes due to programmability
- Option to insert cable outlet in radial or axial direction enables customer-specific cable solutions
- Excellent concentricity, even at high speeds
- Long-term and reliable operation thanks to a high enclosure rating, temperature resistance and bearing lifetime
- The ability to program using the PGT-08 programming software and the PGT-10-Pro display programming device enables fast and flexible adaptation of the encoder to customer requirements
- Programmable zero pulse position simplifies installation

Additional information

Fields of application F-211
Detailed technical data. F-211
Type code. F-212
Ordering information. F-212
Dimensional drawings F-213
PIN assignment. F-214
Signal outputs F-215
Zero pulse width F-216
Recommended accessories. F-216

→ www.mysick.com/en/DFV60_measuring_wheel_encoder

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Measurement of position and speed directly on conveyor belts in wood processing machines, steel and metal processing machines, storage and conveyors, sorting systems and conveyor belts, textile machines, printing and paper machines

Detailed technical data

Performance

Pulses per revolution	1 ... 65,536, programmable
Error limits O-ring surface	± 0.03 mm
Measuring step deviation at non-binary number of lines	
Pulses 1 ... 99	± 0.04°
Pulses 100 ... 10,000	± 0.008°
Pulses > 10,000	± 0.002°
Measuring step deviation at binary number of lines	
Pulses 1 ... 64	± 0.008°
Pulses 128 ... 8,192	± 0.03°
Pulses 16,384 ... 65,536	± 0.0015°
Initialization time	30 ms

Mechanical data

Mechanical design	2 measuring wheels, O ring surface
Mass	0.5 kg
Maximum operating speed	3,000 rpm[1)]
Bearing lifetime	3 x 10^9 revolutions
Spring deflection spring arm	40 mm
Preload spring arm	20 mm

[1)] Take into account self-warming of 3.3 K per 1,000 rpm when designing operating temperature range

Electrical data

Electrical interface	4.5 V ... 32 V TTL/HTL programmable, (factory setting: TTL)
Connection type	Male connector, M12, 8-pin, radial Cable, universal, 1.5 m Cable, universal, 3 m Cable, universal, 5 m
Operating current without load	40 mA
Supply voltage	4.5 V ... 32 V
Load current	≤ 30 mA
Power consumption	0.7 W (without load)
Maximum output frequency	≤ 820 kHz
Reference signal, number	1
Reference signal, position	90° electric, logically gated with A and B (programmable, see zero pulse width)
MTTFd: mean time to dangerous failure	300 years (EN ISO 13849-1) [1)]

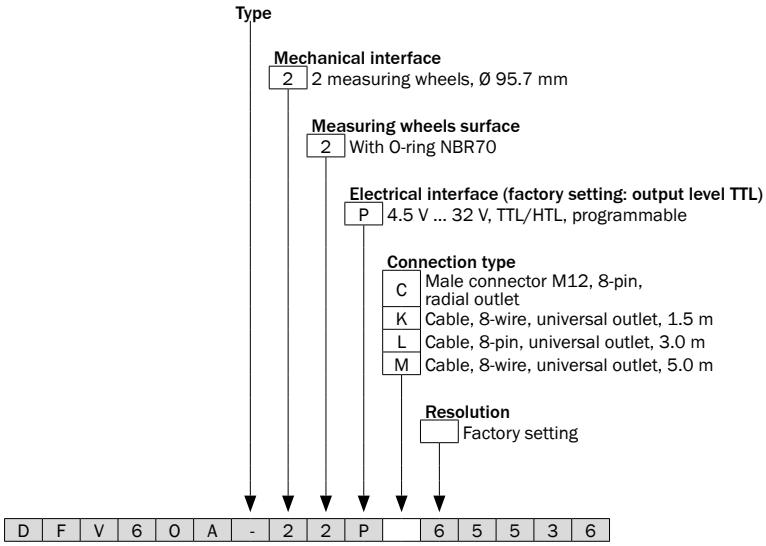
[1)] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of devices, average ambient temperature 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information,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

Ambient data

EMC	EN 61000-6-3, EN 61000-6-2
Enclosure rating (IEC 60529)	IP 65
Air humidity	90% [1]
Operating temperature range	–20 °C ... +100 °C
Storage temperature range	–40 °C ... +100 °C, without packaging
Resistance to shocks	70 g/ 6 ms (EN 60068-2-27)
Resistance to vibrations	30 g/ 2,000 Hz ... 10 Hz (EN 60068-2-6)

[1] Condensation of optical surfaces not permitted.

Type code



F

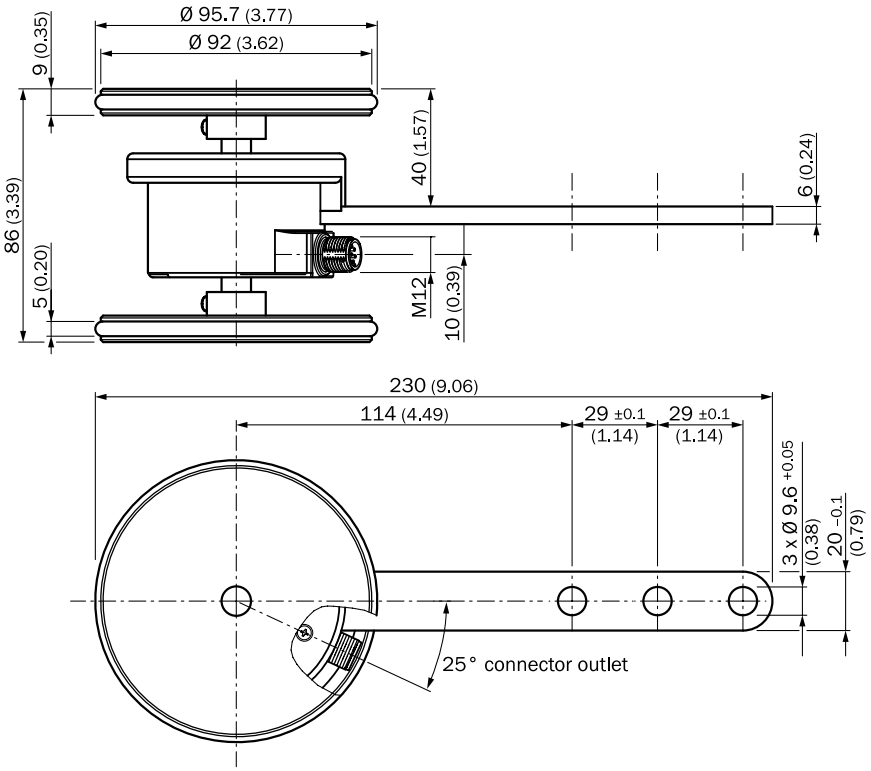
Ordering information

2 measuring wheels, O ring surface

Electrical interface	Connection type	Range of pulses per revolution	Type	Part no.
TTL/HTL programmable	Cable, universal, 1.5 m	65,536	DFV60A-22PK65536	1051331
	Cable, universal, 3 m	65,536	DFV60A-22PL65536	1051334
	Cable, universal, 5 m	65,536	DFV60A-22PM65536	1051337
	Plug connector, M12, 8-pin, radial	65,536	DFV60A-22PC65536	1051309

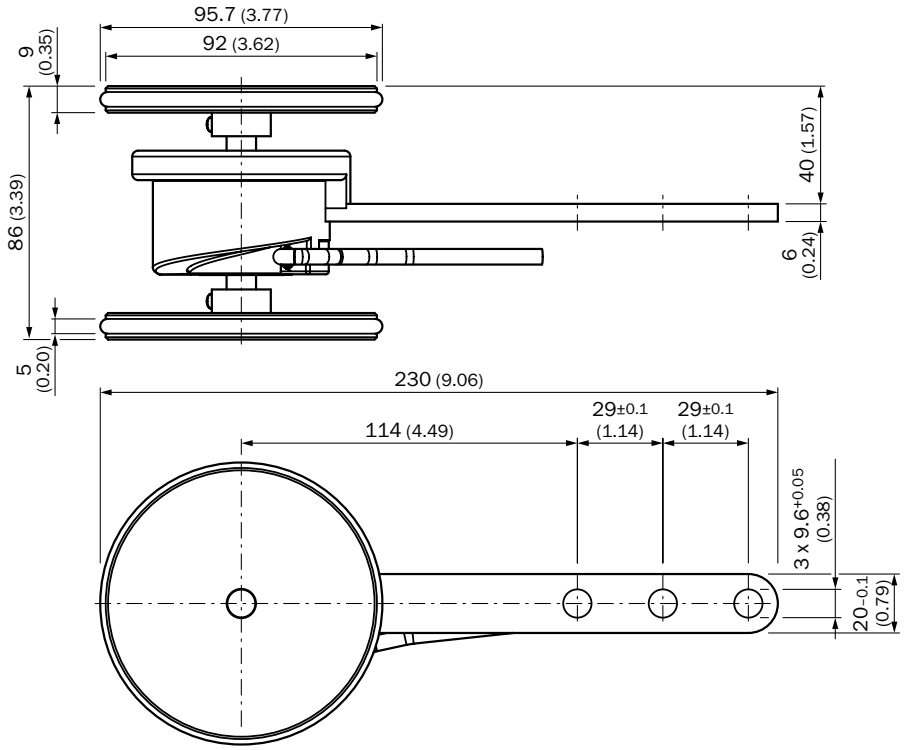
Dimensional drawings (dimensions in mm)

Connector outlet



General tolerances according to ISO 2768-mk

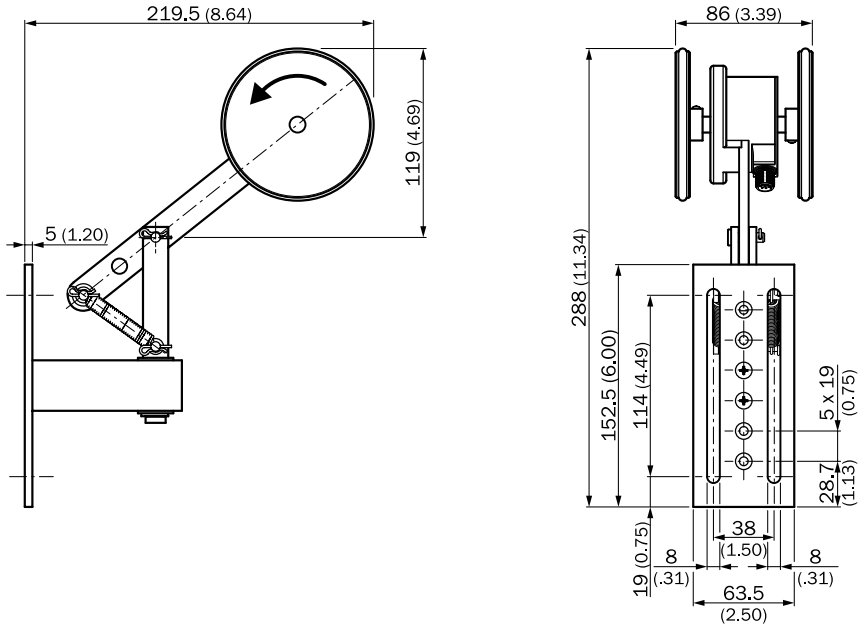
Cable outlet



General tolerances according to ISO 2768-mk

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DFV60 with 2056155 mounted spring arm (available as an accessory)

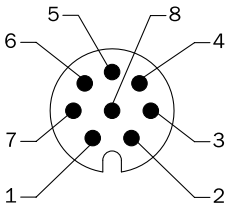


General tolerances according to ISO 2768-mk

PIN assignment

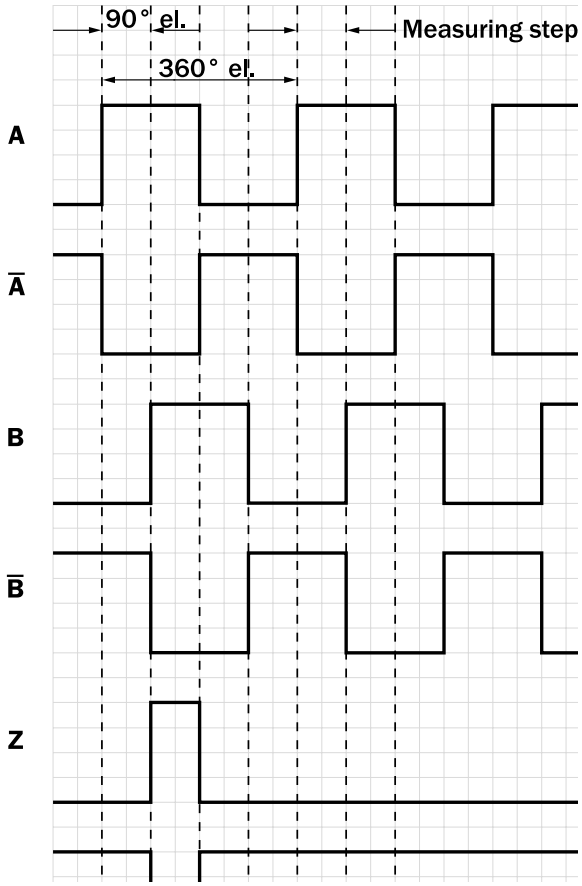
Cable, 8-wire

View of M12 male device connector on encoder



PIN, 8-pin, M12 male connector	Color of the wires for encoders with cable outlet	TTL/HTL signal	Explanation
1	Brown	$\overline{A}$	Signal wire
2	White	A	Signal wire
3	Black	$\overline{B}$	Signal wire
4	Pink	B	Signal wire
5	Yellow	$\overline{Z}$	Signal wire
6	Violet	Z	Signal wire
7	Blue	GND	Ground connection of the encoder
8	Red	$+U_S$	Supply voltage (volt-free to housing)
Screen	Screen	Screen	Screen connected to housing on encoder side. Connected to ground on control side.

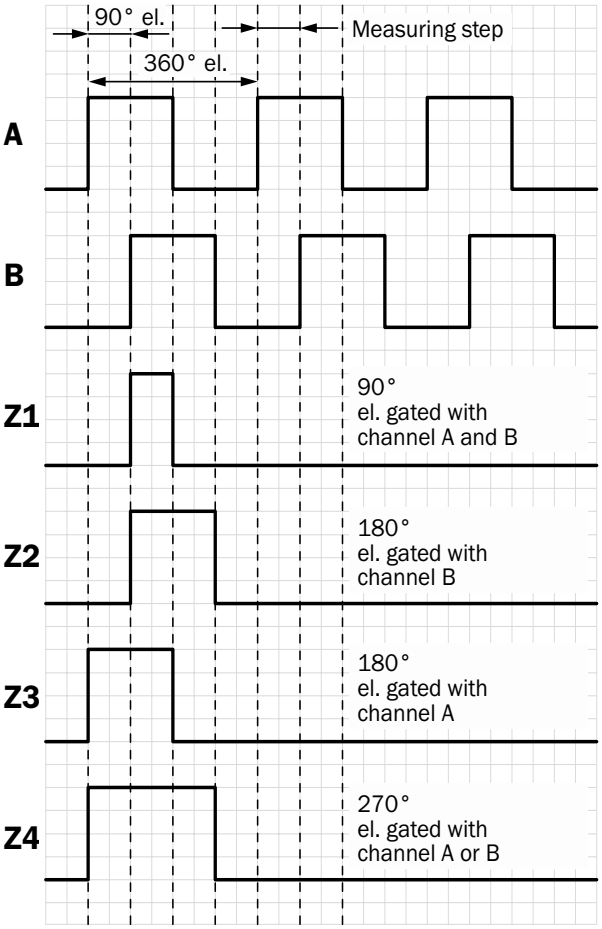
Signal outputs



CCW with view on the measuring wheel, see dimensional drawing.

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Zero pulse width 90 m, 180° or 270°, programmable



CCW with view on the measuring wheel, see dimensional drawing.

F

Recommended accessories

Mounting systems

Other mounting accessories

Measuring wheels and measuring wheel systems

Figure	Brief description	Type	Part no.
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278

Miscellaneous

Figure	Brief description	Type	Part no.
	Spring arm / mounting arm for DFV60	DFV60 sprung arm	2056155

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Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm², 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

Female connector (ready to assemble)

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

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	By the meter	LTG-2308-MWENC	6027529
	Head A: cable Head B: cable Cable: PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm		LTG-2612-MW	6028516

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Male connector (ready to assemble)

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

Connection cables with female and male connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, connector system, 8-pin, straight Head B: male connector, D-Sub, 9-pin, straight Cable: PVC, shielded, can be used for encoders with cable outlet in conjunction with PGT-10-Pro	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: shielded, 4 x 2 x 0.08 mm²	0.5 m	DSL-2D08-G0M5AC3	2046579
	Head A: female connector, M23, 12-pin, straight Head B: male connector, D-Sub, 9-pin, straight Cable: shielded, 4 x 2 x 0.08 mm²	0.5 m	DSL-3D08-G0M5AC3	2046580

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Other accessories

Programming and configuration tools

Figure	Brief description	Type	Part no.
	Programming unit USB, for programmable SICK Encoders AFS60, AFM60, DFS60, VFS60, DFV60 and wire draw encoders with programmable encoder.	PGT-08-S	1036616
	Programming unit display for programmable SICK DFS60, VFS60, DFV60, AFS/AFM60, AHS/AHM36 encoders, and wire draw encoders with DFS60, AFS/AFM60, and AHS/AHM36. Compact dimensions, low weight, and intuitive operation.	PGT-10-Pro	1072254

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

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ABSOLUTE ENCODERS

Flexible, compact and reliable – absolute encoders made to measure!

Absolute encoders generate information about position, angle and rotation counts in type-specific angle steps. For this, a unique code pattern is assigned to each angle increment. The number of code patterns available per revolution determines the resolution. Each code pattern forms a unique reference, and is therefore an absolute position. There is therefore no need for a reference run after switching on. A singleturn encoder measures the absolute position within a revolution. A multiturn encoder not only provides the position within a revolution but also the number of revolutions.

Your benefits

- Optical and magnetic variants for the widest range of requirements
- Reduced maintenance costs thanks to magnetic, wearless scanning in single and multiturn design
- High level of productivity due to optical encoders with a high level of precision and fast calculation of positions
- Rugged design for maximum system availability, even in extreme ambient conditions
- Absolutely compact – specially suited in cases where installation space is tight
- Flexible integration in all common networks

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Applications G-222
Product family overview G-224


AHS/AHM36 SSI G-232
Flexible, smart, compact


AHS/AHM36 CANopen G-252
Flexible, smart, compact


AFS/AFM60 SSI G-268
Precise, flexible, versatile


AFS/AFM60 EtherNet/IP G-312
Intelligent, powerful, precise


AFS/AFM60 PROFINET G-332
Intelligent, powerful, precise


AFS/AFM60 EtherCAT® G-352
Intelligent, powerful, precise


A3M60 PROFIBUS G-372
Compact, rugged, powerful


ATM60 PROFIBUS G-386
Reliable, established, and modular


ATM60 SSI G-398
Reliable, established, and modular


ATM60 CANopen G-412
Reliable, established, and modular


ATM60 DeviceNet G-424
Reliable, established, and modular


ATM90 SSI G-436
Reliable, established, and modular


ATM90 PROFIBUS G-444
Reliable, established, and modular


ARS60 SSI/Parallel G-454
Reliable and established


ACS/ACM36 . . . . . .G-474
Compact, universal, intuitive


ACM60 . . . . . .G-482
Compact, universal, intuitive

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PRODUCT FAMILY OVERVIEW

			
	AHS/AHM36 SSI	**AHS/AHM36 CANopen**	
	Flexible, smart, compact	Flexible, smart, compact	
Technical data overview			
Electrical interface	SSI	CANopen	
Resolution	Up to a maximum of 14-bit singleturn and 12-bit multiturn	Up to a maximum of 14-bit singleturn and 12-bit multiturn	
Mechanical interface	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft	
Connection type	Universal male connector Universal cable	Universal male connector Universal cable	
Ambient temperature	–40 °C ... +100 °C	–40 °C ... +85 °C	
Enclosure rating	Up to IP 67	Up to IP 67	
Programmable	✔	✔	
At a glance			
	• Compact 36 mm absolute encoder with max. 26 bits (singleturn: 14 bits, multiturn: 12 bits) • Face mount flange, servo flange, blind hollow shaft • Rotating M12 male connector or rotating cable outlet • SSI interface • Programmable SSI version: Resolution, preset value, etc. can be programmed (depending on the type) • Protection class up to IP67 (depending on the type) • Operating temperature: –40 °C ... +100 °C (depending on the type)	• Compact 36 mm absolute encoder with max. 26 bits (singleturn: 14 bits, multiturn: 12 bits) • Face mount flange, servo flange, blind hollow shaft • Rotating M12 male connector or rotating cable outlet • CANopen interface with programmable configuration • Diagnostic functions: temperature, operating time, etc. (depending on the type) • Protection class up to IP67 (depending on the type) • Operating temperature: –40 °C ... +85 °C (depending on the type)	
Detailed information	➜ G-232	➜ G-252	

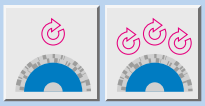
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	AFS/AFM60 SSI	**AFS/AFM60 EtherNet/IP**
	Precise, flexible, versatile	Intelligent, powerful, precise
	SSI/Gray SSI/Gray + Incremental, HTL SSI/Gray + Incremental, TTL SSI/Gray + Sin/Cos, 1,024 periods SSI/Gray, programmable SSI/Gray + Incremental TTL/HTL, programmable SSI/Gray + Sin/Cos, 1,024 periods, programmable	EtherNet/IP
	Up to a maximum of 18-bit singleturn and 12-bit multiturn	Up to a maximum of 18-bit singleturn and 12-bit multiturn
	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft Through hollow shaft	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft
	Radial male connector Universal cable Radial cable	Axial male connector
	–40 °C ... +100 °C	–40 °C ... +85 °C
	Up to IP 67	Up to IP 67
	✔	✔
	• High-resolution absolute encoder with up to 30 bits (AFM60) or 18 bits (AFS60) • Face mount flange, servo flange, blind hollow shaft or through hollow shaft • SSI, SSI + incremental or SSI + sin/cos interface • Resolution,preset, etc. can be programmed (depending on the type) • Connectivity: M12 or M23 male connector or cable outlet • Enclosure rating: IP 67 (housing), IP 65 (shaft) • Operating temperature: –40 °C ... +100 °C (depending on the type)	• High-resolution, 30-bit absolute encoder • Integrated web server and FTP server • DLR (Device Level Ring) • Function module • Comprehensive diagnostic functions • IP addressing via software and hardware • Round axis functionality (transmission calculation)
	→ G-268	→ G-312

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PRODUCT FAMILY OVERVIEW





AFS/AFM60 PROFINET

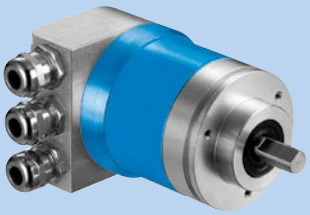


AFS/AFM60 EtherCAT®

	Intelligent, powerful, precise	Intelligent, powerful, precise
Technical data overview		
Electrical interface	PROFINET	EtherCAT®
Resolution	Up to a maximum of 18-bit singleturn and 12-bit multiturn	Up to a maximum of 18-bit singleturn and 12-bit multiturn
Mechanical interface	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft
Connection type	Axial male connector	Axial male connector
Ambient temperature	–40 °C ... +85 °C	–40 °C ... +85 °C
Enclosure rating	Up to IP 67	Up to IP 67
Programmable	✔	✔
At a glance		
	• High-resolution 30-bit absolute encoder (18-bit singleturn and 12-bit multiturn) • Face mount flange, servo flange and blind hollow shaft • Connection type: 3 x M12 axial male connector • PROFINET-IO-RT interface • Less than 5 ms data update time • Round axis functionality • Alarms, warnings and diagnostics functions for speed, position, temperature, operating time, etc. • Status display via 5 LEDs	• High-resolution 30-bit absolute encoder (18-bit singleturn and 12-bit multiturn) • Face mount flange, servo flange and blind hollow shaft • Connection type: 3 x M12 axial male connector • On the fly data transmission rate in µs range • EtherCAT® interface CoE (CiA DS-301) Device profile (CiA DS-406) • Round axis functionality • Alarms, warnings and diagnostics functions for speed, position, temperature, operating time, etc. • Status display via 5 LEDs • Up to 16 adjustable electronic cam switches
Detailed information	➜ G-332	➜ G-352

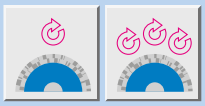
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	A3M60 PROFIBUS	ATM60 PROFIBUS
		
	Compact, rugged, powerful	Reliable, established, and modular
	PROFIBUS	PROFIBUS
	Up to a maximum of 14-bit singleturn and 17-bit multiturn	Up to a maximum of 13-bit singleturn and 13-bit multiturn
	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft
	Axial male connector	Bus connection adapters
	–30 °C ... +80 °C	–20 °C ... +80 °C
	Up to IP 67	Up to IP 67
	✔	–
	• Rugged absolute multiturn encoder with up to 31 bits (14-bit singleturn and 17-bit multiturn) • Face mount flange, servo flange or blind hollow shaft • Compact design (<70 mm) • Integrated PROFIBUS interface with DP V0, V1, and V2 functionality (depending on type) • Connectivity: 3 x M12 male connectors • Protection class up IP 67 • Operating temperature: –30 °C ... +80 °C (depending on the type)	• Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits • Mechanical interface: face mount flange, servo flange, blind hollow shaft, and extensive adapter accessories • Zero-set and preset functions via hardware or software • Electrical interface: PROFIBUS DP as per IEC61158 / RS 485 , electrically isolated • Electronically adjustable, configurable resolution • Magnetic scanning
	➜ G-372	➜ G-386

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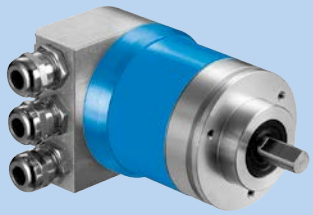
PRODUCT FAMILY OVERVIEW





ATM60 SSI

Reliable, established, and modular



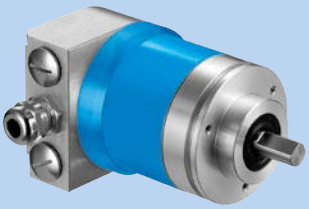
ATM60 CANopen

Reliable, established, and modular

Technical data overview		
Electrical interface	SSI	CANopen
Resolution	Up to a maximum of 13-bit singleturn and 13-bit multiturn	Up to a maximum of 13-bit singleturn and 13-bit multiturn
Mechanical interface	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft
Connection type	Radial male connector Radial cable	Bus connection adapters
Ambient temperature	–20 °C ... +85 °C	–20 °C ... +80 °C
Enclosure rating	Up to IP 67	Up to IP 67
Programmable	✔	✔
At a glance		
	• Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits • Mechanical interface: face mount flange, servo flange, blind hollow shaft, and extensive adapter accessories • Zero-set and preset functions via hardware or software • Electrical interface: SSI with gray or binary code type • Electronically adjustable, configurable resolution • Round axis function (optional) also for non-binary resolutions (per revolution) and decimal numbers (number of revolutions) • Magnetic scanning	• Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits • Mechanical interface: face mount, servo flange, blind hollow shaft, adapter accessories • Zero-set and preset functions via hardware/ software • Electrical interface: CAN specification 2. 0B, electrically isolated; DS 301, V4.01, DSP 406, V2.0, Class 2 • Electronically adjustable, configurable resolution • Network status info via duo LED • Magnetic scanning
Detailed information	➜ G-398	➜ G-412

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	ATM60 DeviceNet	**ATM90 SSI**
	Reliable, established, and modular	Reliable, established, and modular
	DeviceNet	SSI
	Up to a maximum of 13-bit singleturn and 13-bit multiturn	Up to a maximum of 13-bit singleturn and 13-bit multiturn
	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft	Through hollow shaft
	Bus connection adapters	Radial male connector Radial cable
	–20 °C ... +80 °C	–20 °C ... +70 °C
	Up to IP 67	IP 65
	✔	✔
	• Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits • Mechanical interface: face mount, servo flange, blind hollow shaft, and adapter accessories • Zero-set and preset functions via hardware/software • Electrical interface: CAN/DeviceNet specification 2.0B, electrically isolated; device profile: Generic [0] • Electronically adjustable, configurable resolution • Network status info via duo LED • Magnetic scanning	• Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits • Mechanical interface: through hollow shaft with shallow installation depth • Zero-set and preset functions via hardware or software • Electrical interface: SSI with gray or binary code type • Electronically adjustable, configurable resolution • Magnetic scanning
	➜ G-424	➜ G-436

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PRODUCT FAMILY OVERVIEW

			
	ATM90 PROFIBUS	**ARS60 SSI/Parallel**	
	Reliable, established, and modular	Reliable and established	
Technical data overview			
Electrical interface	PROFIBUS	SSI/Gray SSI/Gray capped Parallel/Gray Parallel/Gray capped Parallel/BIN Parallel/BCD	
Resolution	Up to a maximum of 13-bit singleturn and 13-bit multiturn	Up to a maximum of 13 bit	
Mechanical interface	Through hollow shaft	Solid shaft, servo flange Solid shaft, face mount flange Blind hollow shaft Through hollow shaft	
Connection type	3 x radial male connectors 3 x radial PG	Radial male connector Axial male connector Radial cable Axial cable	
Ambient temperature	–20 °C ... +80 °C	–20 °C ... +85 °C	
Enclosure rating	IP 65	Up to IP 66	
Programmable	✔	–	
At a glance			
	• Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits • Mechanical interface: through hollow shaft with shallow installation depth • Zero-set and preset functions via hardware or software • Electrical interface: PROFIBUS DP as per IEC61158 / RS-485 , electrically isolated • Electronically adjustable, configurable resolution • Magnetic scanning	• Absolute singleturn encoder • Resolution: up to 15 bits (32,768 steps) • Electrical interface: SSI with gray or gray capped code type • Electrical interface: Parallel with gray, gray capped, binary, BCD code type • Zero-set function • Mechanical interfaces: face mount flange, servo flange, blind and through hollow shaft • Enclosure rating up to IP 66	
Detailed information	➜ G-444	➜ G-454	

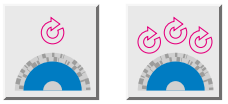
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	ACS/ACM36	**ACM60**
	Compact, universal, intuitive	Compact, universal, intuitive
	Analog, 4 mA ... 20 mA Analog, 0 V ... 10 V	Analog, 4 mA ... 20 mA Analog, 0 V ... 10 V
	5.4 ... 40.2 µA 2.7 ... 25.1 mV 5.2 µA 2.7 mV	1.5 ... 8.8 µA 0.8 ... 5.5 mV
	Solid shaft, servo flange	Solid shaft, servo flange
	Radial cable	Universal or radial male connector
	–30 °C ... +80 °C	–30 °C ... +80 °C
	IP 65	IP 68
	✔	✔
	• Compact 36 mm absolute encoder with up to 3,723 steps (for singleturn and multiturn) • Servo flange • Radial cable outlet • Analog interface 4 ... 20 mA or 0 ... 10 V • Programming via keypad on the encoder • IP 65 protection class • Operating temperature: –30 °C ... +80 °C	• Compact 60 mm absolute encoder with up to 13,107 steps • Servo flange • Radial connector outlet • Analog interface 4 ... 20 mA or 0 ... 10 V • Programming via keypad on the encoder • IP 68 protection class • Operating temperature: –30 °C ... +80 °C
	➜ G-474	➜ G-482

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FLEXIBLE, SMART, COMPACT





[1] UL 508 compliant.

More information

Fields of application G-233
Detailed technical data. G-233
Type code. G-236
Ordering information. G-238
Dimensional drawings G-239
Proposed fitting. G-242
PIN assignment. G-244
Singleturn signal outputs G-245
Multiturn signal outputs G-247
Recommended accessories. G-249

Product description

The AHS/AHM36 SSI absolute encoder product family provides increased flexibility due to its mechanical adaptation, electrical connectivity, and SSI communication. With their rotating male connector or cable outlets as well as the various mounting hole patterns and adapter flanges, these encoders are suitable for nearly any application. The encoders are able to connect to a wide range of controls due to a programming tool that can be used to make individual adjustments to the structure of the SSI protocol, in addition to adjusting the singleturn/multiturn resolution, the counting direction, and other parameters. Thanks to the large operating temperature range from –40 °C ... +100 °C and the protection class up to IP67, this encoder family can be used in harsh ambient conditions. The rugged, reliable, fully magnetic sensor system provides a maximum resolution of 14 bits for the singleturn variant and 26 bits for the multiturn variant.

At a glance

- Compact 36 mm absolute encoder with max. 26 bits (singleturn: 14 bits, multiturn: 12 bits)
- Face mount flange, servo flange, blind hollow shaft
- Rotating M12 male connector or rotating cable outlet
- SSI interface
- Programmable SSI version: Resolution, preset value, etc. can be programmed (depending on the type)
- Protection class up to IP67 (depending on the type)
- Operating temperature: –40 °C ... +100 °C (depending on the type)

Your benefits

- Simple, time-saving mechanical installation due to a rotating male connector or cable outlet, various mounting hole patterns, and many different shafts
- Simple and flexible electrical installation with various configuration options and adjustable SSI protocol structure (programmable SSI version)
- Easy setup for various applications allowing binary, non-binary, and non-integer resolutions with the round axis functionality (programmable SSI version)
- Reliable operation in harsh environments thanks to the rugged, reliable, fully magnetic sensor system
- Space-efficient and cost-effective design that is suitable for applications where space is tight
- High performance at a cost-efficient price

→ www.mysick.com/en/AHS_AHM36_SSI

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Measures the absolute position in various industries, machines, and tools, including automated guided systems (AGS), industrial trucks, commercial vehicles, packaging machines, logistics applications, machine construction and medical technology

Detailed technical data

Performance

	Basic	Advanced
Max. number of steps per revolution	4,096 (12 bit)	16,384 (14 bit)
Max. number of revolutions		
Absolute singleturn	1	
Absolute multiturn	4,096 (12 bit)	
Resolution		
Absolute singleturn		
Non-programmable	256, 360, 512, 720, 1,024, 2,048, 3,600, 4,096	256, 360, 512, 720, 1,024, 2,048, 3,600, 4,096, 8,192, 16,384
Programmable [1]	–	1 ... 16,384
Absolute multiturn		
Non-programmable	8x12 bit, 9x12 bit, 10x12 bit, 11x12 bit, 12x12 bit	8x12 bit, 9x12 bit, 10x12 bit, 11x12 bit, 12x12 bit, 13x12 bit, 14x12 bit
Programmable [1]	–	0x0 bit ... 14x12 bit
Error limits	± 0.35° (at 20 °C)	
Repeatability	± 0.25° (at 20 °C)	± 0.2° (at 20 °C)
Measuring increment (360 °/ number of steps per revolution)	± 0.09°	± 0.022°
Initialization time	100 ms [2]	

[1] Can be programmed using SICK programming tools.

[2] Position can be read after this period.

Interfaces

	Basic	Advanced
Electrical interface	SSI	
Code type		
Non-programmable	Gray	
Programmable	–	Gray, binary
Code sequence		
Non-programmable	CW/CCW, configurable via cable	
Programmable	–	CW/CCW, configurable via Programming Tool or cable
Interface signals	Clock +, Clock -, Data +, Data-	
Max. clock frequency	60 kHz ... 2 MHz [1]	
Set (electronic adjustment)	H active (L = 0 ... 3 V, H = 4 ... Us V)	
CW/CCW (counting sequence when turning)	L active (L = 0 ... 1 V, H = 2 ... Us V)	
Configuration data	–	Number of steps per revolution, number of revolutions (multiturn only), PRESET, counting direction, code type, offset, position bits, position of error bit, round axis functionality (multiturn version only), SSI mode
Position forming time	125 µs	

[1] Min. LOW level (Clock +) 500 ns.

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Electrical data

	Basic	Advanced
Connection type	M12 male connector, 8-pin, universal Cable, 8-wire, universal, 0.5 m Cable, 8-wire, universal, 1.5 m Cable, 8-wire, universal, 3 m Cable, 8-wire, universal, 5 m	
Operating voltage range	4.5 V DC ... 32 V DC	
Max. power consumption without load	≤ 1.5 W	
Reverse polarity protection	✔	
MTTFd: mean time to dangerous failure [1]	230 years (EN ISO 13849-1)	

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

Mechanical data

	Basic	Advanced
Shaft diameter		
Solid shaft	6 mm, 1/4", 8 mm, 3/8", 10 mm	
Blind hollow shaft	6 mm, 1/4", 8 mm, 3/8", 10 mm	
Start up torque		
Solid shaft	0.5 Ncm (at 20 °C)	1 Ncm (at 20 °C)
Blind hollow shaft	0.5 Ncm (at 20 °C)	1 Ncm (at 20 °C)
Operating torque		
Solid shaft	< 0.5 Ncm (at 20 °C)	< 1 Ncm (at 20 °C)
Blind hollow shaft	< 0.5 Ncm (at 20 °C)	< 1 Ncm (at 20 °C)
Permissible shaft loading		
Solid shaft	40 N (radial) 20 N (axial)	
Permissible shaft movement, static/dynamic		
Blind hollow shaft	± 0.3 mm / ± 0.1 mm radial ± 0.3 mm / ± 0.1 mm axial	
Max. operating speed		
Singleturn	9,000 rpm [1]	6,000 rpm [2, 3]
Multiturn	6,000 rpm [1]	6,000 rpm [2, 3]
Bearing lifetime		
Solid shaft	3.6 x 10^8 revolutions	
Blind hollow shaft	2.0 x 10^9 revolutions	
Shaft material	Stainless steel	
Flange material	Aluminum	
Housing material	Zinc	
Cable material	PUR	
Mass		
Solid shaft	0.12 kg (related to encoder with connector outlet)	
Blind hollow shaft	0.12 kg (related to encoder with connector outlet)	

[1] Take into account self-heating of 3.5 K per 1,000 revolutions/min when designing the operating temperature range.

[2] Take into account self-heating of 5.5 K per 1,000 revolutions/min when designing the operating temperature range.

[3] For Advanced type encoders, the shaft seal must be inspected regularly.

	Basic	Advanced
Rotor moment of inertia		
Solid shaft	2.5 gcm²	
Blind hollow shaft	15 gcm²	
Max. angular acceleration	≤ 500,000 rad/s²	

[1] Take into account self-heating of 3.5 K per 1,000 revolutions/min when designing the operating temperature range.

[2] Take into account self-heating of 5.5 K per 1,000 revolutions/min when designing the operating temperature range.

[3] For Advanced type encoders, the shaft seal must be inspected regularly.

Ambient data

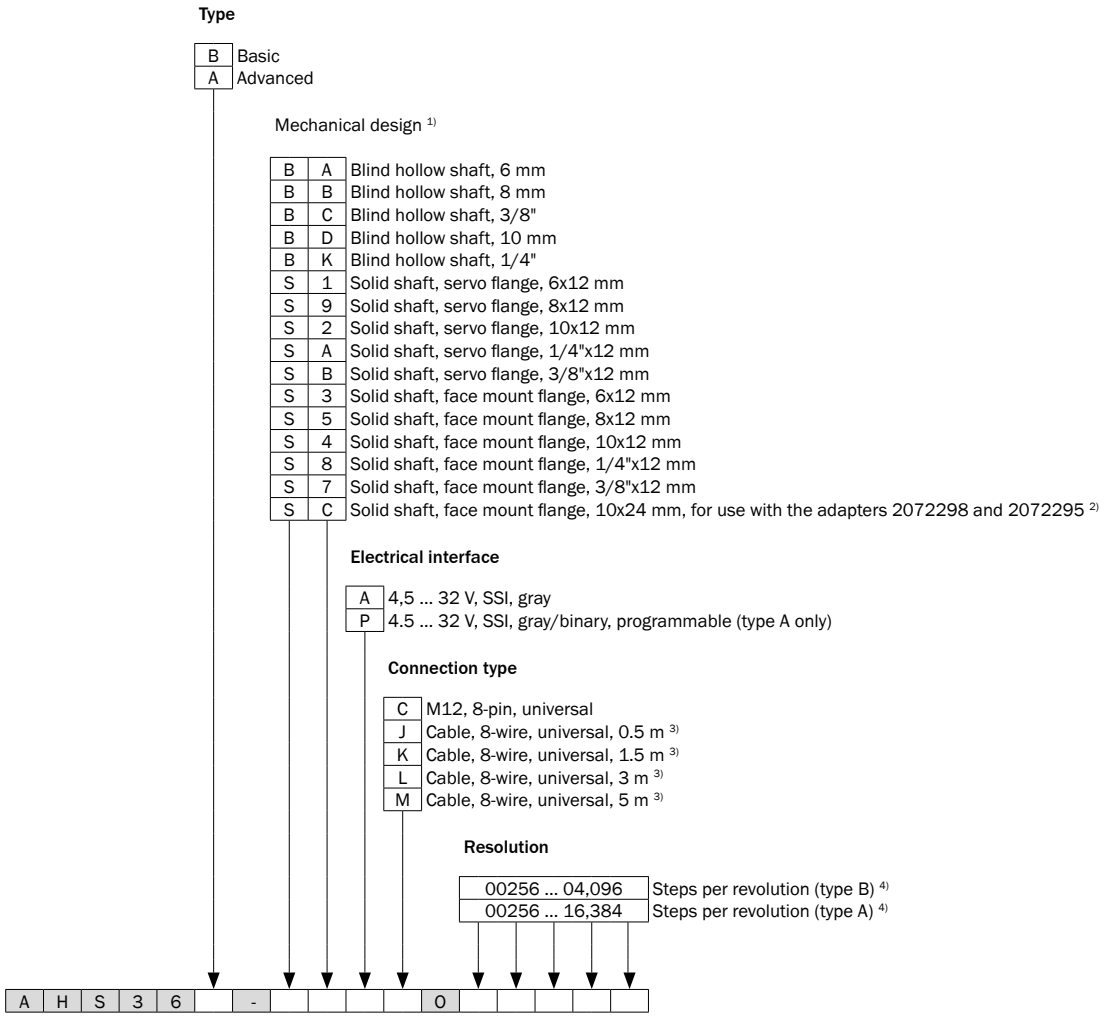
	Basic	Advanced
EMC	According to EN 61000-6-2 and EN 61000-6-3	
Enclosure rating	IP 65 on housing side (acc. to IEC 60529) [1] IP 65 on shaft side (acc. to IEC 60529)	IP 66 + IP 67, on housing side (acc. to IEC 60529) [1] IP 66 + IP 67, on shaft side (acc. to IEC 60529) [2]
Permissible relative humidity	90% (condensation not permitted)	
Operating temperature range	–20 °C ... +70 °C	–40 °C ... +100 °C
Storage temperature range	–40 °C ... +100 °C, without packaging	
Resistance to shocks	100 g/6 ms (according to EN 60068-2-27)	
Resistance to vibrations	20 g/10 Hz ... 2,000 Hz (according to EN 60068-2-6)	

[1] In an assembled male connector.

[2] For Advanced type encoders, the shaft seal must be inspected regularly.

Type code

Singleturn



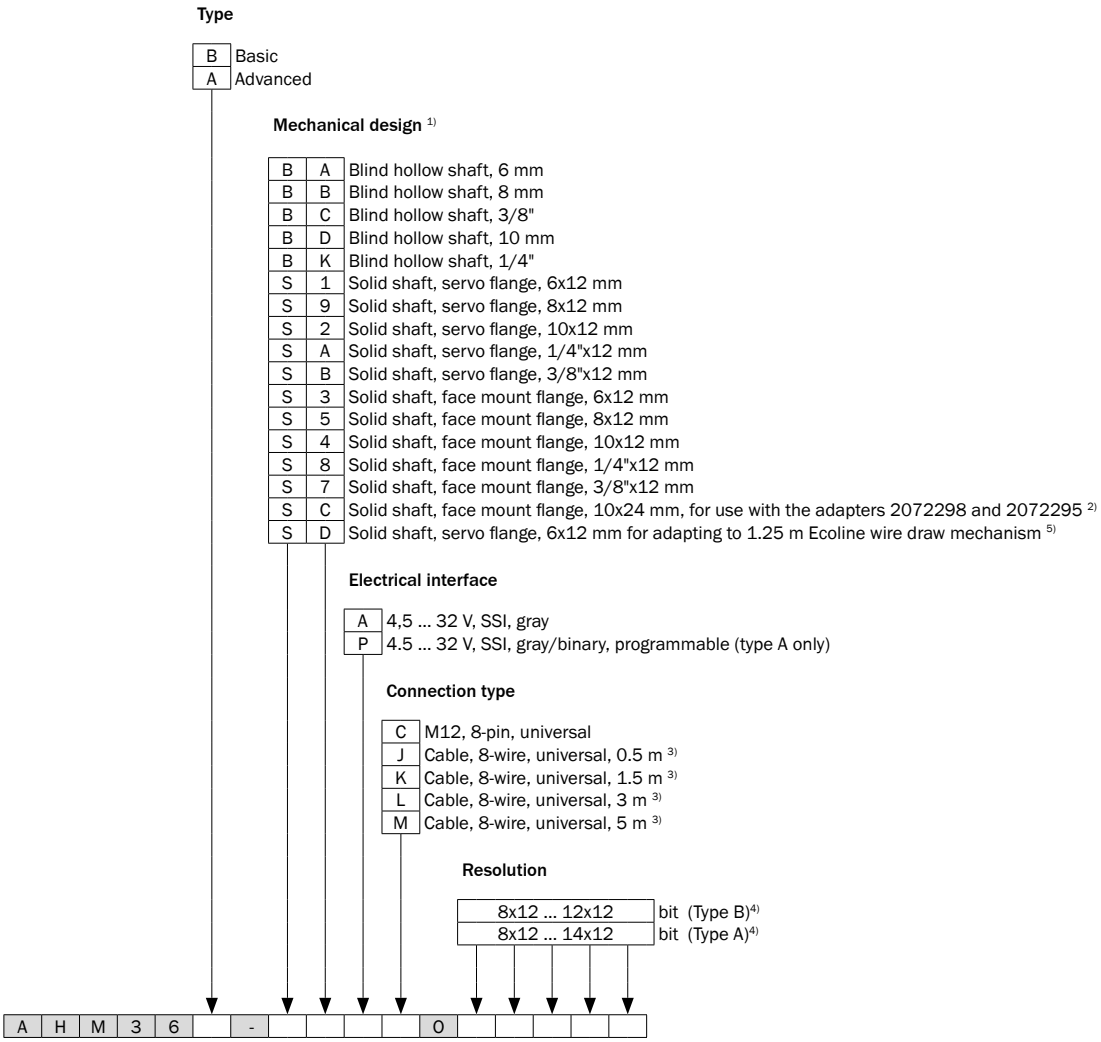
1) Flange adapters can be used for additional mechanical interfaces, see Mounting suggestions.

2) Permissible shaft load lower than figure list in technical data.

3) NRTL certificate only valid for operating temperatures from –40 °C ... + 85 °C.

4) Number of steps for non-programmable devices: Basic: 256, 360, 512, 720, 1,024, 2,048, 3,600, 4,096 Advanced: 256, 360, 512, 720, 1,024, 2,048, 3,600, 4,096, 8,192, 16,384. Other steps available on request. Number of steps for programmable devices (Advanced only): 16,384, programmable using Programming Tool.

Multiturn



1) Flange adapters can be used for additional mechanical interfaces, see Mounting suggestions from page 17.

2) Permissible shaft load lower than figure list in technical data.

3) NRTL certificate only valid for operating temperatures from –40 °C ... + 85 °C.

4) Resolution for non-programmable devices: Basic: 8x12, 9x12, 10x12, 11x12, 12x12. Advanced: 8x12, 9x12, 10x12, 11x12, 12x12, 13x12, 14x12. Other resolutions on request. Resolution for programmable devices (Advanced only): 14x12, programmable using Programming Tool.

5) Protection class on shaft side always IP65.

Ordering information

Absolute singleturn, solid shaft, servo flange

- **Electrical interface:** SSI

Shaft diameter	Connection type	Number of steps	Resolution	Programmable	Type	Part no.
6 x 12 mm	M12 male connector, 8-pin, universal	4,096	4,096 x 1	–	AHS36B-S1AC004096	1066017
6 x 12 mm	M12 male connector, 8-pin, universal	≤ 16,384	16,384 x 1	✔	AHS36A-S1PC016384	1066014
	Cable, 8-wire, universal, 1.5 m	≤ 16,384	16,384 x 1	✔	AHS36A-S1PK016384	1066013

Absolute multiturn, solid shaft, servo flange

- **Electrical interface:** SSI

Shaft diameter	Connection type	Number of steps	Resolution	Programmable	Type	Part no.
6 x 12 mm	M12 male connector, 8-pin, universal	4,096	4,096 x 4,096	–	AHM36B-S1AC012x12	1066012
6 x 12 mm	M12 male connector, 8-pin, universal	≤ 16,384	16,384 x 4,096	✔	AHM36A-S1PC014x12	1066009
	Cable, 8-wire, universal, 1.5 m	≤ 16,384	16,384 x 4,096	✔	AHM36A-S1PK014x12	1066008

Absolute singleturn, solid shaft, face mount flange

- **Electrical interface:** SSI

Shaft diameter	Connection type	Number of steps	Resolution	Programmable	Type	Part no.
8 x 12 mm	M12 male connector, 8-pin, universal	16,384	16,384 x 1	–	AHS36A-S5AC016384	1067269

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Absolute multiturn, solid shaft, face mount flange

- **Electrical interface:** SSI

Shaft diameter	Connection type	Number of steps	Resolution	Programmable	Type	Part no.
6 x 12 mm	M12 male connector, 8-pin, universal	≤ 16,384	16,384 x 4,096	✔	AHM36A-S3PC014x12	1066007
	Cable, 8-wire, universal, 1.5 m	≤ 16,384	16,384 x 4,096	✔	AHM36A-S3PK014x12	1066006

Absolute singleturn, blind hollow shaft

- **Electrical interface:** SSI

Shaft diameter	Connection type	Number of steps	Resolution	Programmable	Type	Part no.
6 mm	M12 male connector, 8-pin, universal	≤ 16,384	16,384 x 1	✔	AHS36A-BAPC016384	1066016
	Cable, 8-wire, universal, 1.5 m	≤ 16,384	16,384 x 1	✔	AHS36A-BAPK016384	1066015

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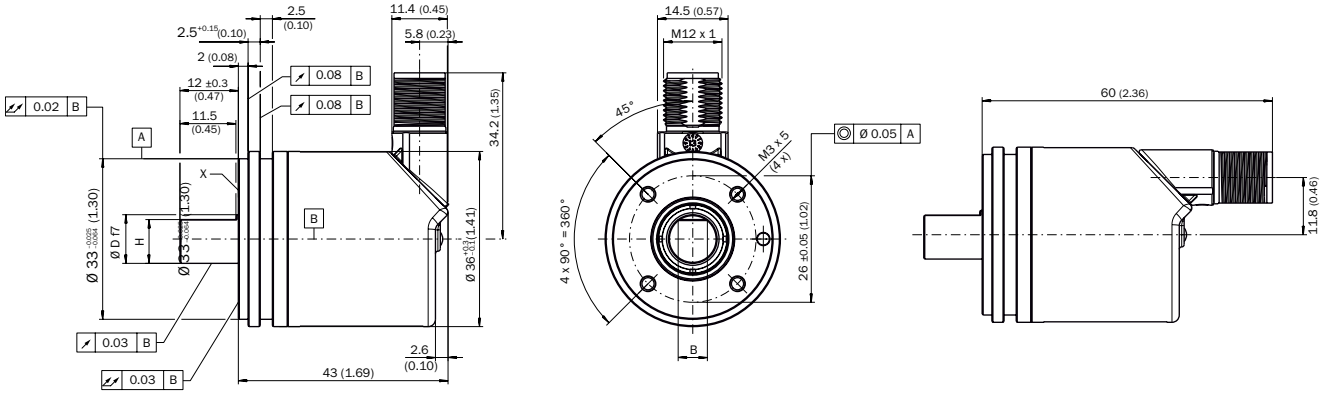
Absolute multiturn, blind hollow shaft

- **Electrical interface:** SSI

Shaft diameter	Connection type	Number of steps	Resolution	Programmable	Type	Part no.
6 mm	M12 male connector, 8-pin, universal	≤ 16,384	16,384 x 4,096	✔	AHM36A-BAPC014x12	1066011
	Cable, 8-wire, universal, 1.5 m	≤ 16,384	16,384 x 4,096	✔	AHM36A-BAPK014x12	1066010

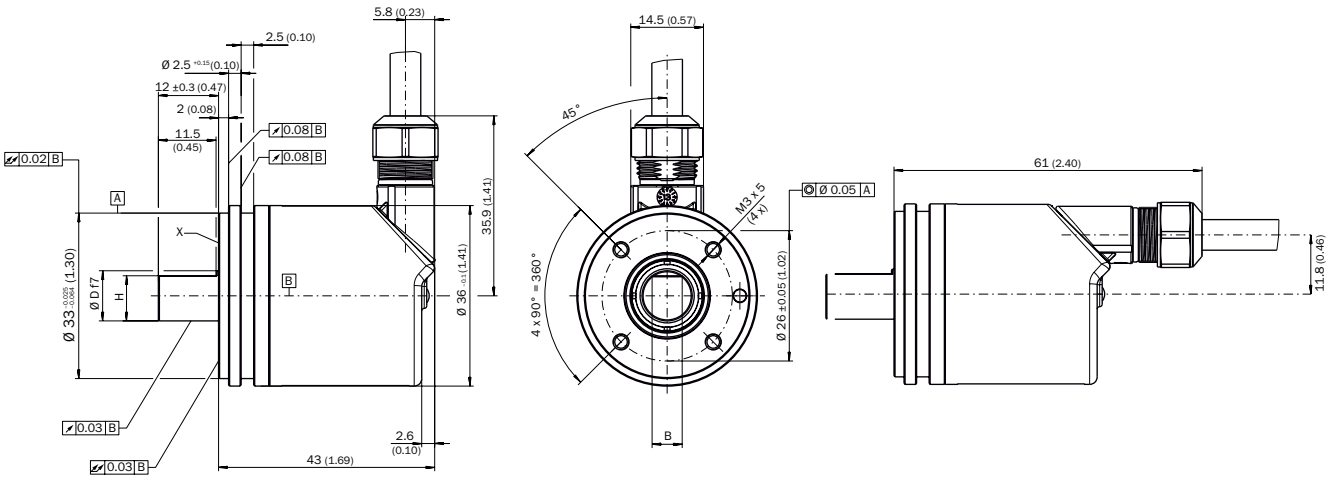
Dimensional drawings (dimensions in mm)

Solid shaft, servo flange, M12 male connector



X = Measuring point for operating temperature

Solid shaft, servo flange, cable output

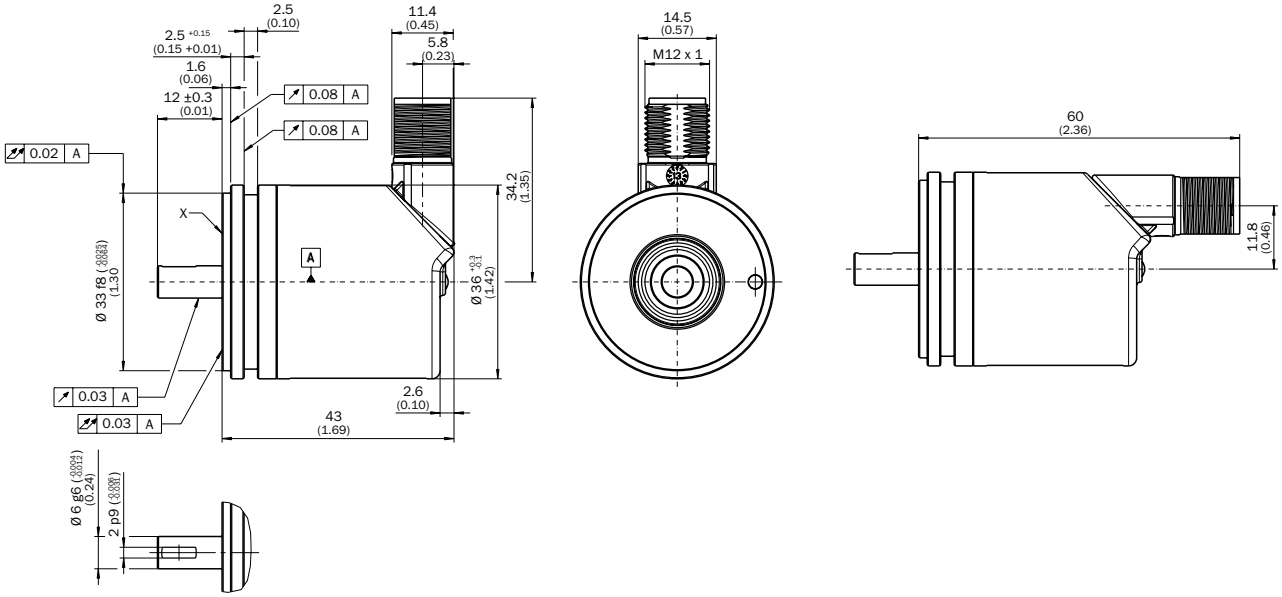


X = Measuring point for operating temperature

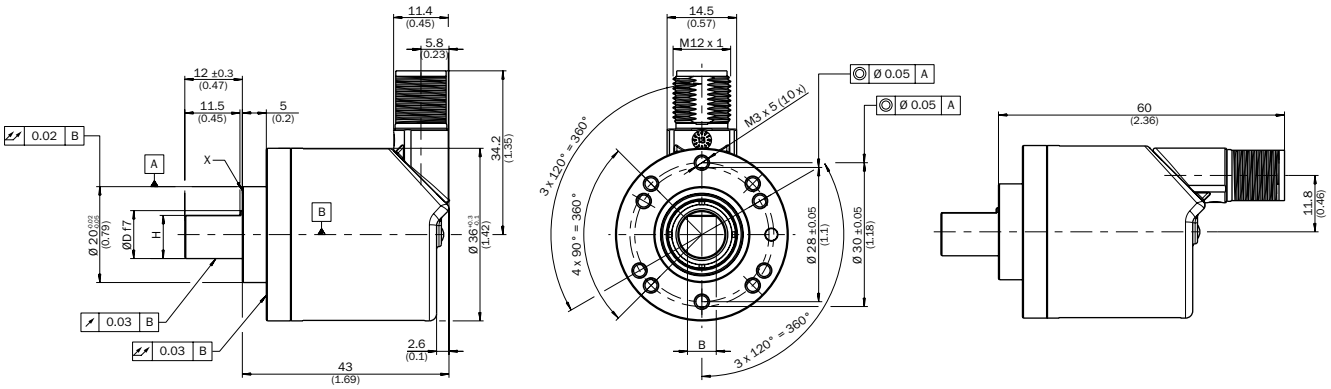
Bend radius of cable; R = 30 mm

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Solid shaft, servo flange, for adapting to 1.25 m Ecoline wire draw mechanism, SD mechanical design

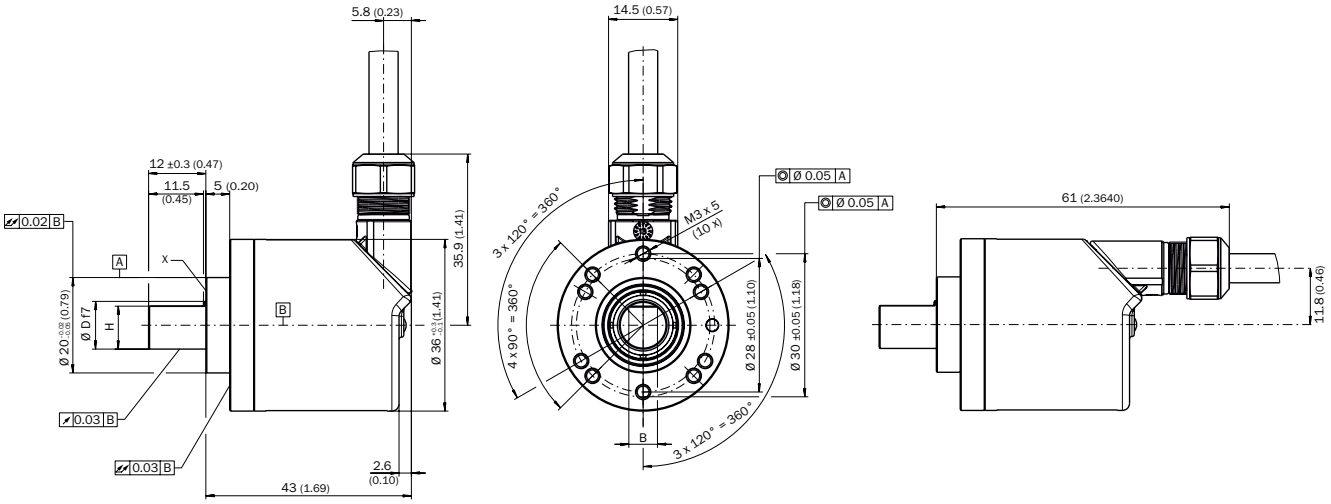


Solid shaft, face mount flange, M12 male connector



X = Measuring point for operating temperature

Solid shaft, face mount flange, cable output

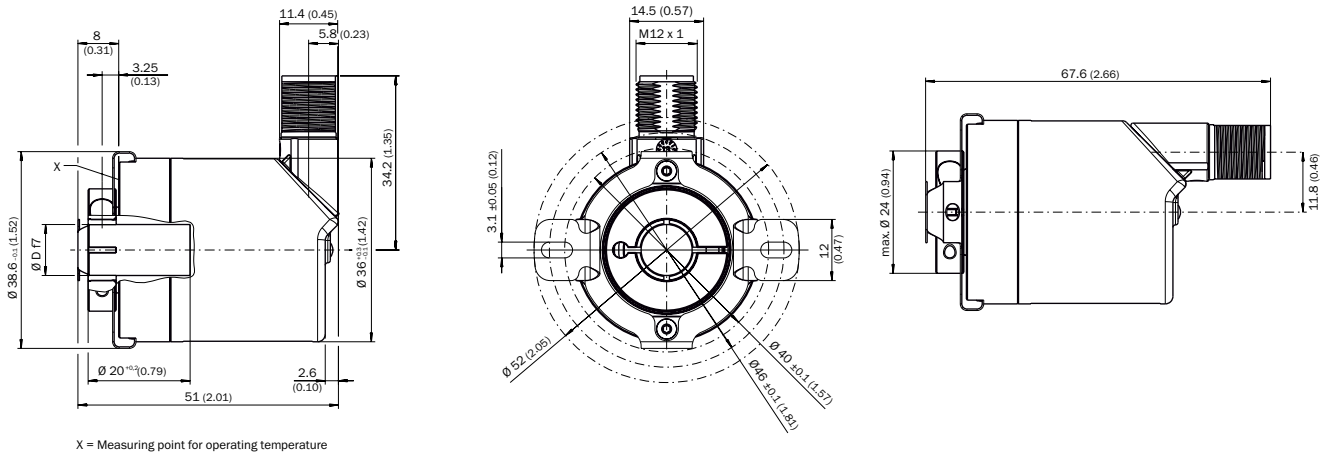


X = Measuring point for operating temperature

Bend radius of cable; R = 30 mm

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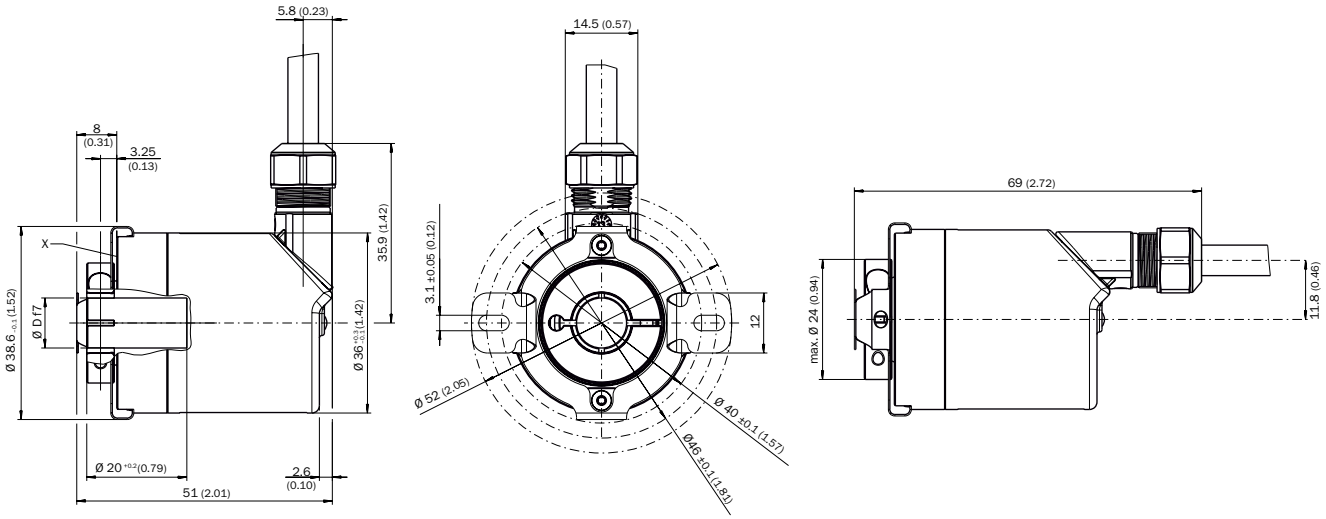
Blind hollow shaft, M12 male connector



X = Measuring point for operating temperature

Customer's own shaft: insertion depth of at least 15 mm to max. of 22 mm, from contact surface, from stator coupling, recommended shaft tolerance of k7

Blind hollow shaft, cable outlet



X = Measuring point for operating temperature

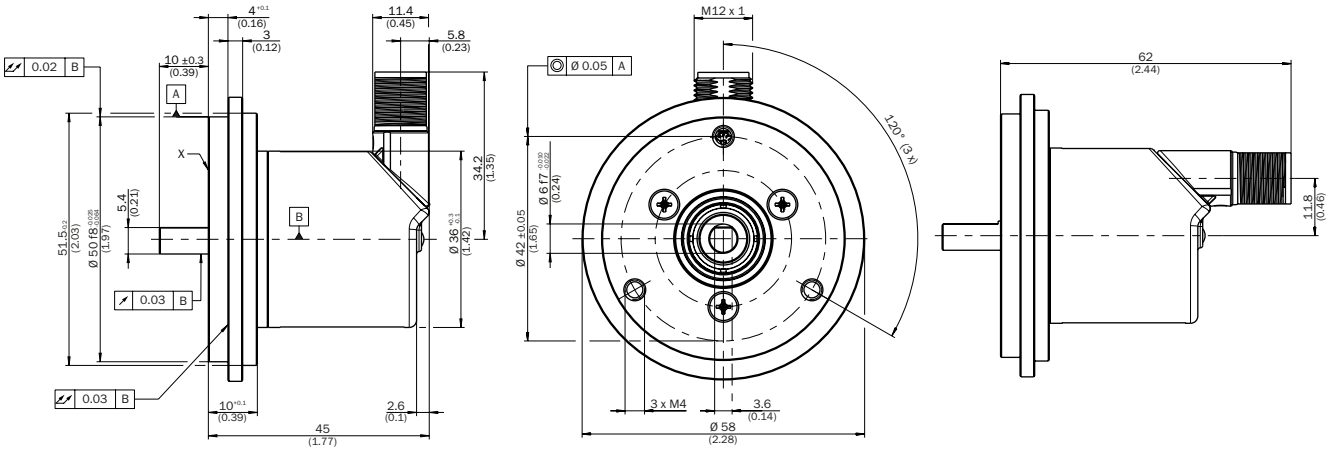
Bend radius of cable; R = 30 mm

Customer's own shaft: insertion depth of at least 15 mm to max. of 22 mm, from contact surface, from stator coupling, recommended shaft tolerance of k7

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Proposed fitting

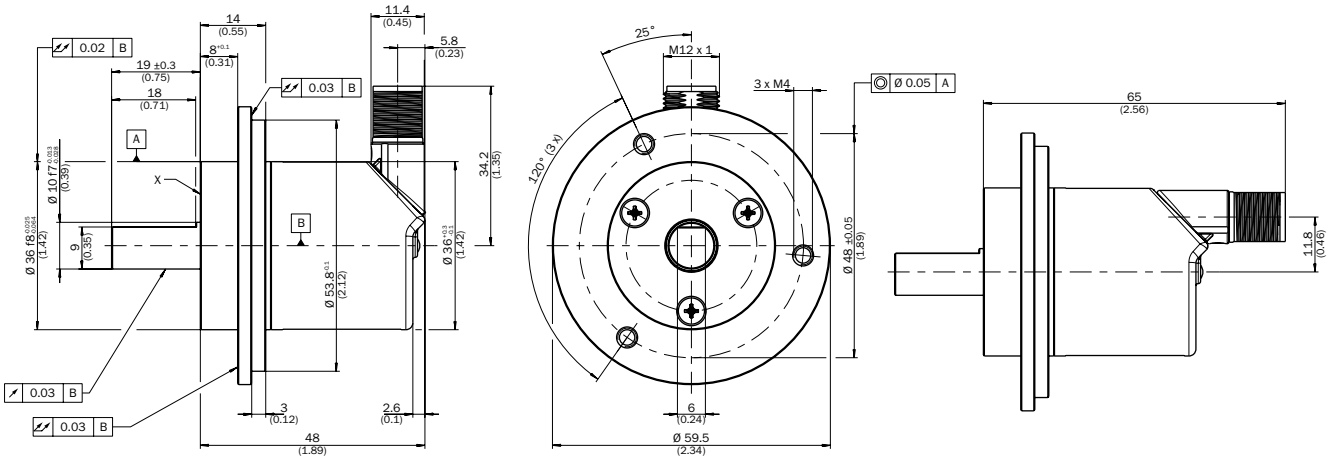
Solid shaft, face mount flange with flange adapter, centering hub D20 to D50 (BEF-FA-020-050, 2072297)



X = Measuring point for operating temperature

Sample order for 6 mm shaft diameter: AHx36x-S3xx0xxxxx + BEF-FA-020-050 (adapter is not pre-assembled)

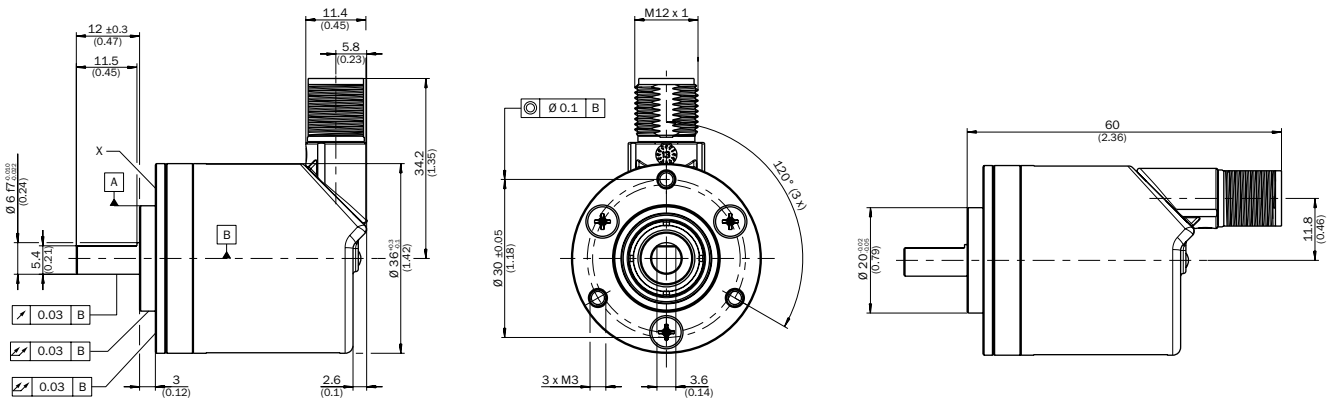
Solid shaft, face mount flange with flange adapter, centering hub D20 to D36 (BEF-FA-020-036, 2072298)



X = Measuring point for operating temperature

Sample order for 10 mm shaft diameter: AHx36x-SCxx0xxxxx + BEF-FA-020-036 (adapter is not pre-assembled)

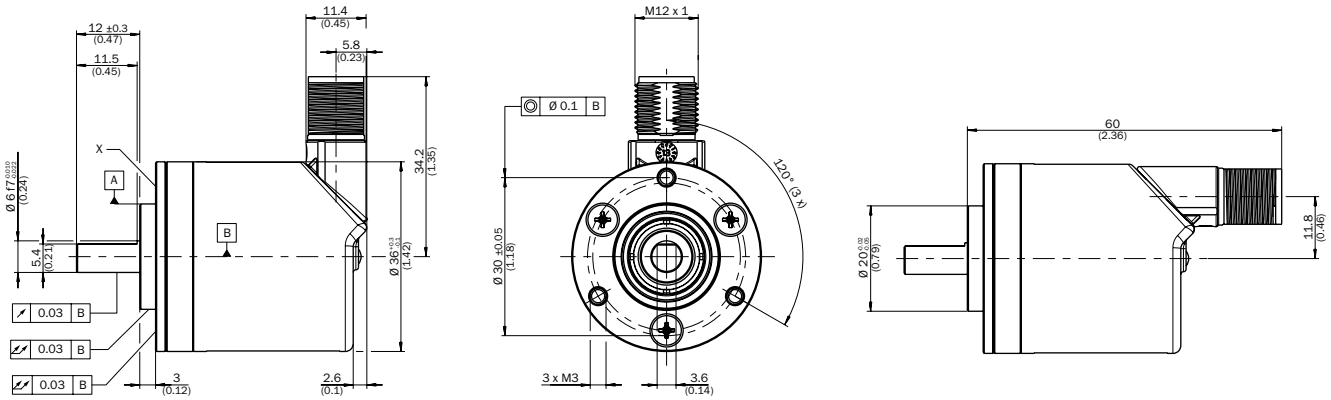
Solid shaft, face mount flange with flange adapter, centering hub D20 to D36, 2 mm high (BEF-FA-020-036-002, 2072296)



X = Measuring point for operating temperature

Sample order for 6 mm shaft diameter: AHx36x-S3xx0xxxxx + BEF-FA-020-036-002 (adapter is not pre-assembled)

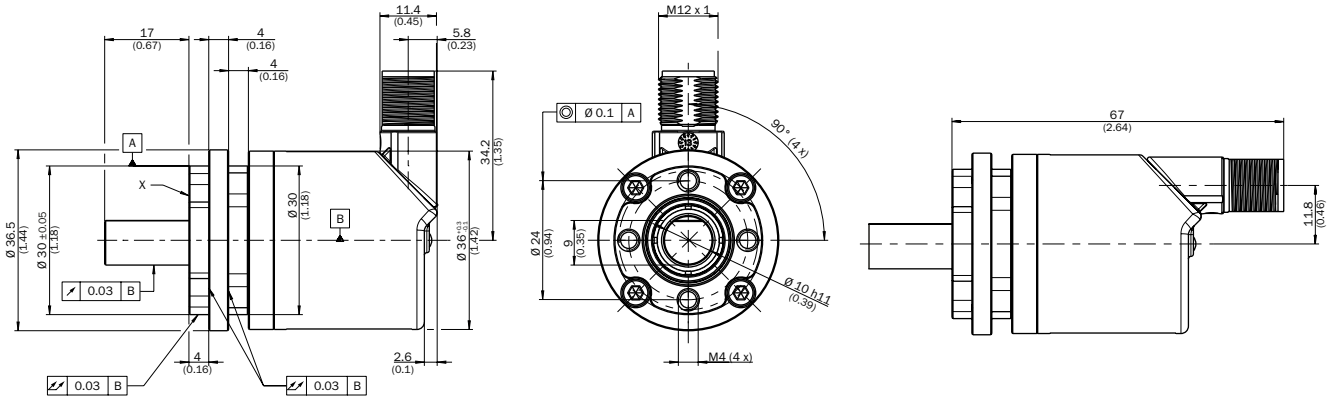
Solid shaft, face mount flange with flange adapter, centering hub D20 to D24 (BEF-FA-020-024, 2072294)



X = Measuring point for operating temperature

Sample order for 6 mm shaft diameter: AHx36x-S3xx0xxxxx + BEF-FA-020-024 (adapter is not pre-assembled)

Solid shaft, face mount flange with flange adapter, centering hub D20 to D30 (BEF-FA-020-030, 2072295)



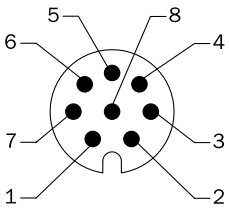
X = Measuring point for operating temperature

Sample order for 10 mm shaft diameter: AHx36x-SCxx0xxxxx + BEF-FA-020-030 (adapter is not pre-assembled)

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PIN assignment

View of M12 male device connector on encoder



PIN, 8-pin, M12 male connector	Wire colors, cable outlet	Signal	Explanation
1	Brown	Data-	Interface signals
2	White	Data+	Interface signals
3	Black	V/$\overline{R}$	Sequence for direction of rotation
4	Pink	SET	Electronic adjustment
5	Yellow	Clock+	Interface signals
6	Lilac	Clock–	Interface signals
7	Blue	GND	Ground connection
8	Red	+US	Operating voltage
Screen	Screen	Screen	Screen connected to housing on encoder side. Connected to ground on control side.

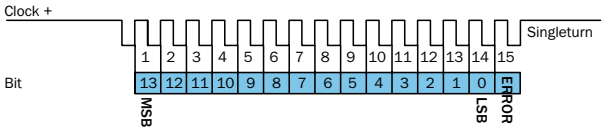
V/$\overline{R}$ Forwards / Reverse: This input programs the counting direction for the encoder. When it is not connected, this input is set to HIGH. If the encoder shaft is rotated clockwise (to the right) as viewed when facing the shaft, it counts in ascending order. If it should count in ascending order when the shaft is rotated counterclockwise (to the left), then this connection must be permanently set to LOW level (GND).

SET This input is for electronic zeroing. If the SET cable is set to US for more than 250 ms, the mechanical position corresponds to the 0 value, i. e., the predetermined SET value.

G

Singleturn signal outputs

Singleturn SSI data format



Cycle 1–14: position bits
Cycle 15: errorbit

Non-programmable encoder

Non-programmable encoders always output the SSI position MSB-justified (left-justified).

- 14 bits + 1 errorbit are always output (irrespective of the type and resolution selected)
- For resolutions below 14 bits, non-assigned bits are filled with 0.

Programmable encoder

- Per default, programmable encoders output the SSI position MSB-justified (left-justified).
- The operating modes “binary” and “non-binary” can be selected to set the resolution.
- All formats (left and right-justified) can be covered by shifting the bits in the programming interface accordingly using the arrow keys.

Errorbit

ERROR: general error This bit is set as soon as an error occurs in the encoder. This bit remains set as long as the error is present. In non-programmable encoders, the errorbit is always output as the 15th bit. In programmable encoders, it can also be output as the 15th bit or can be transmitted directly after the position bits.

The evaluation of the errorbit must be implemented in the control unit.

The errorbit output need not be used by the control unit.
If the errorbits cannot be evaluated in the control unit, the control unit must be set to the encoder resolution.
The errorbits must then be masked out at the control.

SSI mode:

Non-programmable encoders work in asynchronous SSI mode.
In programmable encoders, the programming interface enables users to choose between asynchronous and synchronous SSI mode. Asynchronous SSI mode is selected as the default setting.

Asynchronous SSI mode:

The position is always formed and made available every 125 µs. The time for calculating the position is not related to the master clock. In asynchronous SSI mode, the break between two clock bursts must remain constant with a maximum deviation of ± 20% and must not exceed 600 ms.

Synchronous SSI mode:

The position is formed in sync with the master clock output, i.e., the time of the position values is related to the time of the master clock.
The position formation process begins 20 µs following the end of a clock burst. The position is then made available after 125 µs. The next position is formed a further 20 µs after the end of the subsequent clock burst. The break between two clock bursts must be at least 150 µs.

Programming interface and legend

-> Position Bits:
These bits contain the position within the transmission frame. Depending on the setting the position format is either gray or binary.

-> Error Bit:
In case the device enters the error state this bit is set high.

-> Zero Bit:
Zeros are transmitted in order to fill up the transmission frame.

Operating mode: binary



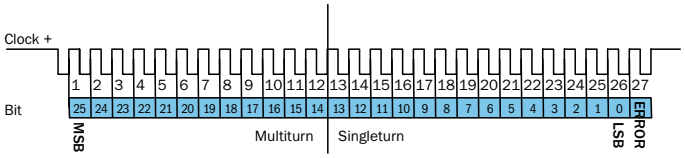
Operating mode: non binary



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Multiturn signal outputs

Multiturn SSI data format



Cycle 1-12: multiturn position bits
Cycle 13-26: singleturn position bits
Cycle 27: errorbit

Non-programmable encoder

Non-programmable encoders always output the SSI position MSB-justified (left-justified).

- For non-programmable multiturn encoders, the number of revolutions is set to a fixed 4,096 (12 bits).
- 26 bits + 1 errorbit are always output (irrespective of the type and resolution selected).

For resolutions below 26 bits, non-assigned bits are filled with 0.

Programmable encoder

- Per default, programmable encoders output the SSI position MSB-justified (left-justified).
- The operating modes “binary”, “non-binary” and “round axis functionality” can be selected to set the resolution.
- All formats (left and right-justified, 25 bit mode and fir-tree format) can be covered by shifting the bits in the programming interface accordingly using the arrow keys.

Errorbit

ERROR: general error This bit is set as soon as an error occurs in the encoder. This bit remains set as long as the error is present. In non-programmable encoders, the errorbit is always output as the 27th bit. In programmable encoders, it can also be output as the 27th bit or can be transmitted directly after the position bits.

The evaluation of the errorbit must be implemented in the control unit.

The errorbit output need not be used by the control unit.
If the errorbits cannot be evaluated in the control unit, the control unit must be set to the encoder resolution.
The errorbits must then be masked out at the control.

SSI mode:

Non-programmable encoders work in asynchronous SSI mode.
In programmable encoders, the programming interface enables users to choose between asynchronous and synchronous SSI mode. Asynchronous SSI mode is selected as the default setting.

Asynchronous SSI mode:

The position is always formed and made available every 125 µs. The time for calculating the position is not related to the master clock. In asynchronous SSI mode, the break between two clock bursts must remain constant with a maximum deviation of ± 20% and must not exceed 600 ms.

Synchronous SSI mode:

The position is formed in sync with the master clock output, i.e., the time of the position values is related to the time of the master clock.
The position formation process begins 20 µs following the end of a clock burst. The position is then made available after 125 µs. The next position is formed a further 20 µs after the end of the subsequent clock burst. The break between two clock bursts must be at least 150 µs.

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Round axis functionality

The programmable multi-turn encoder supports the gear functions for rotary axes (endless shaft). Here, the number of revolutions is set a break; a total number of steps is also set. The total number of steps is distributed over the set number of revolutions, e. g. 100 steps to 12.5 revolutions (see example for the programming interface on the next page).
The round axis functionality can be used to implement a number for the overall resolution that is not a 2n multiple of the number of steps per revolution. It is also possible to set a non-integer number both for the number of revolutions and for the number of steps per revolution.

Programming interface and legend

-> Multi Bits:
These bits contain the number of revolutions. In particular, this is important for the binary mode, because the multi part is separated from the single part within the transmission frame.

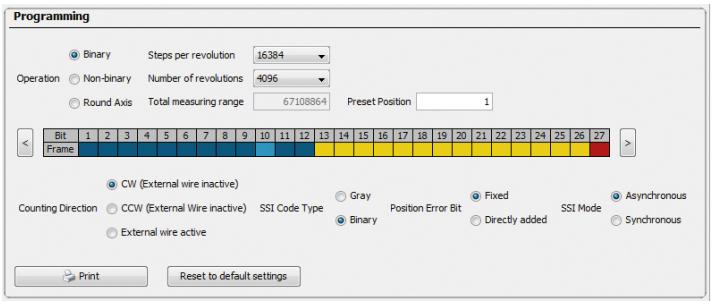
-> Single Bits:
In binary mode the transmission frame contains a multi- and single part. The multi part shows the number of turns and the single part the position within one revolution.

-> Error Bit:
This bit is set high in case the device enters an error state.

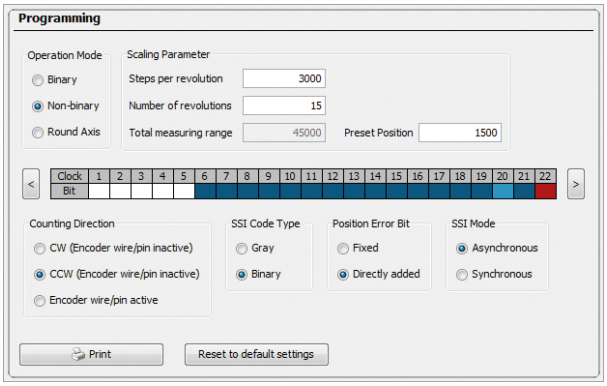
-> Zero Bit:
Zeros are transmitted in order to fill up the transmission frame.

-> Position Bits:
These bits contain the position within the transmission frame. Depending on the setting the position format is either gray or binary.

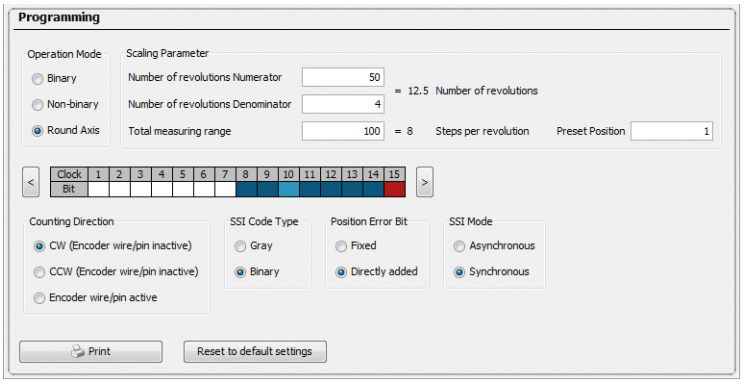
Operating mode: binary



Operating mode: non binary



Operating mode: rotary axis



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Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 20 mm, including mounting kit for face mount flange	BEF-WF-20	2066393

Dimensional drawings ➜ page K-725

Flanges

Figure	Brief description	Type	Part no.
	Stator coupling on hole circle 63 mm	BEF-DS08	2072206
	Flange adapter centering hub D20 to D24	BEF-FA-020-024	2072294
	Flange adapter centering hub D20 to D30	BEF-FA-020-030	2072295
	Flange adapter centering hub D20 to D36	BEF-FA-020-036	2072298
	Flange adapter centering hub D20 to D36, 2 mm high	BEF-FA-020-036-002	2072296
	Flange adapter centering hub D20 to D50	BEF-FA-020-050	2072297

Dimensional drawings ➜ page K-725

Other mounting accessories

Measuring wheels and measuring wheel systems

Figure	Brief description	Type	Part no.
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	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

Dimensional drawings ➜ page K-725

Servo clamps

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

Dimensional drawings ➜ page K-725

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 ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
	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 °C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	Bellows coupling, shaft diameter 10 mm/10 mm; maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular ± 4°; max. revolutions 10,000 rpm, –30 °C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	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. revolutions 10,000 rpm, –30 °C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	KUP-1012-B	5312984
	Double-loop coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0610-D	5326697
	Double-loop coupling, shaft diameter 8 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial +/-± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0810-D	5326704
	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 °C ... +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 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-1012-D	5326702
	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 °C ... +80 °C, max. torque 60 Ncm; material: aluminum flange, fiber-glass reinforced polyamide membrane and tempered steel coupling pin	KUP-0610-F	5312985
	Spring washer coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.4 mm, angular ± 2.5°; max. speed 12,000 rpm, –10 °C ... +80 °C, max. torque 60 Ncm; material: aluminum flange, glass fiber-reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986

Dimensional drawings ➜ page K-725

Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm², 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

Dimensional drawings ➜ page K-725

Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 8-pin, straight, A encoded, shielded, for cable diameter 4 mm ... 8 mm Head B: - Operating temperature: –40 °C ... +85 °C	DOS-1208-GA01	6045001

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Dimensional drawings ➜ page K-725

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

Dimensional drawings ➜ page K-725

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	By the meter	LTG-2308-MWENC	6027529
	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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm		LTG-2612-MW	6028516

Dimensional drawings ➜ page K-725

Connection cables with female and male connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: male connector, D-Sub, 9-pin, straight Cable: PUR, halogen-free, shielded, 4 x 2 x 0.15 mm²	0.5 m	DSL-2D08-G0M5AC2	2048439

Dimensional drawings ➜ page K-725

Other accessories

Programming and configuration tools

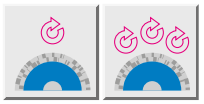
Figure	Brief description	Type	Part no.
	Programming unit USB, for programmable SICK encoders AFS60, AFM60, DFS60, VFS60, DFV60 and wire draw encoders with programmable encoder.	PGT-08-S	1036616
	Programming unit display for programmable SICK DFS60, DFV60, AFS/AFM60, AHS/AHM36 encoders, and wire draw encoders with DFS60, AFS/AFM60, and AHS/AHM36. Compact dimensions, low weight, and intuitive operation.	PGT-10-Pro	1072254

Dimensional drawings ➜ page K-725

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

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FLEXIBLE, SMART, COMPACT





[1] UL 508 compliant.

More information

Fields of application G-253
Detailed technical data. G-253
Type code. G-256
Ordering information. G-258
Dimensional drawings G-260
Proposed fitting. G-263
PIN assignment. G-264
Recommended accessories. G-265

Product description

The AHS/AHM36 CANopen absolute encoder product family provides increased flexibility and diagnostics due to its mechanical adaptation, electrical connectivity, and CANopen communication. With their rotating male connector or cable outlets as well as the various mounting hole patterns and adapter flanges, these encoders are suitable for nearly any application. Individual adjustments can be made to the singleturn/multiturn resolution, the counting direction, and other parameters when integrating the encoders into the CANopen network. The encoder also communicates diagnostic data such as temperature or operating time. Thanks to the large operating temperature range from –40 °C ... +85 °C and the protection class up to IP67, this encoder family can be used in harsh ambient conditions. The rugged, reliable, fully magnetic sensor system provides a maximum resolution of 14 bits for the singleturn variant and 26 bits for the multiturn variant.

At a glance

- Compact 36 mm absolute encoder with max. 26 bits (singleturn: 14 bits, multiturn: 12 bits)
- Face mount flange, servo flange, blind hollow shaft
- Rotating M12 male connector or rotating cable outlet
- CANopen interface with programmable configuration
- Diagnostic functions: temperature, operating time, etc. (depending on the type)
- Protection class up to IP67 (depending on the type)
- Operating temperature: –40 °C ... +85 °C (depending on the type)

Your benefits

- Simple, time-saving mechanical installation due to a rotating male connector or cable outlet, various mounting hole patterns, and many different shafts
- Simple network installation with various configuration options
- Intelligent diagnostic functions evaluate maintenance intervals for the entire system, thereby increasing system reliability
- Easy setup for various applications allowing binary, non-binary, and non-integer resolutions with the round axis functionality (advanced version)
- Reliable operation in harsh environments thanks to the rugged, reliable, fully magnetic sensor system
- Space-efficient and cost-effective design that is suitable for applications where space is tight
- High performance at a cost-efficient price

→ www.mysick.com/en/AHS_AHM36_CANopen

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Measures the absolute position in various industries, machines, and tools, including automated guided systems (AGS), industrial trucks, commercial vehicles, packaging machines, logistics applications, machine construction and medical technology

Detailed technical data

Performance

	Basic	Advanced
Max. number of steps per revolution	4,096 (12 bit)	16,384 (14 bit)
Max. number of revolutions		
Absolute singleturn	1	
Absolute multiturn	4,096 (12 bit)	
Resolution[1]		
Absolute singleturn	12 bit	14 bit
Absolute multiturn	12 bit x 12 bit	14 bit x 12 bit
Error limits	± 0.35° (at 20 °C)	
Repeatability	± 0.25° (at 20 °C)	± 0.2° (at 20 °C)
Measuring increment (360°/number of steps per revolution)	0.09°	0.022°
Initialization time	2 s [2]	

[1] Programmable options via control unit.

[2] Position can be read after this period.

Interfaces

	Basic	Advanced
Electrical interface	CANopen	
Bus interface	CANopen®	
Encoder profile	CANopen CiA DS-301, V4.02 CiA DSP-305 LSS Encoder Profile: - CiA DS-406, V3.2. - Class C2	
Address setting	0 ... 127, default: 5	
Data transmission rate (baud rate)	20 kbit/s ... 1,000 Mbit/s factory setting: 125 kbit/s	
PDO data	Position, speed, temperature	
Configuration data	Number of steps per revolution, number of revolutions, PRESET, counting direction, sampling rate for speed monitoring, unit for output of the speed value	Number of steps per revolution, number of revolutions, PRESET, counting direction, sampling rate for speed monitoring, unit for output of the speed value, round axis functionality (multiturn version only), electronic cams (2 channels x 8 cams)
Available diagnostic data	–	Current, minimum and maximum temperature, maximum speed, power-on counter, operating hours counter, power-on/motion, counter of direction changes/number of movements cw/number of movements ccw, minimum and maximum operating voltage
Status information	CANopen status via status LED	
Bus termination	Via external terminator [1]	

[1] See accessories.

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Electrical data

	Basic	Advanced
Connection type	M12 male connector, 5-pin, universal Cable, 5-wire, universal, 0.5 m Cable, 5-wire, universal, 1.5 m Cable, 5-wire, universal, 3 m Cable, 5-wire, universal, 5 m	
Max. power consumption (without load)	1.5 W	
Operating voltage range	10 V DC ... 30 V DC	
Reverse polarity protection	✔	
MTTFd: mean time to dangerous failure [1]	270 years (EN ISO 13849-1)	

[1] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of devices, average ambient temperature 40 °C, frequency of use 8,760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Mechanical data

	Basic	Advanced
Shaft diameter		
Solid shaft	6 mm, 1/4", 8 mm, 3/8", 10 mm	
Blind hollow shaft	6 mm, 1/4", 8 mm, 3/8", 10 mm	
Start up torque		
Solid shaft	0.5 Ncm (at 20 °C)	1 Ncm (at +20 °C)
Blind hollow shaft	0.5 Ncm (at 20 °C)	1 Ncm (at +20 °C)
Operating torque		
Solid shaft	< 0.5 Ncm (at 20 °C)	< 1 Ncm (at 20 °C)
Blind hollow shaft	< 0.5 Ncm (at 20 °C)	< 1 Ncm (at 20 °C)
Permissible shaft loading		
Solid shaft	40 N (radial) 20 N (axial)	
Permissible shaft load, static dynamic		
Blind hollow shaft	± 0.3 mm/± 0.1 mm radial ± 0.3 mm/ ± 0.1 mm axial	
Max. operating speed		
Singleturn	9,000 rpm [1]	6,000 rpm [2, 3]
Multiturn	6,000 rpm [1]	6,000 rpm [2, 3]
Bearing lifetime		
Solid shaft	3.6 x 10^8 revolutions	
Blind hollow shaft	2.0 x 10^9 revolutions	
Shaft material	Stainless steel	
Flange material	Aluminum	
Housing material	Zinc	

[1] Take into account self-heating of 3.5 K per 1,000 revolutions/min when designing the operating temperature range.

[2] Take into account self-heating of 5.5 K per 1,000 revolutions/min when designing the operating temperature range.

[3] For Advanced type encoders, the shaft seal must be inspected regularly.

	Basic	Advanced
Cable material	PUR	
Mass		
Solid shaft	0.12 kg (related to devices with connector outlet)	
Blind hollow shaft	0.12 kg (related to devices with connector outlet)	
Rotor moment of inertia		
Solid shaft	2.5 gcm²	
Blind hollow shaft	15 gcm²	
Max. angular acceleration	≤ 500,000 rad/s²	

[1] Take into account self-heating of 3.5 K per 1,000 revolutions/min when designing the operating temperature range.

[2] Take into account self-heating of 5.5 K per 1,000 revolutions/min when designing the operating temperature range.

[3] For Advanced type encoders, the shaft seal must be inspected regularly.

Ambient data

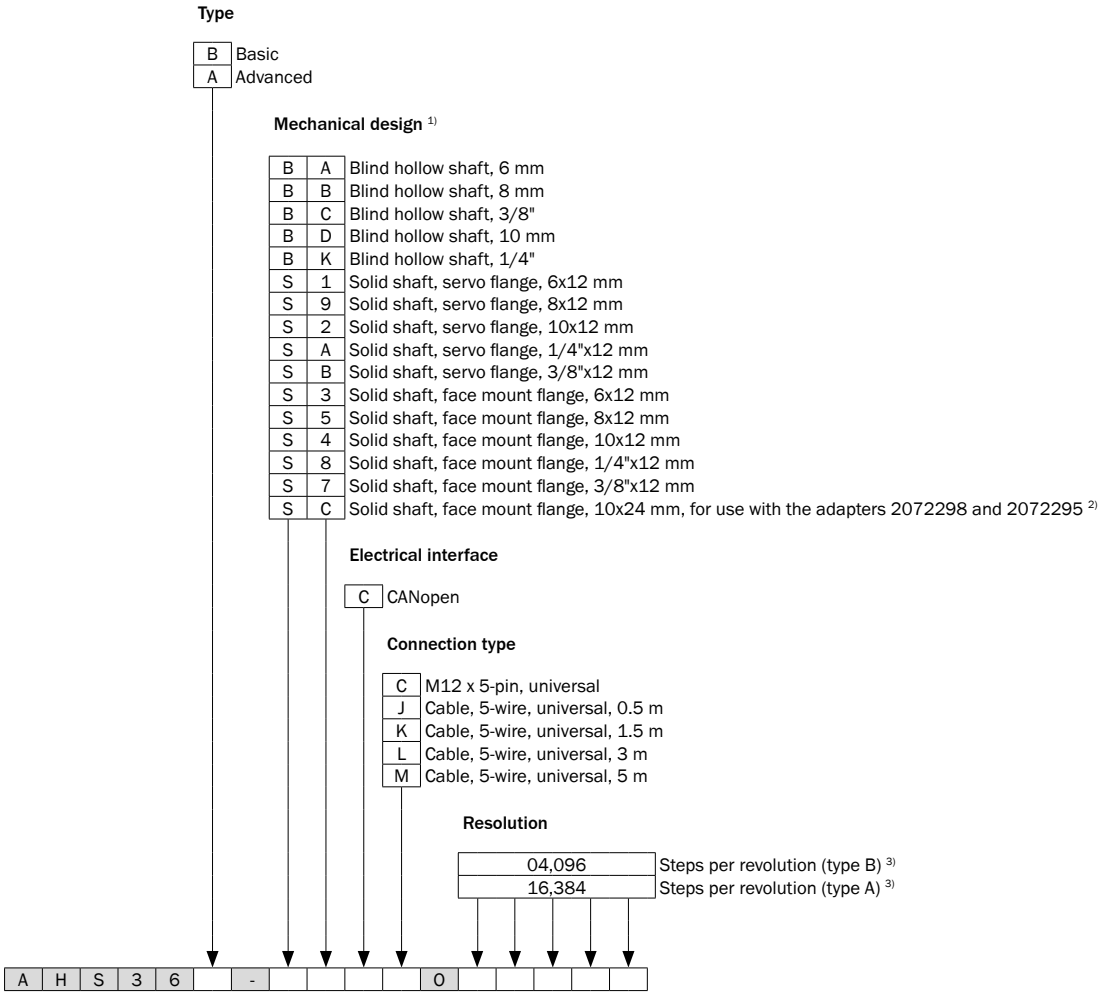
	Basic	Advanced
EMC	According to EN 61000-6-2 and EN 61000-6-3	
Enclosure rating	IP 65 on housing side (acc. to IEC 60529) [1] IP 65 on shaft side (acc. to IEC 60529)	IP 66 + IP 67, on housing side (according to IEC 60529) [1] IP 66 + IP 67, on shaft side (according to IEC 60529) [2]
Permissible relative humidity	90% (condensation not permitted)	
Operating temperature range	–20 °C ... +70 °C	–40 °C ... +85 °C
Storage temperature range	–40 °C ... +100 °C, without packaging	
Resistance to shocks	100 g, 6 ms (according to EN 60068-2-27)	
Resistance to vibrations	20 g, 10 Hz ... 2,000 Hz (according to EN 60068-2-6)	

[1] In an assembled male connector.

[2] For Advanced type encoders, the shaft seal must be inspected regularly.

Type code

Singleturn



1) Flange adapters can be used for additional mechanical interfaces, see Mounting suggestions.

2) Permissible shaft load lower than figure list in technical data.

3) Number of steps programmable via control unit.

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Multiturn

Type

B	Basic
A	Advanced

Mechanical design [1]

B	A	Blind hollow shaft, 6 mm
B	B	Blind hollow shaft, 8 mm
B	C	Blind hollow shaft, 3/8"
B	D	Blind hollow shaft, 10 mm
B	K	Blind hollow shaft, 1/4"
S	1	Solid shaft, servo flange, 6x12 mm
S	9	Solid shaft, servo flange, 8x12 mm
S	2	Solid shaft, servo flange, 10x12 mm
S	A	Solid shaft, servo flange, 1/4"x12 mm
S	B	Solid shaft, servo flange, 3/8"x12 mm
S	3	Solid shaft, face mount flange, 6x12 mm
S	5	Solid shaft, face mount flange, 8x12 mm
S	4	Solid shaft, face mount flange, 10x12 mm
S	8	Solid shaft, face mount flange, 1/4"x12 mm
S	7	Solid shaft, face mount flange, 3/8"x12 mm
S	C	Solid shaft, face mount flange, 10x24 mm, for use with the adapters 2072298 and 2072295 [2]
S	D	Solid shaft, servo flange, 6x12 mm for adapting to 1.25 m Ecoline wire draw mechanism [3]

Electrical interface

C	CANopen

Connection type

C	M12 x 5-pin, universal
J	Cable, 5-wire, universal, 0.5 m
K	Cable, 5-wire, universal, 1.5 m
L	Cable, 5-wire, universal, 3 m
M	Cable, 5-wire, universal, 5 m

Resolution

12x12	bit (Type B)[4]
14x12	bit (Type A)[4]

A	H	M	3	6		-					O						

[1] Flange adapters can be used for additional mechanical interfaces, see Mounting suggestions.

[2] Permissible shaft load lower than figure list in technical data.

[3] Protection class on shaft side always IP 65.

[4] Programmable options for resolution via control unit.

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Ordering information

Absolute singleturn, solid shaft, servo flange

- **Electrical interface:** CANopen
- **Programmable:** ✔

Shaft diameter	Connection type	Number of steps	Resolution	Type	Part no.
6 x 12 mm	M12 male connector, 5-pin, universal	≤ 4,096	4,096 x 1	AHS36B-S1CC004096	1066005
		≤ 16,384	16,384 x 1	AHS36A-S1CC016384	1066002
	Cable, 5-wire, universal, 1.5 m	≤ 16,384	16,384 x 1	AHS36A-S1CK016384	1066001

Absolute multiturn, solid shaft, servo flange

- **Electrical interface:** CANopen
- **Programmable:** ✔

Shaft diameter	Connection type	Number of steps	Resolution	Type	Part no.
6 x 12 mm	M12 male connector, 5-pin, universal	≤ 4,096	4,096 x 4,096	AHM36B-S1CC012x12	1065992
		≤ 16,384	16,384 x 4,096	AHM36A-S1CC014x12	1065993
	Cable, 5-wire, universal, 1.5 m	≤ 16,384	16,384 x 4,096	AH-M36A-S1CK014x12	1065994

Absolute singleturn, solid shaft, face mount flange

- **Electrical interface:** CANopen
- **Programmable:** ✔
- **Number of steps:** ≤ 16,384
- **Resolution:** 16,384 x 1

Shaft diameter	Connection type	Type	Part no.
8 x 12 mm	M12 male connector, 5-pin, universal	AHS36A-S5CC016384	1067268

Absolute multiturn, solid shaft, face mount flange

- **Electrical interface:** CANopen
- **Programmable:** ✔
- **Number of steps:** ≤ 16,384
- **Resolution:** 16,384 x 4,096

Shaft diameter	Connection type	Type	Part no.
6 x 12 mm	M12 male connector, 5-pin, universal	AHM36A-S3CC014x12	1065999
	Cable, 5-wire, universal, 1.5 m	AHM36A-S3CK014x12	1066000

Absolute singleturn, blind hollow shaft

- **Electrical interface:** CANopen
- **Programmable:** ✔
- **Number of steps:** ≤ 16,384
- **Resolution:** 16,384 x 1

Shaft diameter	Connection type	Type	Part no.
6 mm	M12 male connector, 5-pin, universal	AHS36A-BACC016384	1066004
	Cable, 5-wire, universal, 1.5 m	AHS36A-BACK016384	1066003

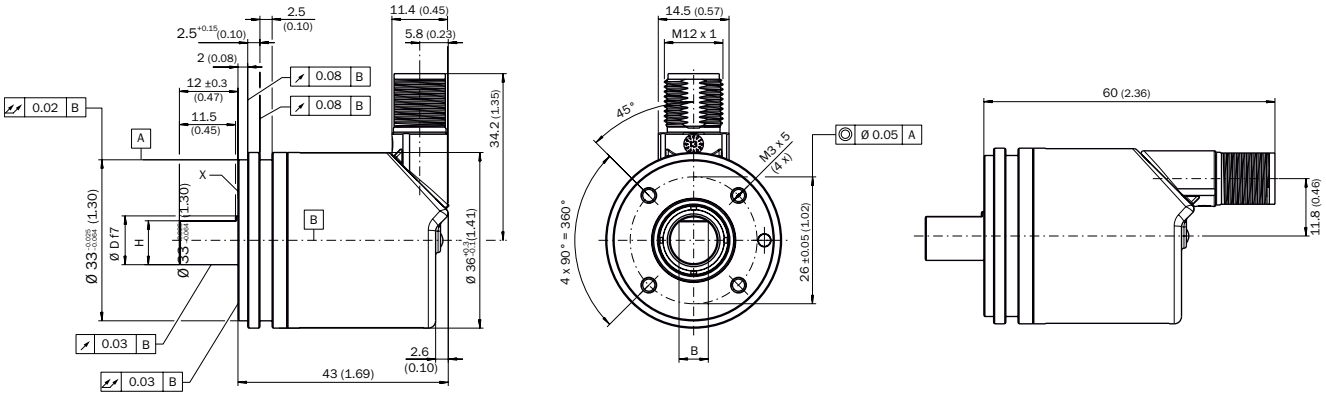
Absolute multiturn, blind hollow shaft

- **Electrical interface:** CANopen
- **Programmable:** ✔
- **Number of steps:** ≤ 16,384
- **Resolution:** 16,384 x 4,096

Shaft diameter	Connection type	Type	Part no.
6 mm	M12 male connector, 5-pin, universal	AHM36A-BACC014x12	1065990
	Cable, 5-wire, universal, 1.5 m	AHM36A-BACK014x12	1065991

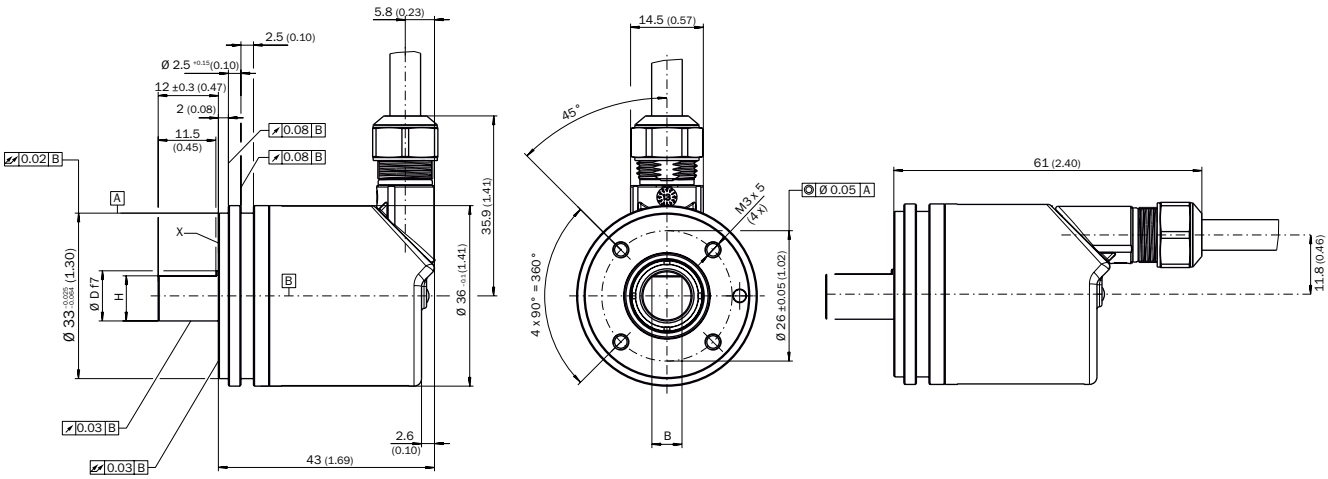
Dimensional drawings (dimensions in mm)

Solid shaft, servo flange, M12 male connector



X = Measuring point for operating temperature

Solid shaft, servo flange, cable output

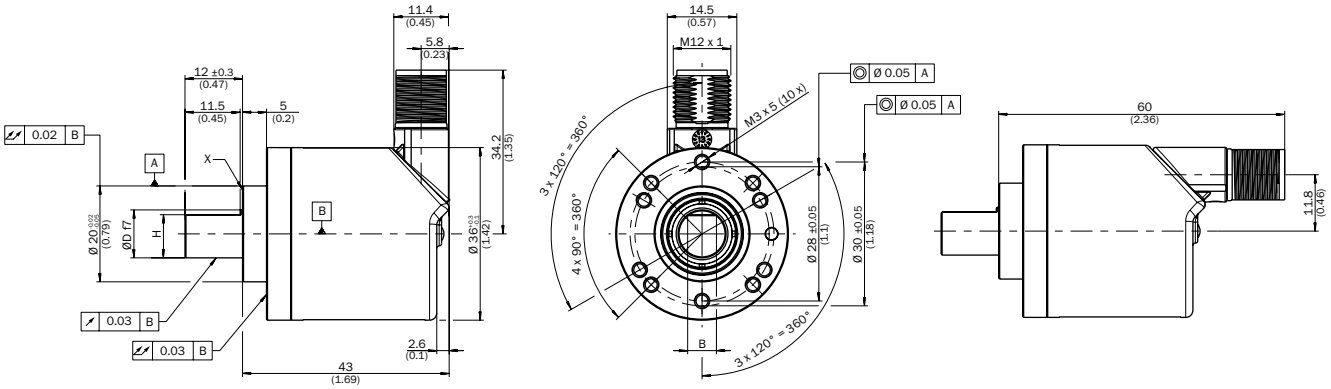


X = Measuring point for operating temperature

Bend radius of cable; R = 30 mm

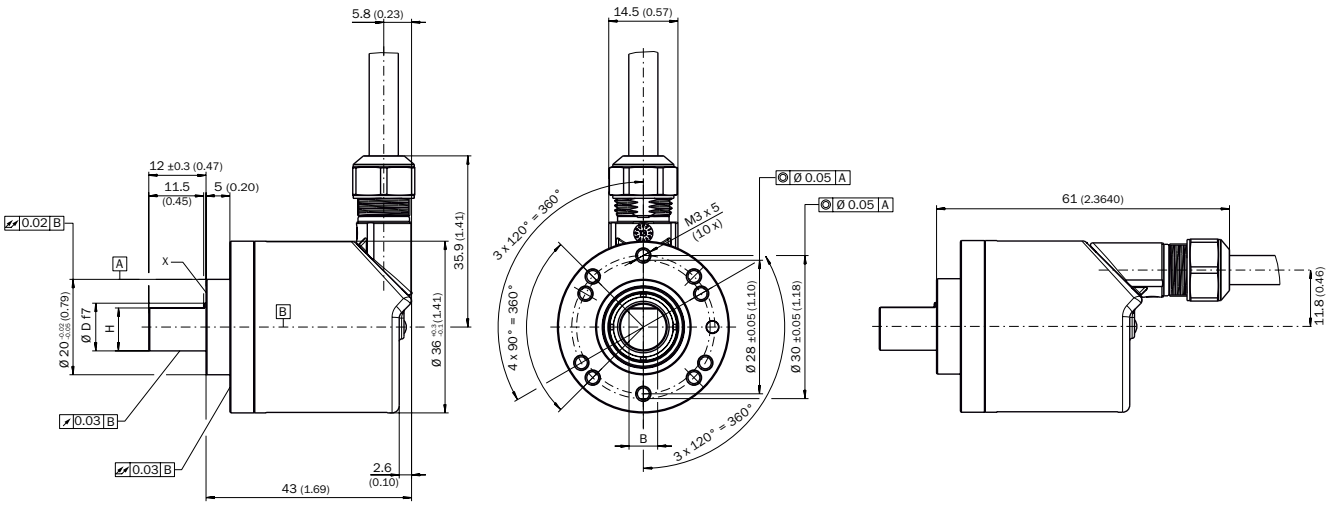
G

Solid shaft, face mount flange, M12 male connector



X = Measuring point for operating temperature

Solid shaft, face mount flange, cable output

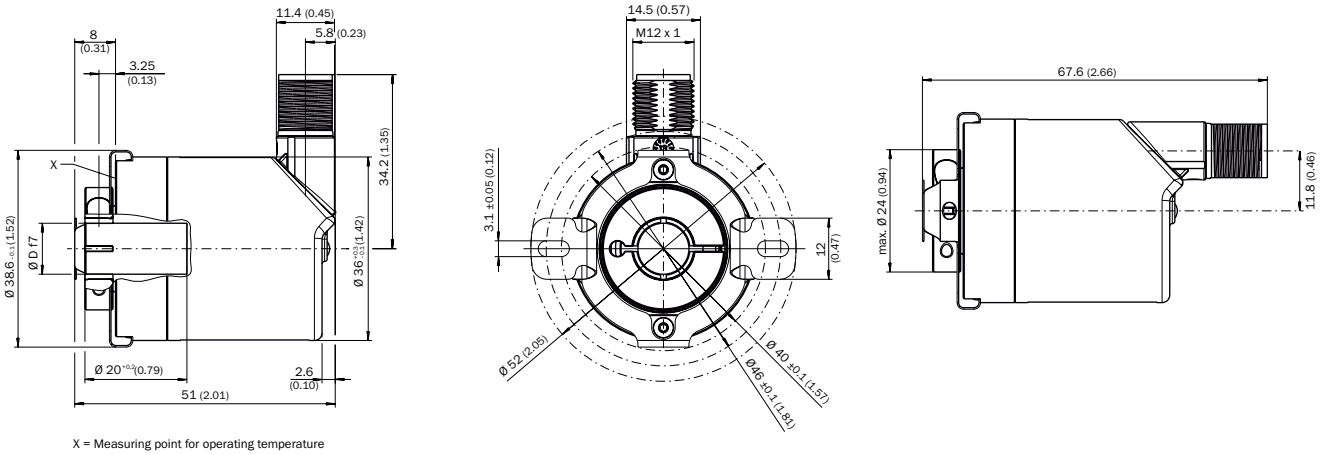


X = Measuring point for operating temperature

Bend radius of cable; R = 30 mm

G

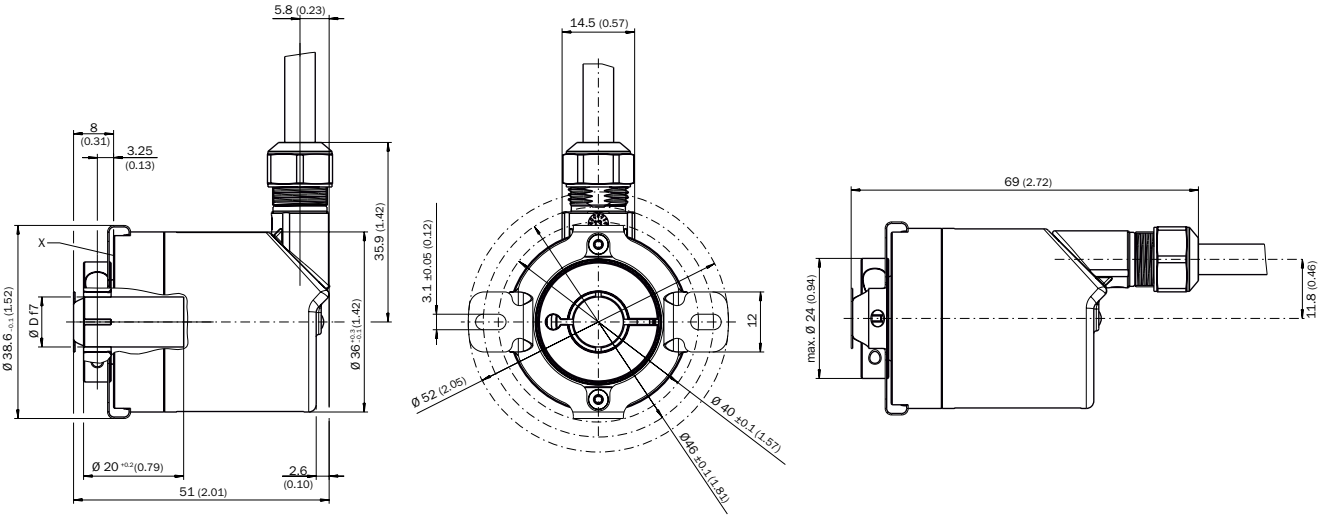
Blind hollow shaft, M12 male connector



X = Measuring point for operating temperature

Customer's own shaft: insertion depth of at least 15 mm to max. of 22 mm, from contact surface, from stator coupling, recommended shaft tolerance of k7

Blind hollow shaft, cable outlet



X = Measuring point for operating temperature

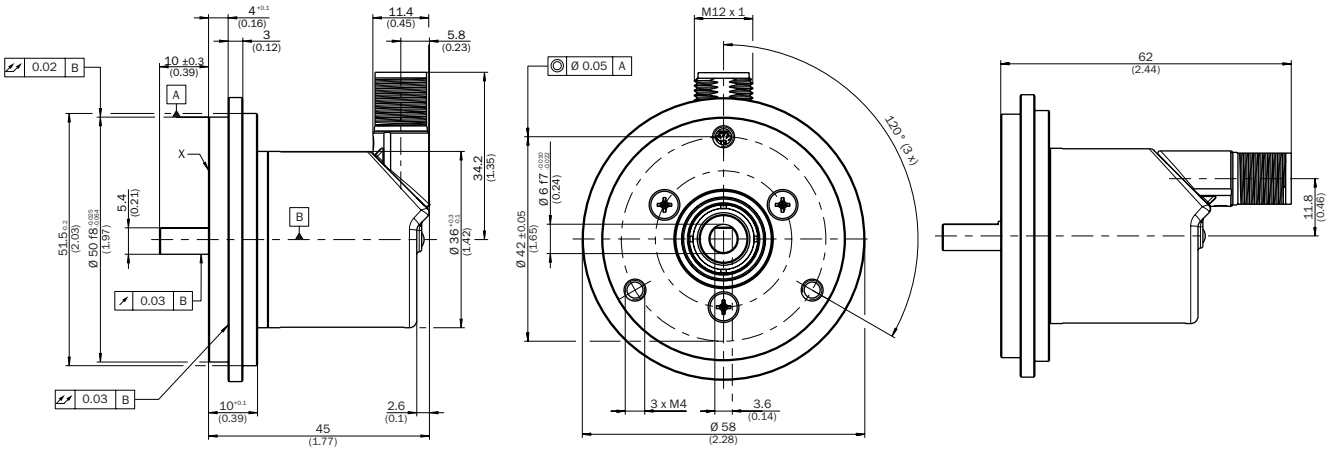
Bend radius of cable; R = 30 mm

Customer's own shaft: insertion depth of at least 15 mm to max. of 22 mm, from contact surface, from stator coupling, recommended shaft tolerance of k7

G

Proposed fitting

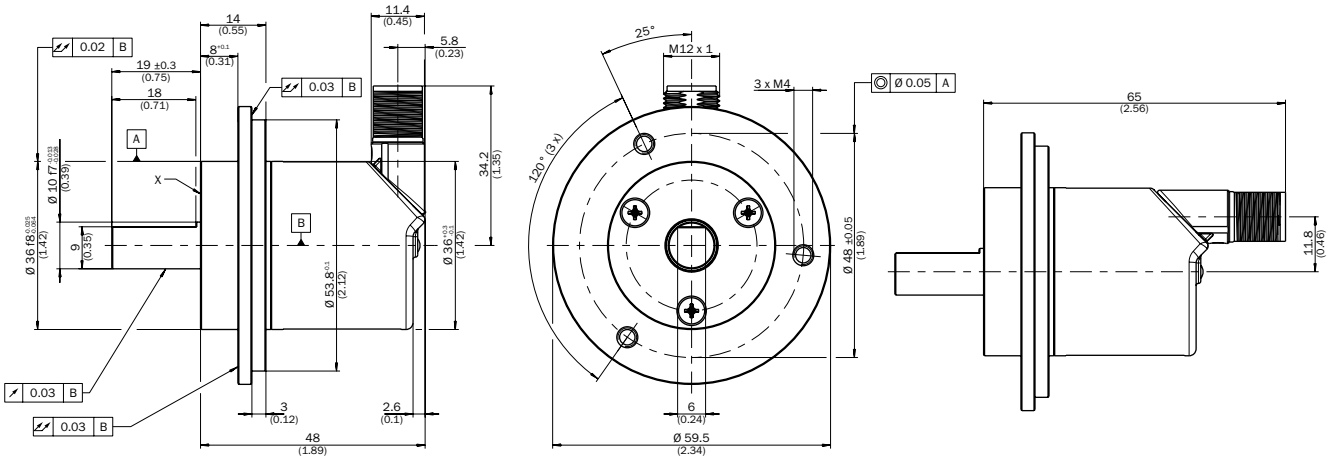
Solid shaft, face mount flange with flange adapter, centering hub D20 to D50 (BEF-FA-020-050, 2072297)



X = Measuring point for operating temperature

Sample order for 6 mm shaft diameter: AHx36x-S3xx0xxxxx + BEF-FA-020-050 (adapter is not pre-assembled)

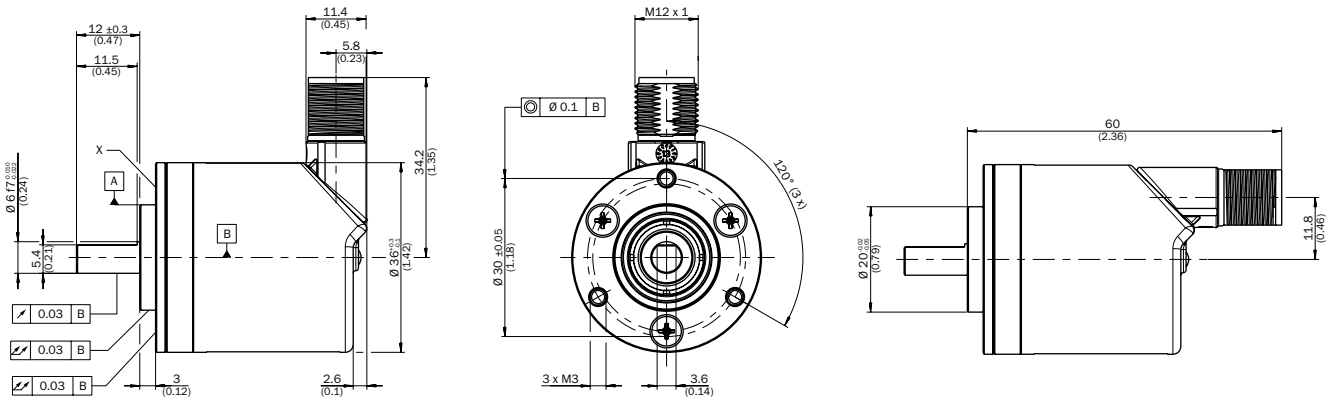
Solid shaft, face mount flange with flange adapter, centering hub D20 to D36 (BEF-FA-020-036, 2072298)



X = Measuring point for operating temperature

Sample order for 10 mm shaft diameter: AHx36x-SCxx0xxxxx + BEF-FA-020-036 (adapter is not pre-assembled)

Solid shaft, face mount flange with flange adapter, centering hub D20 to D36, 2 mm high (BEF-FA-020-036-002, 2072296)

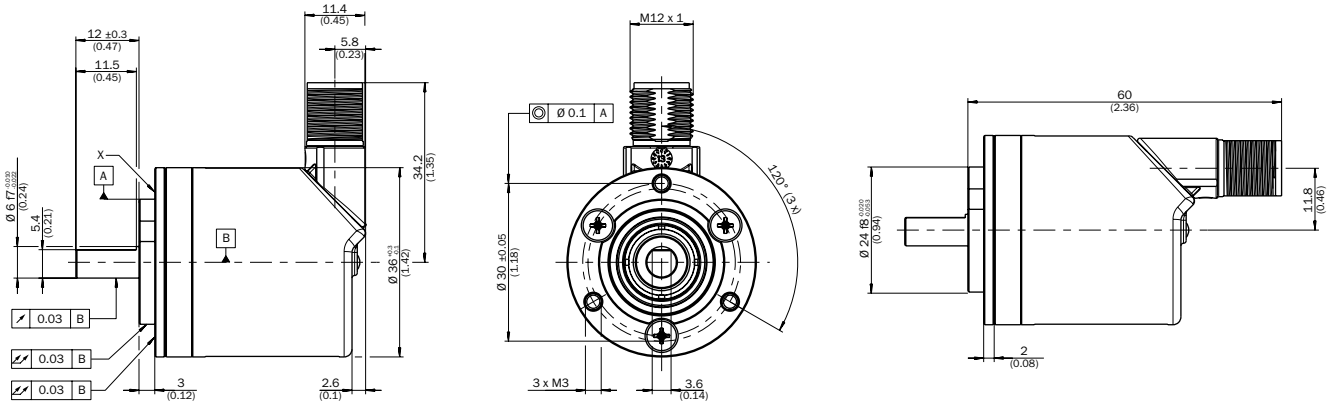


X = Measuring point for operating temperature

Sample order for 6 mm shaft diameter: AHx36x-S3xx0xxxxx + BEF-FA-020-036-002 (adapter is not pre-assembled)

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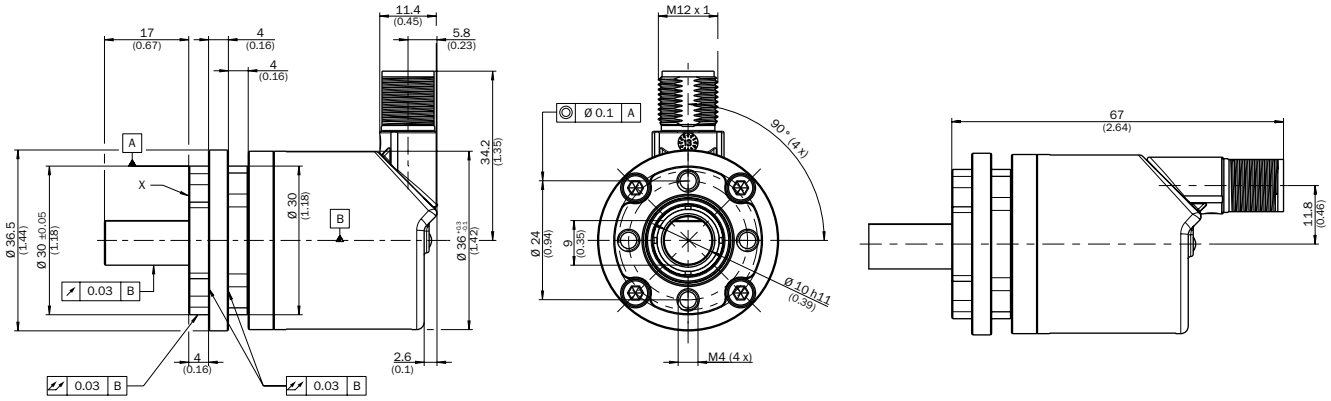
Solid shaft, face mount flange with flange adapter, centering hub D20 to D24 (BEF-FA-020-024, 2072294)



X = Measuring point for operating temperature

Sample order for 6 mm shaft diameter: AHx36x-S3xx0xxxxx + BEF-FA-020-024 (adapter is not pre-assembled)

Solid shaft, face mount flange with flange adapter, centering hub D20 to D30 (BEF-FA-020-030, 2072295)

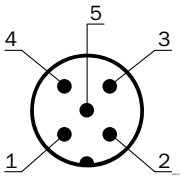


X = Measuring point for operating temperature

Sample order for 10 mm shaft diameter: AHx36x-SCxx0xxxxx + BEF-FA-020-030 (adapter is not pre-assembled)

PIN assignment

View of M12 male device connector on encoder



PIN	Signal	Wire color	Function
1	CAN shield	White	Screen
2	VDC	Red	Encoder supply voltage: 10 ... 30 V DC
3	GND / CAN GND	Blue	0 V (GND)
4	CAN high	Black	CAN signal
5	CAN low	Pink	CAN signal
Housing	-	-	Screen

Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 20 mm, including mounting kit for face mount flange	BEF-WF-20	2066393

Dimensional drawings ➜ page K-725

Flanges

Flange plate

Figure	Brief description	Type	Part no.
	Stator coupling on hole circle 63 mm	BEF-DS08	2072206
	Flange adapter centering hub D20 to D24	BEF-FA-020-024	2072294
	Flange adapter centering hub D20 to D30	BEF-FA-020-030	2072295
	Flange adapter centering hub D20 to D36	BEF-FA-020-036	2072298
	Flange adapter centering hub D20 to D36, 2 mm high	BEF-FA-020-036-002	2072296
	Flange adapter centering hub D20 to D50	BEF-FA-020-050	2072297

Dimensional drawings ➜ page K-725

Other mounting accessories

Measuring wheels and measuring wheel systems

Figure	Brief description	Type	Part no.
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	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

Dimensional drawings ➜ page K-725

Servo clamps

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

Dimensional drawings ➜ page K-725

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 ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
	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 °C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	Bellows coupling, shaft diameter 10 mm/10 mm; maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular ± 4°; max. revolutions 10,000 rpm, –30 °C .... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	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. revolutions 10,000 rpm, –30 °C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	KUP-1012-B	5312984
	Double-loop coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0610-D	5326697
	Double-loop coupling, shaft diameter 8 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0810-D	5326704
	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 °C ... +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 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-1012-D	5326702
	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 °C ... +80 °C, max. torque 60 Ncm; material: aluminum flange, fiber-glass reinforced polyamide membrane and tempered steel coupling pin	KUP-0610-F	5312985
	Spring washer coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.4 mm, angular ± 2.5°; max. speed 12,000 rpm, –10 °C ... +80° C, max. torque 60 Ncm; material: aluminum flange, glass fiber-reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986

Dimensional drawings ➜ page K-725

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8015560/2015-09-01

Subject to change without notice

Connectivity

Adapters and distributors

T-piece

Figure	Brief description	Type	Part no.
	CANopen, T-piece	DSC-1205T000025KM0	6030664

Dimensional drawings ➜ page K-725

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: suitable for drag chain, shielded, 2 x 0.34 mm² + 2 x 0.25 mm² + 1 x 0.34 mm², Ø 6.7 mm A-coded	2 m	DOL-1205-G02MY	6053041
		5 m	DOL-1205-G05MY	6053042
		10 m	DOL-1205-G10MY	6053043

Dimensional drawings ➜ page K-725

Connection cables with female and male connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 5-pin, straight Head B: male connector, M12, 5-pin, straight Cable: suitable for drag chain, PUR, halogen-free, shielded, 2 x 0.34 mm² + 2 x 0.25 mm² + 1 x 0.34 mm², Ø 6.7 mm, A-coded	2 m	DSL-1205-G02MY	6053044
		5 m	DSL-1205-G05MY	6053045
		10 m	DSL-1205-G10MY	6053046

Dimensional drawings ➜ page K-725

Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 5-pin, straight, shielded, for cable diameter 4.5 mm ... 7 mm Head B: -	DOS-1205-GA	6027534

Dimensional drawings ➜ page K-725

Male connector (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: male connector, M12, 5-pin, straight, A encoded, shielded, for cable diameter 4 mm ... 8 mm Head B: -	STE-1205-GA	6027533

Dimensional drawings ➜ page K-725

Other plug connectors and cables

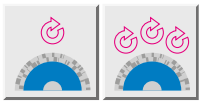
Figure	Brief description	Type	Part no.
	Head A: male connector, M12, 5-pin, straight, shielded Cable: terminator	STE-1205-GKEND	6037193

Dimensional drawings ➜ page K-725

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

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PRECISE, FLEXIBLE, VERSATILE





Product description

With a high resolution of 18 bits (AFS60) or 30 bits (AFM60) and a large selection of programmable parameters, the AFS60 absolute singleturn encoder and the AFM60 absolute multiturn encoder set new standards when it comes to rotary encoders. The high resolution combined with the high IP protection class enables use in a multitude of industrial applications. Both encoders are equipped with the SSI interface while the AFM60 is also available with the SSI + Incremental and SSI + Sin/Cos combined interfaces. A shaft bearing distance of 30 mm means the AFS60/AFM60 product family has significantly better rotation accuracy than encoders with blocked ball bearings. Yet despite their large bearing distance, the AFS60/AFM60 have a compact design. The AFS and AFM60 SSI can be programmed via the same PC-based programming tool (PGT-08-S) or the hand-held PGT-10-Pro programming tool.

At a glance

- High-resolution absolute encoder with up to 30 bits (AFM60) or 18 bits (AFS60)
- Face mount flange, servo flange, blind hollow shaft or through hollow shaft
- SSI, SSI + incremental or SSI + sin/cos interface
- Resolution, offset, etc. can be programmed (depending on the type)
- Connectivity: M12 or M23 male connector or cable outlet
- Enclosure rating: IP67 (housing), IP65 (shaft)
- Operating temperature: –40 °C ... +100 °C (depending on the type)

Your benefits

- The programmability of the encoder results in reduced storage, high machine availability, and easy installation
- Precise positioning thanks to high resolutions
- Large selection of mechanical interfaces and electrical contacting options: suitable for all applications
- Suitable for applications with limited space (extremely short installation depth of 30 mm)
- Excellent concentricity properties due to long bearing distance
- Suitable programming tools are available as accessories for every application

More information

Fields of application G-269
Detailed technical data. G-269
Viewing number of resolutions. . . G-273
Ordering information. G-274
Dimensional drawings G-292
PIN assignment. G-302
Signal outputs G-304
Interfaces. G-305
Recommended accessories G-306

→ www.mysick.com/en/AFS_AFM60_SSI

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.

8015560/2015-09-01

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Fields of application

- Measurement of absolute position using one or more revolutions in various machines and systems such as tool machines, packaging systems, wood processing machines, presses, printing machines

Detailed technical data

Performance

	Eco	Basic	Advanced
Max. number of steps per revolution (SSI interface)[1]	4,096	32,768	262,144
Max. number of revolutions			
Absolute singleturn	1		
Absolute multiturn	4,096		
Resolution			
Absolute singleturn	12 bit	15 bit	18 bit
Absolute multiturn	12 x 12 bit	15 x 12 bit	18 x 12 bit
Error limits	± 0.2°	± 0.05°	± 0.03°
Repeatability	0.002°		
Measurement increment deviation			
1 ... 399 (steps per revolution)	± 0.2°	± 0.08°	± 0.04°
400 ... 40,000 (steps per revolution)	± 0.2°	± 0.01°	± 0.008°
> 40,000 (steps per revolution)	–		± 0.002°
Measuring increment (360 °/ number of steps per revolution)	0.09°	0.01°	0.014°
Initialization time	50 ms [2]		
Position forming time	< 1 µs		

[1] See maximum viewing number of resolutions

[2] Position can be read after this period.

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Interfaces

	Eco	Basic	Advanced
Electrical interface	SSI		
Signal offset	2.5 V ± 10%		
Code type	Gray		
Configurable code sequence	CW/CCW		
Measurement increment			
360°/number of steps	0.09°	0.01°	0.0014°
Number of steps per revolution			
AFS60 and AFM60 [1]	4,096	32,768	262144
Number of revolutions (AFM60)	4,096		
Measurement increment deviation			
Number of steps per revolution			
1 ... 399	± 0.2°	± 0.08°	± 0.04°
400 ... 40,000	± 0.2°	± 0.01°	± 0.008°
> 40,000	–		± 0.002°
Clock+, Clock–, Data+, Data–			
SSI max. clock frequency 2 MHz, and min. LOW level (Clock+): 500 ns	1 MHz	2 MHz	2 MHz
SET (electronic adjustment)	H active (L = 0 – 3 V; H = 4 – U_S V)		
V/$\overline{R}$ (counting sequence when turning)	L active (L = 0 – 1.5 V; H = 2.0 – U_S V)		
Incremental interface TTL/HTL/programmable (AFM60 SSI + incremental)			
Number of lines per revolution	1/4 of number of SSI steps per revolution		
Measurement increment	90° electric/number of lines		
Measurement increment deviation			
Number of steps per revolution 1 ... 99	± 0.2°	± 0.08°	± 0.04°
Number of steps per revolution 100 ... 10,000	± 0.2°	± 0.01°	± 0.008°
Number of steps per revolution > 10,000	–		± 0.002°
Interface signals A, $\overline{A}$, B, $\overline{B}$	Digital, differential		
Max. output frequency	300 kHz	600 kHz	820 kHz
Load current	30 mA		
Incremental interface sine/cosine 4.5 V ... 5.5 V, sine 0.5 V_{SS} (AFM60 SSI + sin/cos)			
Number of lines per revolution	1,024		
Max. output frequency	200 kHz		
Load resistance	Min. 120 Ω		
Interface signals Sin+, Sin–, Cos+, Cos–	Analog, differential		
Signal before difference at 120 Ω load	0.5 V_{PP} ± 20%		
Signal offset before differential generation	2.5 V ± 10%		
Signal after difference at 120 Ω load	1 V_{SS} ± 20 %		

[1] See maximum viewing number of resolutions

Electrical data

	Eco	Basic	Advanced
Connection type	M23 male connector, 12-pin, radial M12 male connector, 8-pin, radial Cable, 8-wire, universal, 1.5 m [1] Cable, 8-wire, universal, 3 m [1] Cable, 8-wire, universal, 5 m [1] Cable, 8-wire, universal, 10 m [1] Cable, 12-wire, radial, 1.5 m [2] Cable, 12-wire, radial, 3 m [2] Cable, 12-wire, radial, 5 m [2]		
Power consumption	0.5 W (without load)		
Operating voltage range	4.5 V DC ... 32 V DC		
Min. load resistance	–		≥ 120 Ω
Maximum output frequency	–		≤ 200 kHz
Code type	Gray		
Code sequence	CW/CCW, configurable		
Reverse polarity protection	✔		
MTTFd: mean time to dangerous failure	250 years (EN ISO 13849-1) [3]		

[1] The universal cable outlet is positioned so that it is possible to lay it without bends in a radial or axial direction.

[2] No UL certificate.

[3] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of devices, average ambient temperature 40 °C, frequency of use 8,760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Mechanical data

	Eco	Basic	Advanced
Shaft diameter			
Face mount flange	10 mm x 19 mm		
Servo flange	6 mm x 10 mm		
Blind hollow shaft, through hollow shaft	8, 10, 12, 14, 15 mm and 3/8", 1/2", 5/8" [1]		
Shaft material	Stainless steel		
Flange material	Aluminum		
Housing material	Aluminum die-cast		
Mass [2]			
Face mount flange, servo flange	0.3 kg		
Blind hollow shaft, through hollow shaft	0.2 kg		
Start up torque at 20 °C			
Face mount flange, servo flange	0.5 Ncm		
Blind hollow shaft, through hollow shaft	0.8 Ncm		
Operating torque at 20 °C			
Face mount flange, servo flange	0.3 Ncm		
Blind hollow shaft, through hollow shaft	0.6 Ncm		
Permissible shaft movement, axial static/ dynamic			
Blind hollow shaft, through hollow shaft	± 0.5 mm, ± 0.2 mm		± 0.5 mm, ± 0.1 mm

[1] 5/8" not available for multiturn.

[2] Relates to devices with cable outlet.

[3] Take into account self-warming of 3.3 K per 1,000 rpm when designing operating temperature range

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	Eco	Basic	Advanced
Permissible shaft movement, radial static/ dynamic			
Blind hollow shaft, through hollow shaft	± 0.3 mm/ ± 0.1 mm		± 0.3 mm/ ± 0.05 mm
Permissible shaft loading			
Face mount flange, servo flange	80 N (radial) 40 N (axial)		
Maximum operating speed [3]			
Face mount flange, servo flange	9,000 rpm		
Blind hollow shaft	6,000 rpm		
Through hollow shaft	9,000 rpm		
Rotor moment of inertia			
Face mount flange, servo flange	6.2 gcm²		
Blind hollow shaft, through hollow shaft	40 gcm²		
Bearing lifetime	3.0 x 10^9 revolutions		
Max. angular acceleration	≤ 500,000 rad/s²		

[1] 5/8" not available for multiturn.

[2] Relates to devices with cable outlet.

[3] Take into account self-warming of 3.3 K per 1,000 rpm when designing operating temperature range

Ambient data

	Eco	Basic	Advanced
EMC	According to EN 61000-6-2 and EN 61000-6-3 [1]		
Enclosure rating			
On the shaft	IP 65		
On the housing, male connector outlet [2]	IP 67		
On the housing, cable outlet	IP 67		
Permissible relative humidity	90% (condensation of optical surfaces not permitted)		
Operating temperature range	0 °C ... +85 °C	–40 °C [3] ... +100 °C	
Storage temperature range	–40 °C ... +100 °C, without packaging		
Resistance to shocks (according to EN 60068-2-27)	50 g/ 6 ms	70 g/ 6 ms	60 g/ 6 ms
Resistance to vibration (according to EN 60068-2-6)	20 g/ 10 Hz ... 2,000 Hz	30 g/ 10 Hz ... 2,000 Hz	20 g/ 10 Hz ... 2,000 Hz

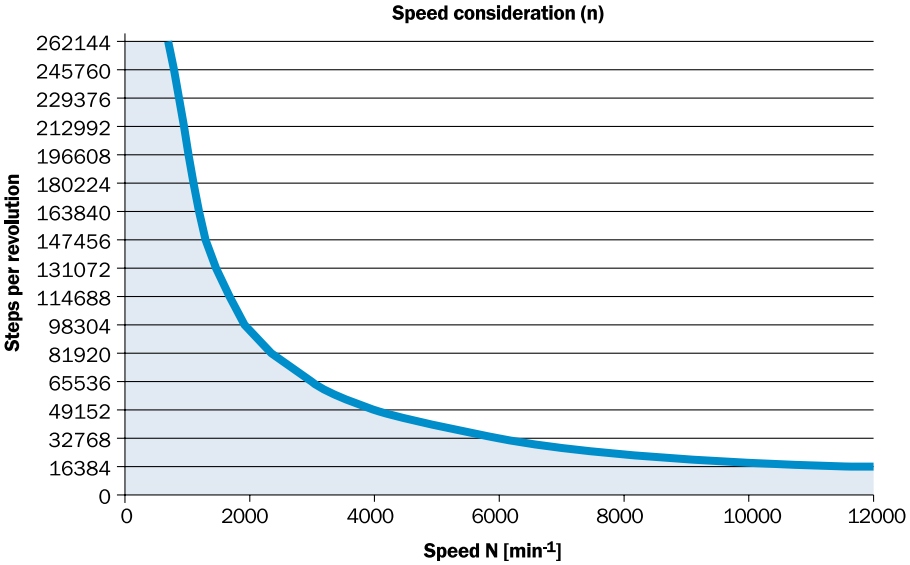
[1] The EMC according to the standards quoted is achieved if shielded cables are used.

[2] In an assembled male connector.

[3] When cables are fixed in place.

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Maximum viewing number of resolutions depends on the selected number of steps per revolution

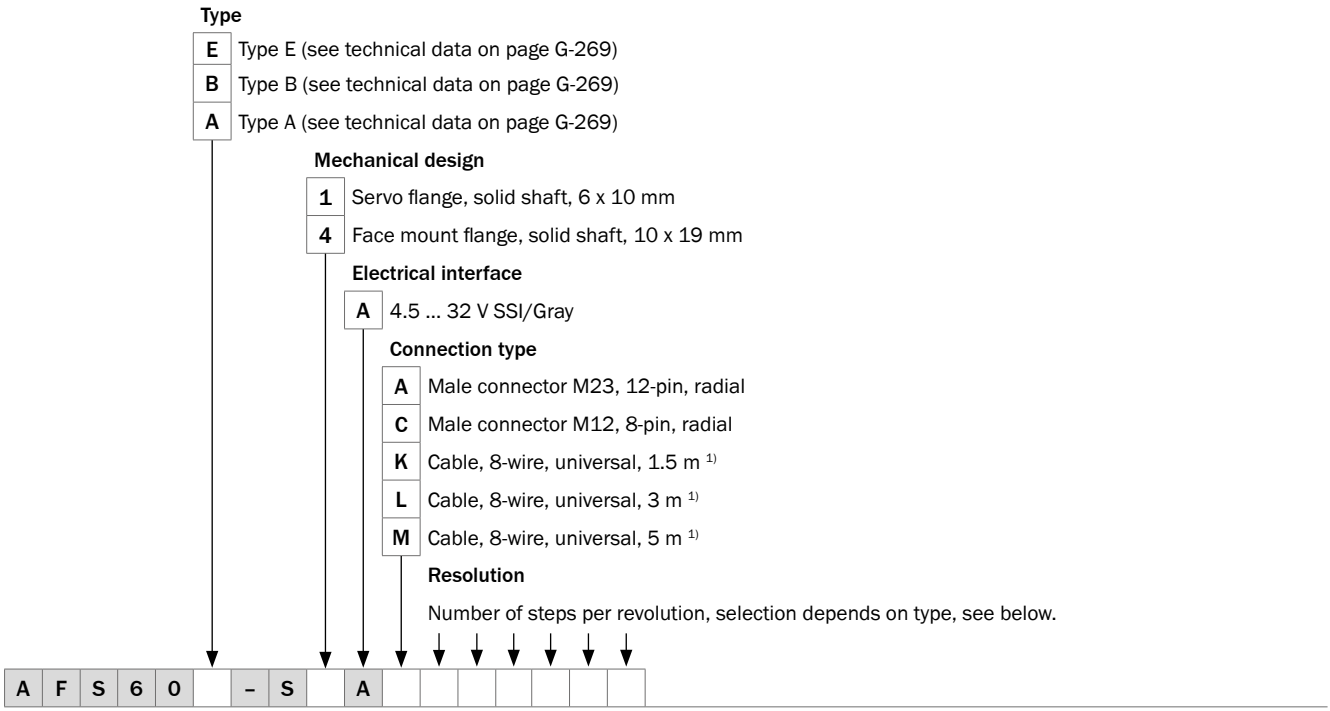


The maximum speed depends on the type of shaft.

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Ordering information

Type code AFS60 SSI absolute encoder, singleturn, solid shaft



1) The universal cable outlet is positioned so that it is possible to lay it without bends in a radial or axial direction.

Number of steps per revolution

- Type E 1)

000256	8 bit	**001024**	10 bit	**004096**	12 bit
000512	9 bit	**002048**	11 bit		

- Type B 1)

000256	8 bit	**002048**	11 bit	**016384**	14 bit
000512	9 bit	**004096**	12 bit	**032768**	15 bit
001024	10 bit	**008192**	13 bit		

1) Others available on request.

- Type A 1)

000256	8 bit	**002048**	11 bit	**016384**	14 bit	**131072**	17 bit
000512	9 bit	**004096**	12 bit	**032768**	15 bit	**262144**	18 bit
001024	10 bit	**008192**	13 bit	**065536**	16 bit		

1) Others available on request.

Example orders

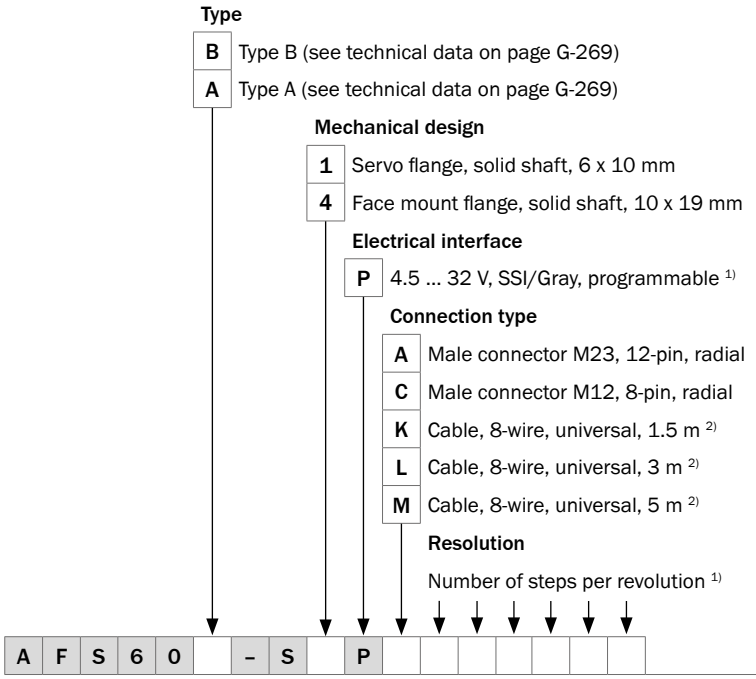
- Servo flange

Servo flange design	Type
Type E, M12 male connector, 8-pin , radial, number of steps per revolution 1,024 (10 bit)	AFS60E-S1AC001024

- Face mount flange

Face mount flange design	Type
Type E, M12 male connector, 8-pin , radial, number of steps per revolution 1,024 (10 bit)	AFS60E-S4AC001024

Type code AFS60 SSI absolute encoder, singleturn, solid shaft, **programmable**



1) Number of steps from 256 to 262144 can be programmed by the customer. Factory setting for Type B: 032768; Type A: 262144.

2) The universal cable outlet is positioned so that it is possible to lay it without bends in a radial or axial direction.

Example orders

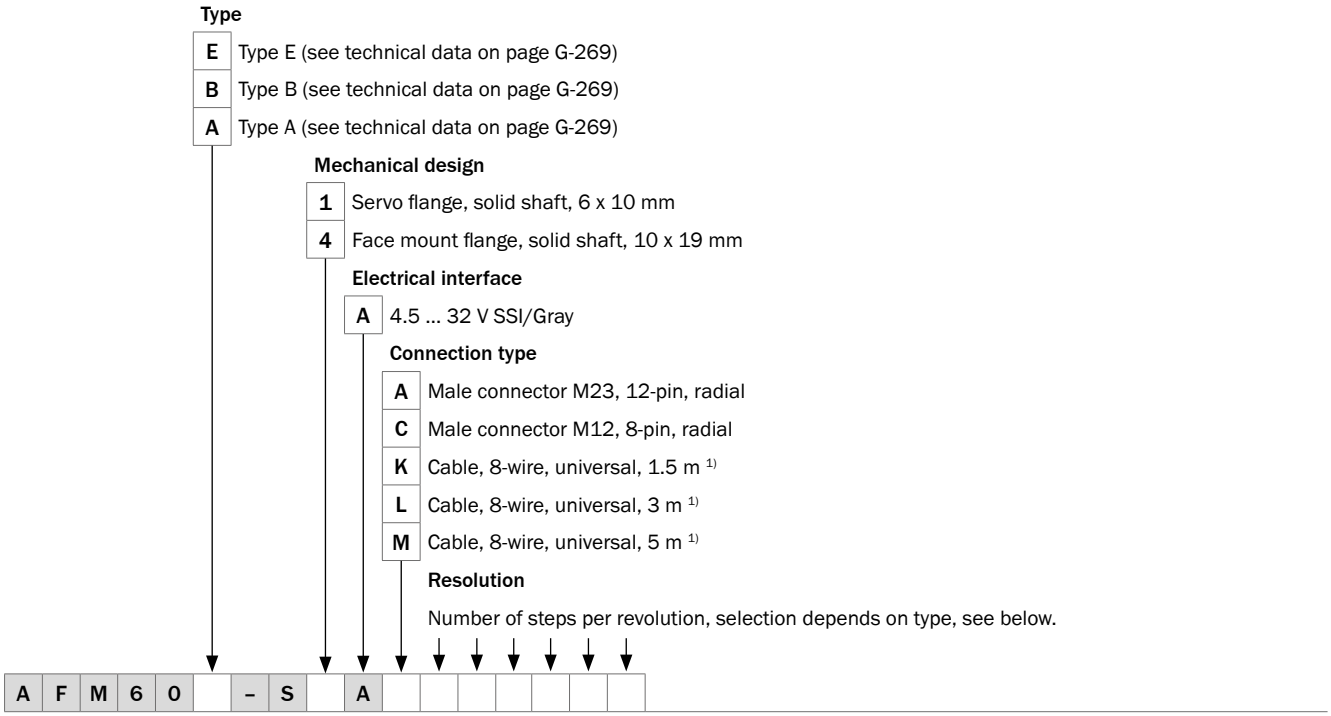
- Servo flange

	Servo flange design	Type	Part no.
Type B	M23 male connector, 12-pin, radial, number of steps per revolution 32,768	AFS60B-S1PA032768	1037493
	M12 male connector, 8-pin, radial, number of steps per revolution 32,768	AFS60B-S1PC032768	1037494
	Cable, 8-wire, universal, 1.5 m, number of steps per revolution 32,768	AFS60B-S1PK032768	1037495
	Cable, 8-wire, universal, 3 m, number of steps per revolution 32,768	AFS60B-S1PL032768	1037496
	Cable, 8-wire, universal, 5 m, number of steps per revolution 32,768	AFS60B-S1PM032768	1037497
Type A	M23 male connector, 12-pin , radial, number of steps per revolution 262144	AFS60A-S1PA262144	1037498
	M12 male connector, 8-pin, radial, number of steps per revolution 262144	AFS60A-S1PC262144	1037499
	Cable, 8-wire, universal, 1.5 m, number of steps per revolution 262144	AFS60A-S1PK262144	1037500
	Cable, 8-wire, universal, 3 m, number of steps per revolution 262144	AFS60A-S1PL262144	1037501
	Cable, 8-wire, universal, 5 m, number of steps per revolution 262144	AFS60A-S1PM262144	1037502

- Face mount flange

	Face mount flange design	Type	Part no.
Type B	M23 male connector, 12-pin, radial, number of steps per revolution 32,768	AFS60B-S4PA032768	1037483
	M12 male connector, 8-pin, radial, number of steps per revolution 32,768	AFS60B-S4PC032768	1037484
	Cable, 8-wire, universal, 1.5 m, number of steps per revolution 32,768	AFS60B-S4PK032768	1037485
	Cable, 8-wire, universal, 3 m, number of steps per revolution 32,768	AFS60B-S4PL032768	1037486
	Cable, 8-wire, universal, 5 m, number of steps per revolution 32,768	AFS60B-S4PM032768	1037487
Type A	M23 male connector, 12-pin , radial, number of steps per revolution 262144	AFS60A-S4PA262144	1037488
	M12 male connector, 8-pin, radial, number of steps per revolution 262144	AFS60A-S4PC262144	1037489
	Cable, 8-wire, universal, 1.5 m, number of steps per revolution 262144	AFS60A-S4PK262144	1037490
	Cable, 8-wire, universal, 3 m, number of steps per revolution 262144	AFS60A-S4PL262144	1037491
	Cable, 8-wire, universal, 5 m, number of steps per revolution 262144	AFS60A-S4PM262144	1037492

Type code AFM60 SSI/gray absolute encoder, multiturn, 4,096 revolutions, solid shaft



1) The universal cable outlet is positioned so that it is possible to lay it without bends in a radial or axial direction.

Number of steps per revolution x 4,096 (12 bit)

- Type E

000256	8 bit	**001024**	10 bit	**004096**	12 bit
000512	9 bit	**002048**	11 bit		

- Type B

000256	8 bit	**002048**	11 bit	**016384**	14 bit
000512	9 bit	**004096**	12 bit	**032768**	15 bit
001024	10 bit	**008192**	13 bit		

- Type A

000256	8 bit	**002048**	11 bit	**016384**	14 bit	**131072**	17 bit
000512	9 bit	**004096**	12 bit	**032768**	15 bit	**262144**	18 bit
001024	10 bit	**008192**	13 bit	**065536**	16 bit		

Example orders

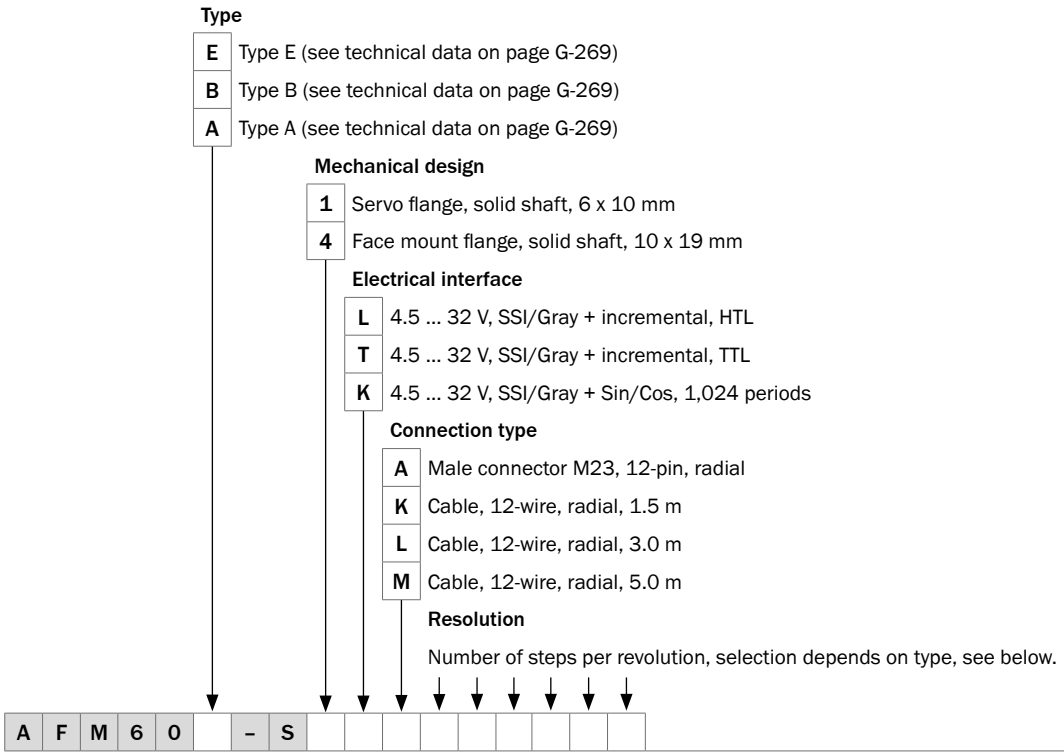
- Servo flange

Servo flange design	Type
Type E, cable, 8-wire, universal, 1.5 m, number of steps per revolution 4,096 (12 bits)	AFM60E-S1AK004096

- Face mount flange

Face mount flange design	Type
Type E, cable, 8-wire, universal, 1.5 m, number of steps per revolution 4,096 (12 bits)	AFM60E-S4AK004096

Type code AFM60 SSI/gray + incremental and SSI/gray + sin/cos, absolute encoder, multiturn, 4,096 revolutions, solid shaft



Number of steps per revolution x 4,096 (12 bit), number of incremental lines in brackets

- Type E

000256	8 bit (64)	**001024**	10 bit (256)	**004096**	12 bit (1024)
000512	9 bit (128)	**002048**	11 bit (512)		

- Type B

000256	8 bit (64)	**002048**	11 bit (512)	**016384**	14 bit (4096)
000512	9 bit (128)	**004096**	12 bit (1024)	**032768**	15 bit (8192)
001024	10 bit (256)	**008192**	13 bit (2048)		

- Type A

000256	8 bit (64)	**002048**	11 bit (512)	**016384**	14 bit (4096)	**131072**	17 bit (32768)
000512	9 bit (128)	**004096**	12 bit (1024)	**032768**	15 bit (8192)	**262144**	18 bit (65536)
001024	10 bit (256)	**008192**	13 bit (2048)	**065536**	16 bit (16384)		

Example orders

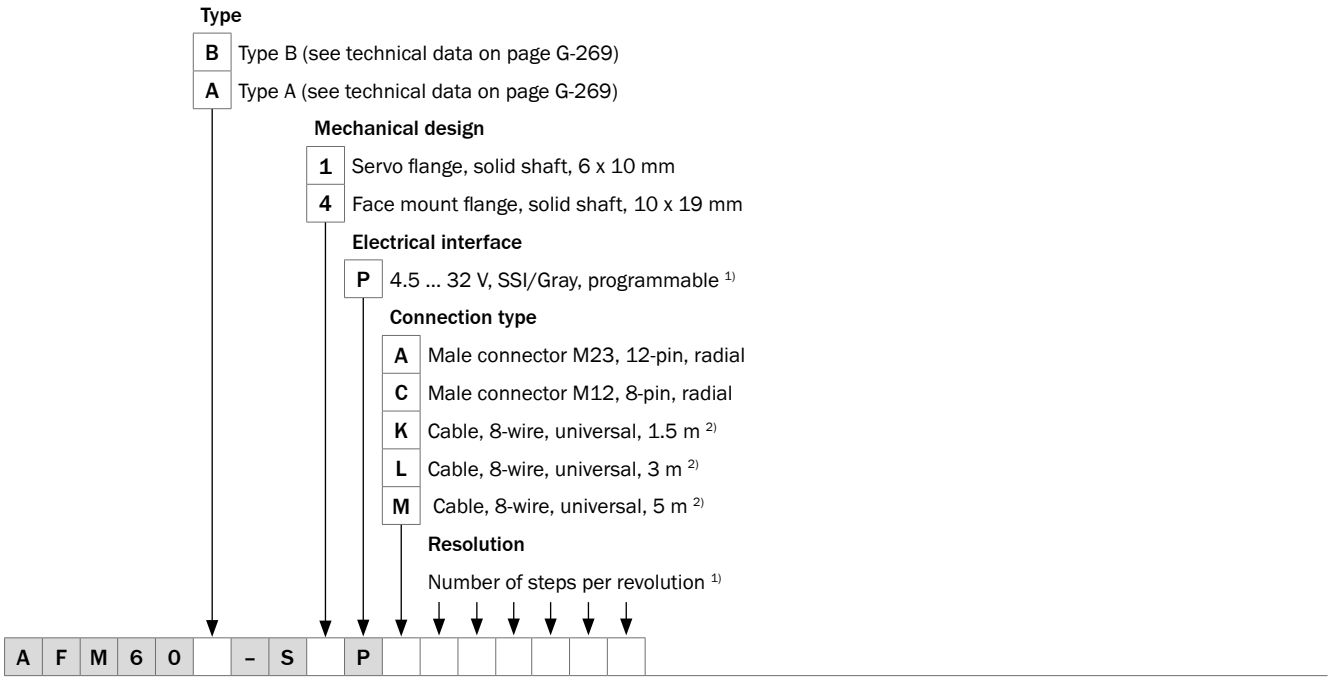
- Servo flange

Servo flange design	Type
Type E, 4.5 ... 32 V, SSI/gray + incremental, TTL, M23 male connector, 12-pin , radial, number of steps per revolution 2,048 (11 bit)	AFM60E-S1TA002048

- Face mount flange

Face mount flange design	Type
Type E, 4.5 ... 32 V, SSI/gray + incremental, TTL, M23 male connector, 12-pin , radial, number of steps per revolution 2,048 (11 bit)	AFM60E-S4TA002048

Type code AFM60 SSI/gray absolute encoder, multiturn, 4,096 revolutions, solid shaft, **programmable**



1) Number of steps from 256 (8 bit) to 262144 (18 bit) can be programmed by the customer. Factory setting for Type B: 032768; Type A: 262144.

2) The universal cable outlet is positioned so that it is possible to lay it without bends in a radial or axial direction.

Example orders

- Servo flange

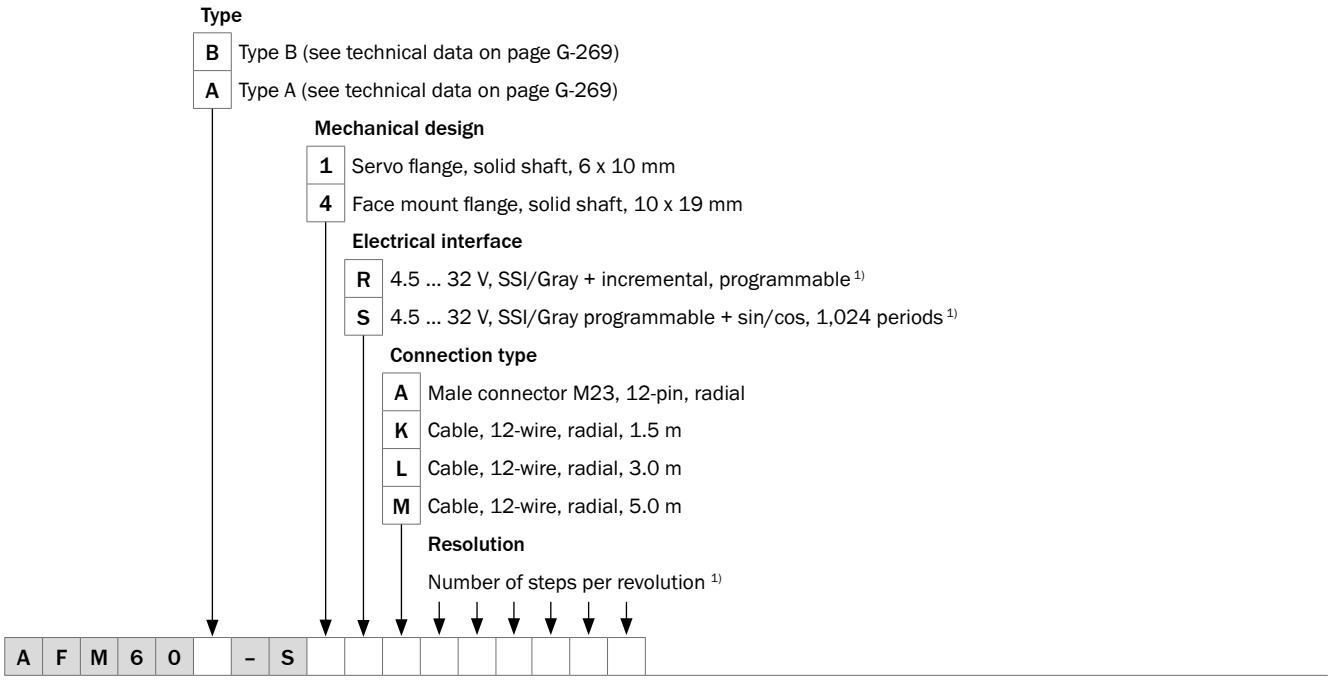
Servo flange design		Type	Part no.
Type B	M23 male connector, 12-pin, radial, number of steps per revolution 32,768	AFM60B-S1PA032768	1037513
	M12 male connector, 8-pin, radial, number of steps per revolution 32,768	AFM60B-S1PC032768	1037514
	Cable, 8-wire, universal, 1.5 m, number of steps per revolution 32,768	AFM60B-S1PK032768	1037515
	Cable, 8-wire, universal, 3 m, number of steps per revolution 32,768	AFM60B-S1PL032768	1037516
	Cable, 8-wire, universal, 5 m, number of steps per revolution 32,768	AFM60B-S1PM032768	1037517
Type A	M23 male connector, 12-pin , radial, number of steps per revolution 262144	AFM60A-S1PA262144	1037518
	M12 male connector, 8-pin, radial, number of steps per revolution 262144	AFM60A-S1PC262144	1037519
	Cable, 8-wire, universal, 1.5 m, number of steps per revolution 262144	AFM60A-S1PK262144	1037520
	Cable, 8-wire, universal, 3 m, number of steps per revolution 262144	AFM60A-S1PL262144	1037521
	Cable, 8-wire, universal, 5 m, number of steps per revolution 262144	AFM60A-S1PM262144	1037522

- Face mount flange

Face mount flange design		Type	Part no.
Type B	M23 male connector, 12-pin, radial, number of steps per revolution 32,768	AFM60B-S4PA032768	1037503
	M12 male connector, 8-pin, radial, number of steps per revolution 32,768	AFM60B-S4PC032768	1037504
	Cable, 8-wire, universal, 1.5 m, number of steps per revolution 32,768	AFM60B-S4PK032768	1037505
	Cable, 8-wire, universal, 3 m, number of steps per revolution 32,768	AFM60B-S4PL032768	1037506
	Cable, 8-wire, universal, 5 m, number of steps per revolution 32,768	AFM60B-S4PM032768	1037507
Type A	M23 male connector, 12-pin , radial, number of steps per revolution 262144	AFM60A-S4PA262144	1037508
	M12 male connector, 8-pin, radial, number of steps per revolution 262144	AFM60A-S4PC262144	1037509
	Cable, 8-wire, universal, 1.5 m, number of steps per revolution 262144	AFM60A-S4PK262144	1037510
	Cable, 8-wire, universal, 3 m, number of steps per revolution 262144	AFM60A-S4PL262144	1037511
	Cable, 8-wire, universal, 5 m, number of steps per revolution 262144	AFM60A-S4PM262144	1037512

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Type code AFM60 SSI/gray + incremental and SSI/gray + sin/cos, absolute encoder, multiturn, 4,096 revolutions, solid shaft, **programmable**



1) Number of steps from 256 (8 bit) to 262144 (18 bit) can be programmed by the customer. Factory setting for Type B: 032768; Type A: 262144. Number of incremental lines is always 1/4 of the number of SSI/gray lines.

Example orders

- Servo flange

Servo flange design		Type	Part no.
Type B	4.5 ... 32 V, SSI/gray + incremental, programmable, M23 male connector, 12-pin, radial, number of steps per revolution 32,768	AFM60B-S1RA032768	1052835
Type A	4.5 ... 32 V, SSI/gray + incremental, programmable, M23 male connector, 12-pin , radial, number of steps per revolution 262144	AFM60A-S1RA262144	1052837
Type B	4.5 ... 32 V, SSI/gray, programmable, + sin/cos, 1,024 periods, M23 male connector, 12-pin, radial, number of steps per revolution 32,768	AFM60B-S1SA032768	1054220
Type A	4.5 ... 32 V, SSI/gray, programmable, + sin/cos, 1,024 periods, M23 male connector, 12-pin , radial, number of steps per revolution 262144	AFM60A-S1SA262144	1054219

- Face mount flange

Face mount flange design		Type	Part no.
Type B	4.5 ... 32 V, SSI/gray + incremental, programmable, M23 male connector, 12-pin, radial, number of steps per revolution 32,768	AFM60B-S4RA032768	1052833
Type A	4.5 ... 32 V, SSI/gray + incremental, programmable, M23 male connector, 12-pin , radial, number of steps per revolution 262144	AFM60A-S4RA262144	1052624
Type B	4.5 ... 32 V, SSI/gray, programmable, + sin/cos, 1,024 periods, M23 male connector, 12-pin, radial, number of steps per revolution 32,768	AFM60B-S4SA032768	1054222
Type A	4.5 ... 32 V, SSI/gray, programmable, + sin/cos, 1,024 periods, M23 male connector, 12-pin , radial, number of steps per revolution 262144	AFM60A-S4SA262144	1054221

Type code AFS60 SSI absolute encoder, singleturn, hollow shaft

Type

- **E** Type E (see technical data on page G-269)
- **B** Type B (see technical data on page G-269)
- **A** Type A (see technical data on page G-269)

Mechanical design

- **B** Blind hollow shaft
- **T** Through hollow shaft

- **B** Hollow shaft diameter 8 mm
- **C** Hollow shaft diameter 3/8"
- **D** Hollow shaft diameter 10 mm
- **E** Hollow shaft diameter 12 mm
- **F** Hollow shaft diameter 1/2"
- **G** Hollow shaft diameter 14 mm
- **H** Hollow shaft diameter 15 mm
- **J** Hollow shaft diameter 5/8"

Electrical interface

- **A** 4.5 ... 32 V SSI/Gray

Connection type

- **A** Male connector M23, 12-pin, radial
- **C** Male connector M12, 8-pin, radial
- **K** Cable, 8-wire, universal, 1.5 m [1)]
- **L** Cable, 8-wire, universal, 3 m [1)]
- **M** Cable, 8-wire, universal, 5 m [1)]

Resolution

Number of steps per revolution, selection depends on type, see below.

A	F	S	6	0		–			A							

[1)] The universal cable outlet is positioned so that it is possible to lay it without bends in a radial or axial direction.

Number of steps per revolution

- Type E [1)]

000256	8 bit	**001024**	10 bit	**004096**	12 bit
000512	9 bit	**002048**	11 bit		

- Type B [1)]

000256	8 bit	**002048**	11 bit	**016384**	14 bit
000512	9 bit	**004096**	12 bit	**032768**	15 bit
001024	10 bit	**008192**	13 bit		

[1)] Others available on request.

- Type A [1)]

000256	8 bit	**002048**	11 bit	**016384**	14 bit	**131072**	17 bit
000512	9 bit	**004096**	12 bit	**032768**	15 bit	**262144**	18 bit
001024	10 bit	**008192**	13 bit	**065536**	16 bit		

[1)] Others available on request.

8015560/2015-09-01

Subject to change without notice

Example orders

- Blind hollow shaft

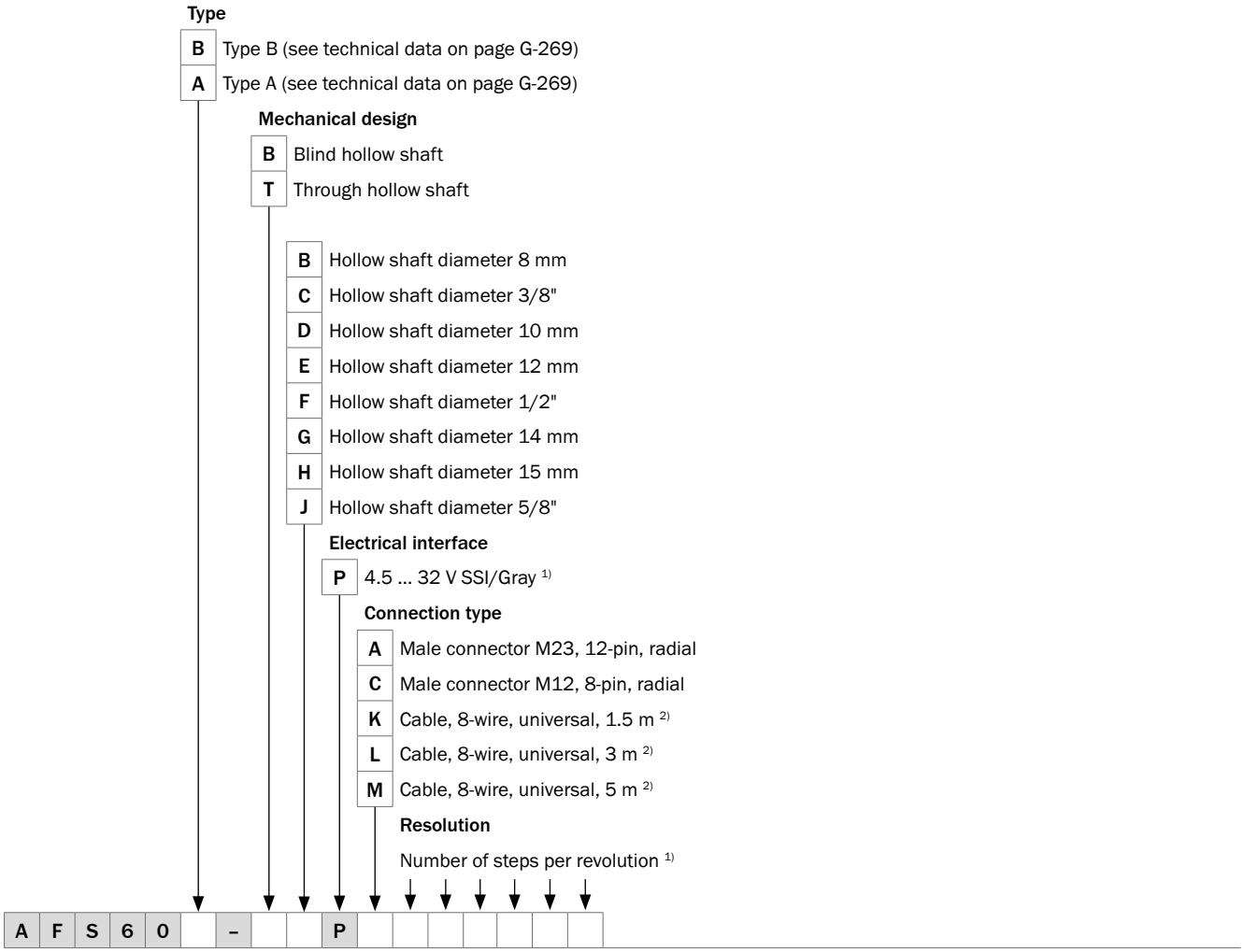
Blind hollow shaft design	Type
Type E, hollow shaft design 8 mm, M12 male connector, 8-pin , radial, number of steps per revolution 1,024 (10 bit)	AFS60E-BBAC001024

- Through hollow shaft

Through hollow shaft design	Type
Type E, hollow shaft design 8 mm, M12 male connector, 8-pin , radial, number of steps per revolution 1,024 (10 bit)	AFS60E-TBAC001024

G

Type code AFS60 SSI absolute encoder, singleturn, hollow shaft, **programmable**



1) Number of steps from 256 to 262144 can be programmed by the customer. Factory setting for Type B: 032768; Type A: 262144.

2) The universal cable outlet is positioned so that it is possible to lay it without bends in a radial or axial direction.

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Example orders [1)]

- Blind hollow shaft

Blind hollow shaft design		Type
Type B	M23 male connector, 12-pin, radial, number of steps per revolution 32,768	AFS60B-BxPA032768
	M12 male connector, 8-pin, radial, number of steps per revolution 32,768	AFS60B-BxPC032768
	Cable, 8-wire, universal, 1.5 m, number of steps per revolution 32,768	AFS60B-BxPK032768
Type A	M23 male connector, 12-pin , radial, number of steps per revolution 262144	AFS60A-BxPA262144
	M12 male connector, 8-pin, radial, number of steps per revolution 262144	AFS60A-BxPC262144
	Cable, 8-wire, universal, 1.5 m, number of steps per revolution 262144	AFS60A-BxPK262144

[1)] x stands for hollow shaft diameters B to J, please enter corresponding letters in position 9.

- Through hollow shaft

Through hollow shaft design		Type
Type B	M23 male connector, 12-pin, radial, number of steps per revolution 32,768	AFS60B-TxPA032768
	M12 male connector, 8-pin, radial, number of steps per revolution 32,768	AFS60B-TxPC032768
	Cable, 8-wire, universal, 1.5 m, number of steps per revolution 32,768	AFS60B-TxPK032768
Type A	M23 male connector, 12-pin , radial, number of steps per revolution 262144	AFS60A-TxPA262144
	M12 male connector, 8-pin, radial, number of steps per revolution 262144	AFS60A-TxPC262144
	Cable, 8-wire, universal, 1.5 m, number of steps per revolution 262144	AFS60A-TxPK262144

[1)] x stands for hollow shaft diameters B to J, please enter corresponding letters in position 9.

Type code AFM60 SSI/gray absolute encoder, multiturn, 4,096 revolutions, hollow shaft

Type

- **E** Type E (see technical data on page G-269)
- **B** Type B (see technical data on page G-269)
- **A** Type A (see technical data on page G-269)

Mechanical design

- **B** Blind hollow shaft
- **T** Through hollow shaft

- **B** Hollow shaft diameter 8 mm
- **C** Hollow shaft diameter 3/8"
- **D** Hollow shaft diameter 10 mm
- **E** Hollow shaft diameter 12 mm
- **F** Hollow shaft diameter 1/2"
- **G** Hollow shaft diameter 14 mm
- **H** Hollow shaft diameter 15 mm

Electrical interface

- **A** 4.5 ... 32 V SSI/Gray

Connection type

- **A** Male connector M23, 12-pin, radial
- **C** Male connector M12, 8-pin, radial
- **K** Cable, 8-wire, universal, 1.5 m [1)]
- **L** Cable, 8-wire, universal, 3 m [1)]
- **M** Cable, 8-wire, universal, 5 m [1)]

Resolution

Number of steps per revolution, selection depends on type, see below.

A	F	M	6	0		–			A							

[1)] The universal cable outlet is positioned so that it is possible to lay it without bends in a radial or axial direction.

Number of steps per revolution x 4,096 (12 bit)

- Type E

000256	8 bit	**001024**	10 bit	**004096**	12 bit
000512	9 bit	**002048**	11 bit		

- Type B

000256	8 bit	**002048**	11 bit	**016384**	14 bit
000512	9 bit	**004096**	12 bit	**032768**	15 bit
001024	10 bit	**008192**	13 bit		

- Type A

000256	8 bit	**002048**	11 bit	**016384**	14 bit	**131072**	17 bit
000512	9 bit	**004096**	12 bit	**032768**	15 bit	**262144**	18 bit
001024	10 bit	**008192**	13 bit	**065536**	16 bit		

Example orders

- Blind hollow shaft

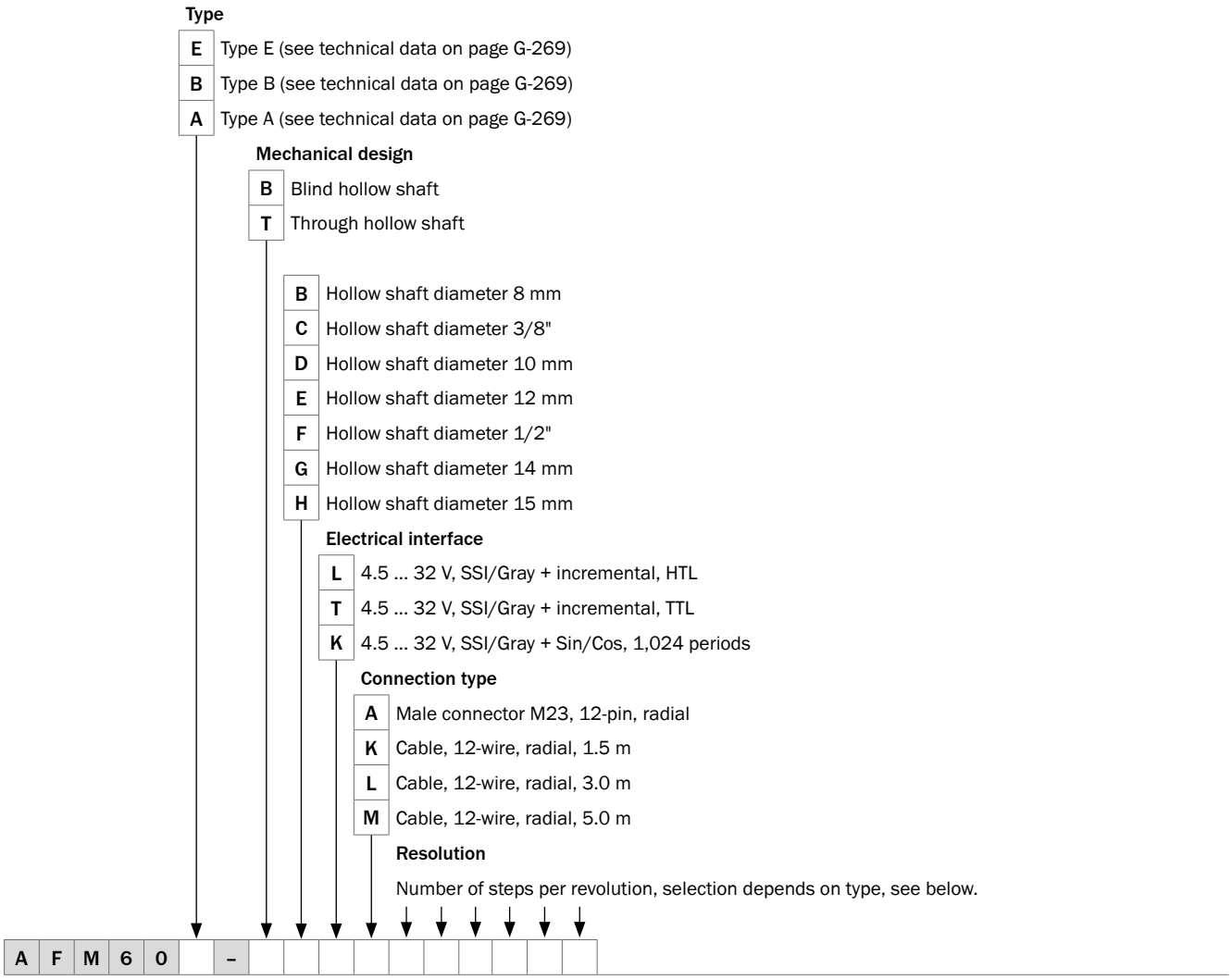
Blind hollow shaft design	Type
Type E, hollow shaft diameter 8 mm cable, 8-wire, universal, 1.5 m, number of steps per revolution 4,096 (12 bits)	AFM60E-BBAK004096

- Through hollow shaft

Through hollow shaft design	Type
Type E, hollow shaft diameter 8 mm cable, 8-wire, universal, 1.5 m, number of steps per revolution 4,096 (12 bits)	AFM60E-TBAK004096

G

Type code AFM60 SSI/gray + incremental and SSI/gray + sin/cos, absolute encoder, multiturn, 4,096 revolutions, hollow shaft



Number of steps per revolution x 4,096 (12 bit), number of incremental lines in brackets

- Type E

000256	8 bit (64)	**001024**	10 bit (256)	**004096**	12 bit (1024)
000512	9 bit (128)	**002048**	11 bit (512)		

- Type B

000256	8 bit (64)	**002048**	11 bit (512)	**016384**	14 bit (4096)
000512	9 bit (128)	**004096**	12 bit (1024)	**032768**	15 bit (8192)
001024	10 bit (256)	**008192**	13 bit (2048)		

- Type A

000256	8 bit (64)	**002048**	11 bit (512)	**016384**	14 bit (4096)	**131072**	17 bit (32768)
000512	9 bit (128)	**004096**	12 bit (1024)	**032768**	15 bit (8192)	**262144**	18 bit (65536)
001024	10 bit (256)	**008192**	13 bit (2048)	**065536**	16 bit (16384)		

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Example orders

- Blind hollow shaft

Blind hollow shaft design	Type
Type E, hollow shaft diameter 8 mm, 4.5 ... 32 V, SSI/gray + incremental, TTL, M23 male connector, 12-pin , radial, number of steps per revolution 2,048 (11 bit)	AFM60E-BBTA002048

- Through hollow shaft

Through hollow shaft design	Type
Type E, hollow shaft diameter 8 mm, 4.5 ... 32 V, SSI/gray + incremental, TTL, M23 male connector, 12-pin , radial, number of steps per revolution 2,048 (11 bit)	AFM60E-TBTA002048

Type code AFM60 SSI/gray absolute encoder, multiturn, 4,096 revolutions, hollow shaft, **programmable**

Type

- **B** Type B (see technical data on page G-269)
- **A** Type A (see technical data on page G-269)

Mechanical design

- **B** Blind hollow shaft
- **T** Through hollow shaft

- **B** Hollow shaft diameter 8 mm
- **C** Hollow shaft diameter 3/8"
- **D** Hollow shaft diameter 10 mm
- **E** Hollow shaft diameter 12 mm
- **F** Hollow shaft diameter 1/2"
- **G** Hollow shaft diameter 14 mm
- **H** Hollow shaft diameter 15 mm

Electrical interface

- **P** 4.5 ... 32 V, SSI/Gray, programmable [1]

Connection type

- **A** Male connector M23, 12-pin, radial
- **C** Male connector M12, 8-pin, radial
- **K** Cable, 8-wire, universal, 1.5 m [2]
- **L** Cable, 8-wire, universal, 3 m [2]
- **M** Cable, 8-wire, universal, 5 m [2]

Resolution

Number of steps per revolution [1]

A	F	M	6	0		–			P							

[1] Number of steps from 256 (8 bit) to 262144 (18 bit) can be programmed by the customer. Factory setting for Type B: 032768; Type A: 262144.

[2] The universal cable outlet is positioned so that it is possible to lay it without bends in a radial or axial direction.

Example orders [1)]

- Blind hollow shaft

Blind hollow shaft design		Type
Type B	M23 male connector, 12-pin, radial, number of steps per revolution 32,768	AFM60B-BxPA032768
	M12 male connector, 8-pin, radial, number of steps per revolution 32,768	AFM60B-BxPC032768
	Cable, 8-wire, universal, 1.5 m, number of steps per revolution 32,768	AFM60B-BxPK032768
Type A	M23 male connector, 12-pin , radial, number of steps per revolution 262144	AFM60A-BxPA262144
	M12 male connector, 8-pin, radial, number of steps per revolution 262144	AFM60A-BxPC262144
	Cable, 8-wire, universal, 1.5 m, number of steps per revolution 262144	AFM60A-BxPK262144

[1)] x stands for hollow shaft diameters B to H, please enter corresponding letters in position 9.

- Through hollow shaft

Through hollow shaft design		Type
Type B	M23 male connector, 12-pin, radial, number of steps per revolution 32,768	AFM60B-TxPA032768
	M12 male connector, 8-pin, radial, number of steps per revolution 32,768	AFM60B-TxPC032768
	Cable, 8-wire, universal, 1.5 m, number of steps per revolution 32,768	AFM60B-TxPK032768
Type A	M23 male connector, 12-pin , radial, number of steps per revolution 262144	AFM60A-TxPA262144
	M12 male connector, 8-pin, radial, number of steps per revolution 262144	AFM60A-TxPC262144
	Cable, 8-wire, universal, 1.5 m, number of steps per revolution 262144	AFM60A-TxPK262144

[1)] x stands for hollow shaft diameters B to H, please enter corresponding letters in position 9.

Type code AFM60 SSI/gray + incremental and SSI/gray + sin/cos, absolute encoder, multiturn, 4,096 revolutions, hollow shaft, **programmable**

Type

- **B** Type B (see technical data on page G-269)
- **A** Type A (see technical data on page G-269)

Mechanical design

- **B** Blind hollow shaft
- **T** Through hollow shaft

- **B** Hollow shaft diameter 8 mm
- **C** Hollow shaft diameter 3/8"
- **D** Hollow shaft diameter 10 mm
- **E** Hollow shaft diameter 12 mm
- **F** Hollow shaft diameter 1/2"
- **G** Hollow shaft diameter 14 mm
- **H** Hollow shaft diameter 15 mm

Electrical interface

- **R** 4.5 ... 32 V, SSI/Gray + incremental, programmable [1)]
- **S** 4.5 ... 32 V, SSI/Gray programmable + sin/cos, 1,024 periods [1)]

Connection type

- **A** Male connector M23, 12-pin, radial
- **K** Cable, 12-wire, radial, 1.5 m
- **L** Cable, 12-wire, radial, 3.0 m
- **M** Cable, 12-wire, radial, 5.0 m

Resolution

Number of steps per revolution [1)]

A	F	M	6	0		–										

[1)] Number of steps from 256 (8 bit) to 262144 (18 bit) can be programmed by the customer. Factory setting for Type B: 032768; Type A: 262144. Number of incremental lines is always 1/4 of the number of SSI/gray lines.

Example orders [1)]

- Blind hollow shaft

Blind hollow shaft design		Type
Type B	4.5 ... 32 V, SSI/gray + incremental, programmable, M23 male connector, 12-pin, radial, number of steps per revolution 32,768	AFM60B-BxRA032768
Type A	4.5 ... 32 V, SSI/gray + incremental, programmable, M23 male connector, 12-pin , radial, number of steps per revolution 262144	AFM60A-BxRA262144
Type B	4.5 ... 32 V, SSI/gray, programmable, + sin/cos, 1,024 periods, M23 male connector, 12-pin, radial, number of steps per revolution 32,768	AFM60B-BxSA032768
Type A	4.5 ... 32 V, SSI/gray, programmable, + sin/cos, 1,024 periods, M23 male connector, 12-pin , radial, number of steps per revolution 262144	AFM60A-BxSA262144

[1)] x stands for hollow shaft diameters B to H, please enter corresponding letters in position 9.

- Through hollow shaft

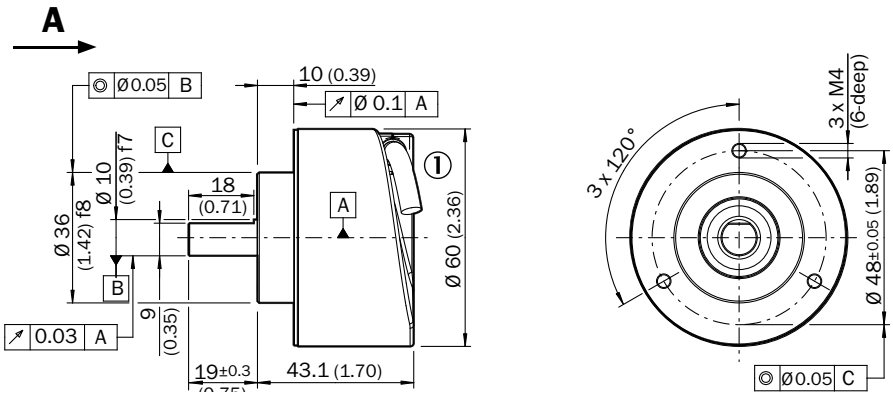
Through hollow shaft design		Type
Type B	4.5 ... 32 V, SSI/gray + incremental, programmable, M23 male connector, 12-pin, radial, number of steps per revolution 32,768	AFM60B-TxRA032768
Type A	4.5 ... 32 V, SSI/gray + incremental, programmable, M23 male connector, 12-pin , radial, number of steps per revolution 262144	AFM60A-TxRA262144
Type B	4.5 ... 32 V, SSI/gray, programmable, + sin/cos, 1,024 periods, M23 male connector, 12-pin, radial, number of steps per revolution 32,768	AFM60B-TxSA032768
Type A	4.5 ... 32 V, SSI/gray, programmable, + sin/cos, 1,024 periods, M23 male connector, 12-pin , radial, number of steps per revolution 262144	AFM60A-TxSA262144

[1)] x stands for hollow shaft diameters B to H, please enter corresponding letters in position 9.

Dimensional drawings (dimensions in mm)

Face mount flange

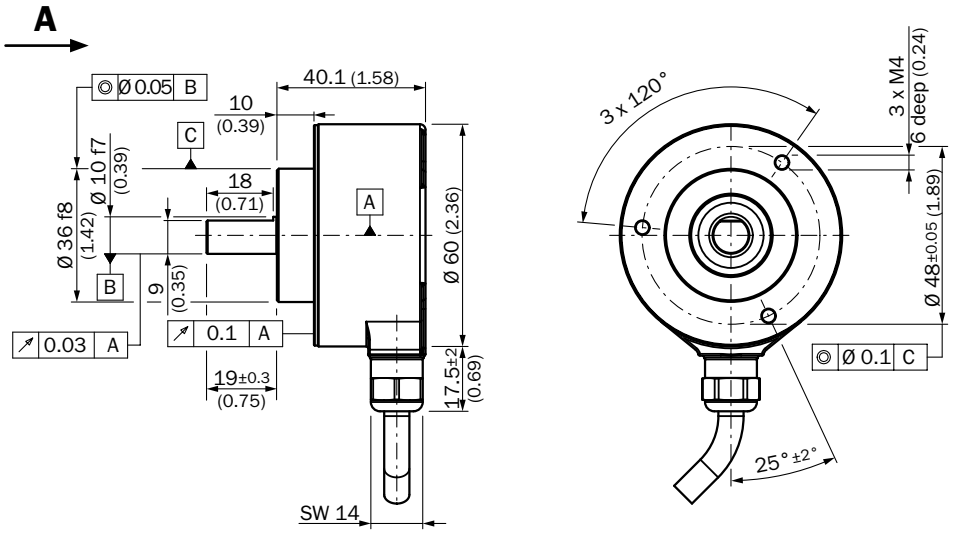
Universal cable outlet



General tolerances according to DIN ISO 2768-mk

① Cable Ø = 5.6 mm ± 0.2 mm bend radius R = 30 mm

Radial cable outlet for AFM60 SSI + incremental and AFM60 SSI + sin/cos



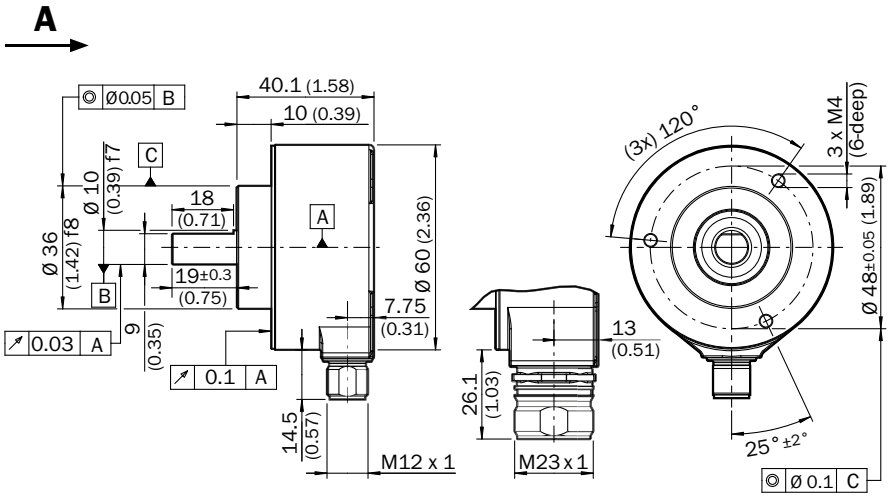
General tolerances according to DIN ISO 2768-mk

G

8015560/2015-09-01

Subject to change without notice

M12 and M23 cable outlet

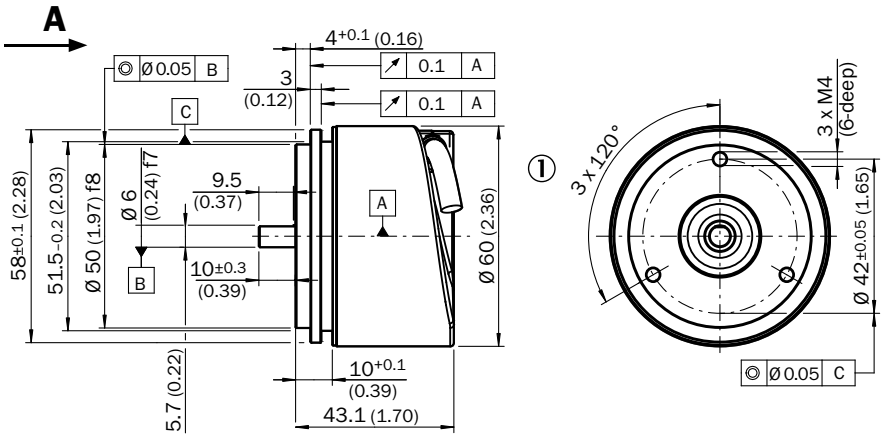


General tolerances according to DIN ISO 2768-mk

G

Servo flange

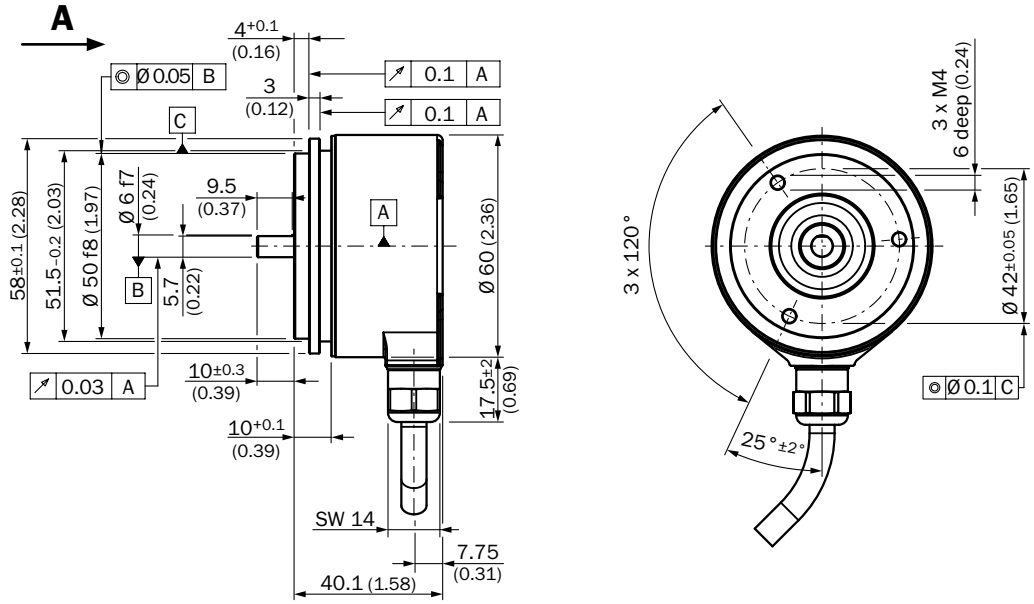
Universal cable outlet



General tolerances according to DIN ISO 2768-mk

① Cable Ø = 5.6 mm ± 0.2 mm bend radius R = 30 mm

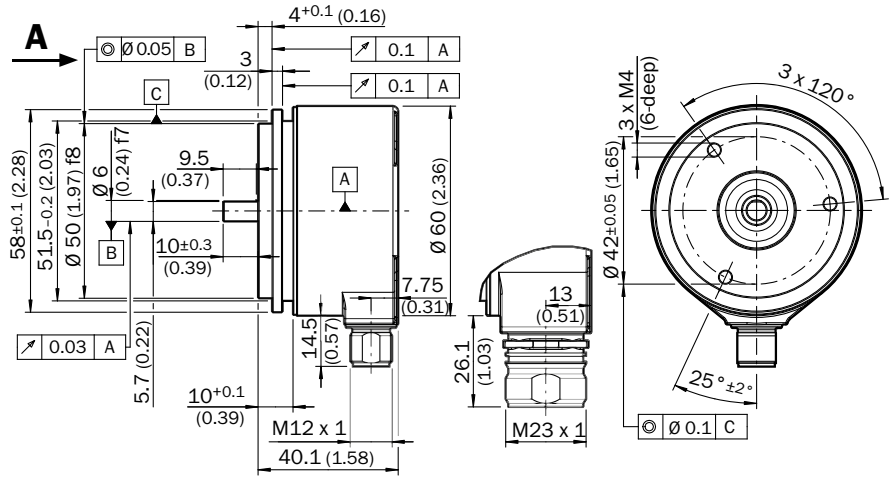
Radial cable outlet for AFM60 SSI + incremental and AFM60 SSI + sin/cos



General tolerances according to DIN ISO 2768-mk

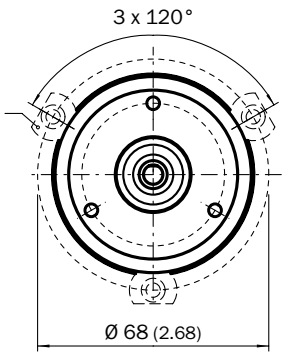
G

M12 and M23 cable outlet

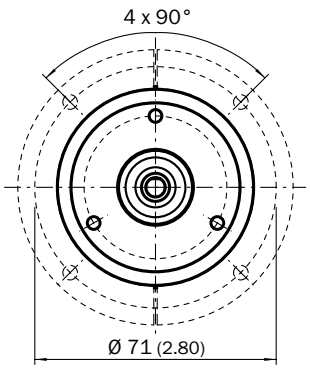


General tolerances according to DIN ISO 2768-mk

Mounting suggestion for small servo clamp
part number 2029166



Mounting suggestion for half-shell servo clamp
part number 2029165

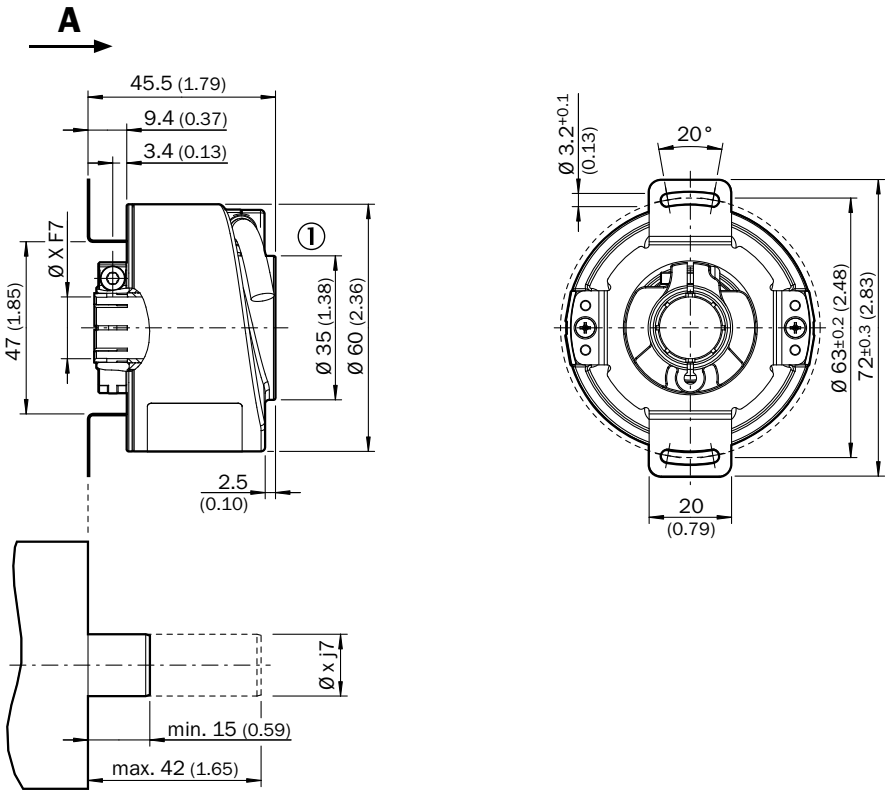


General tolerances according to DIN ISO 2768-mk

G

Blind hollow shaft

Universal cable outlet



Customer-side

General tolerances according to DIN ISO 2768-mk

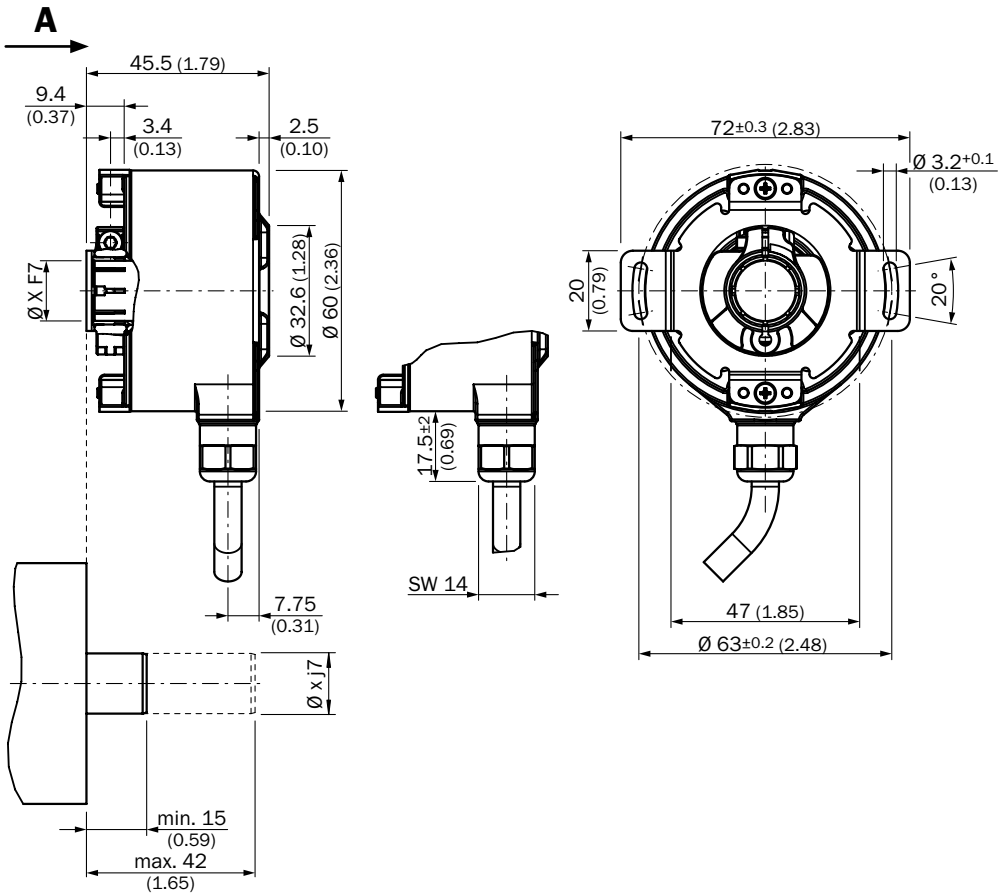
① Cable Ø = 5.6 mm ± 0.2 mm bend radius R = 30 mm

XF7 = Encoder shaft diameter, see type code

xj7 = Shaft diameter, on the customer side

G

Radial cable outlet for AFM60 SSI + incremental and AFM60 SSI + sin/cos

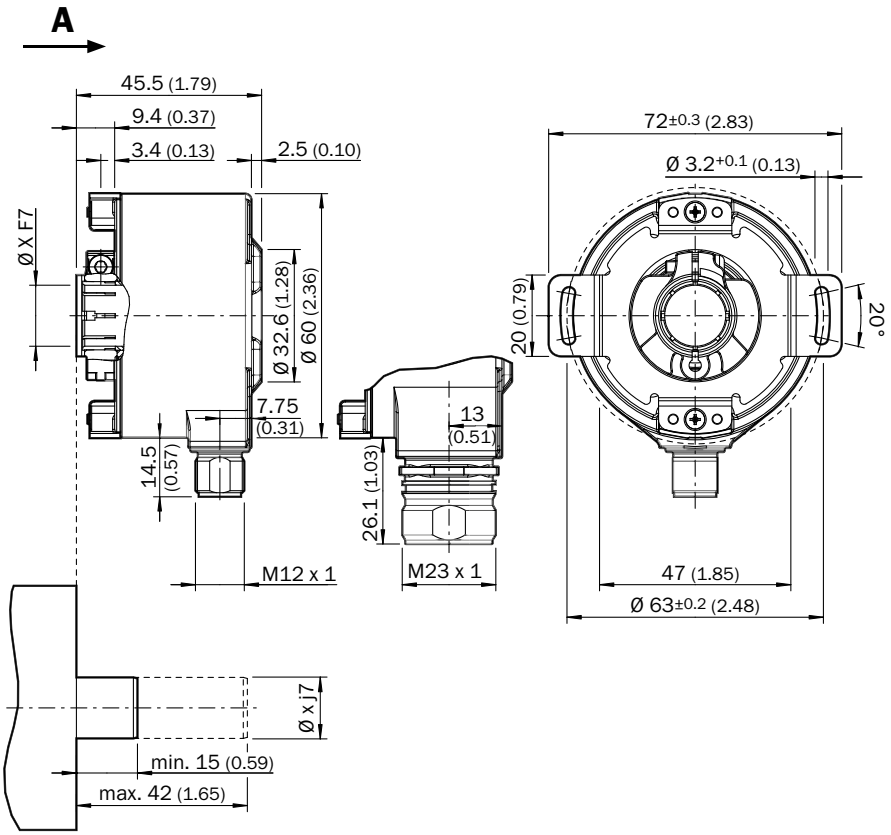


Customer-side

General tolerances according to DIN ISO 2768-mk
XF7 = Encoder shaft diameter, see type code
xj7 = Shaft diameter, on the customer side

G

M12 and M23 cable outlet



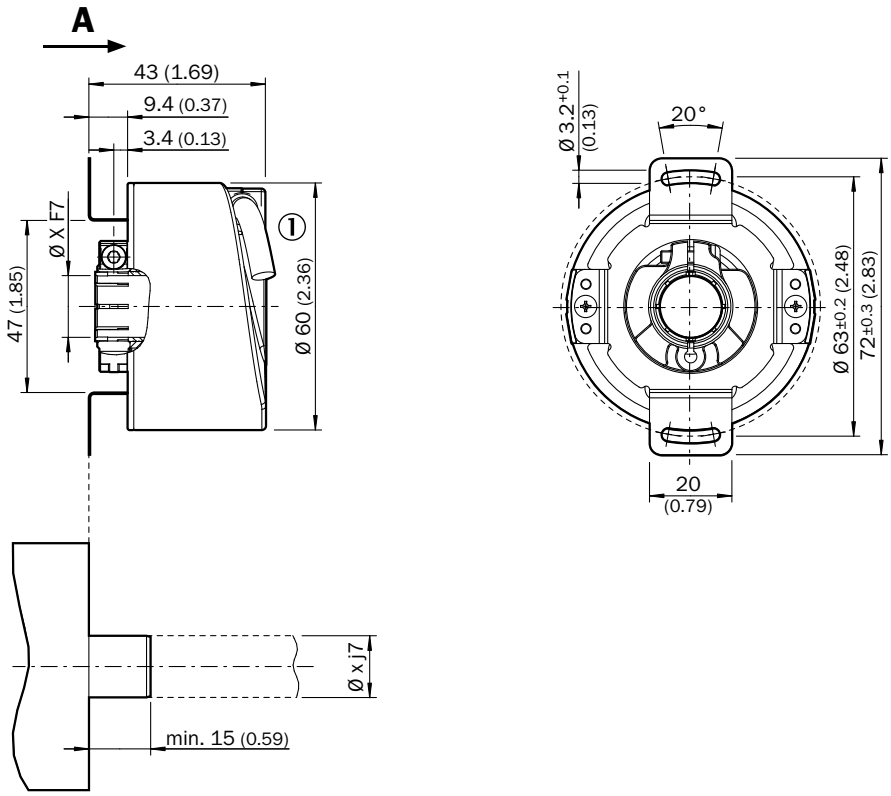
Customer-side

General tolerances according to DIN ISO 2768-mk
XF7 = Encoder shaft diameter, see type code
xj7 = Shaft diameter, on the customer side

G

Through hollow shaft

Universal cable outlet



Customer-side

General tolerances according to DIN ISO 2768-mk

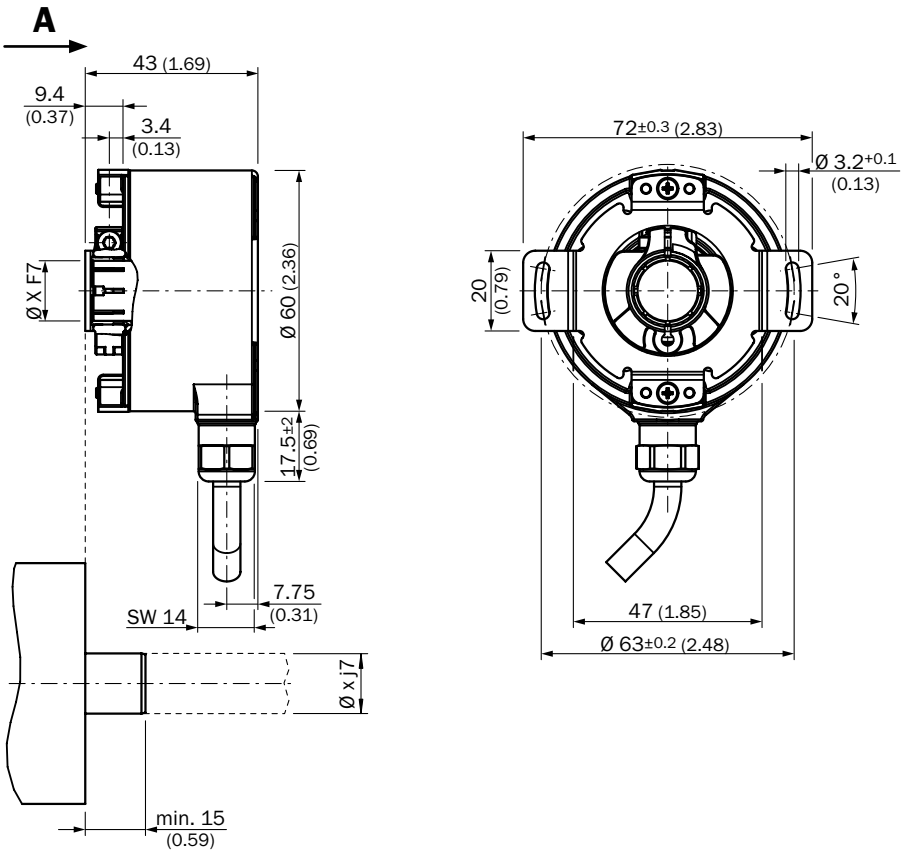
① Cable Ø = 5.6 mm ± 0.2 mm bend radius R = 30 mm

XF7 = Encoder shaft diameter, see type code

xj7 = Shaft diameter, on the customer side

G

Radial cable outlet for AFM60 SSI + incremental and AFM60 SSI + sin/cos



Customer-side

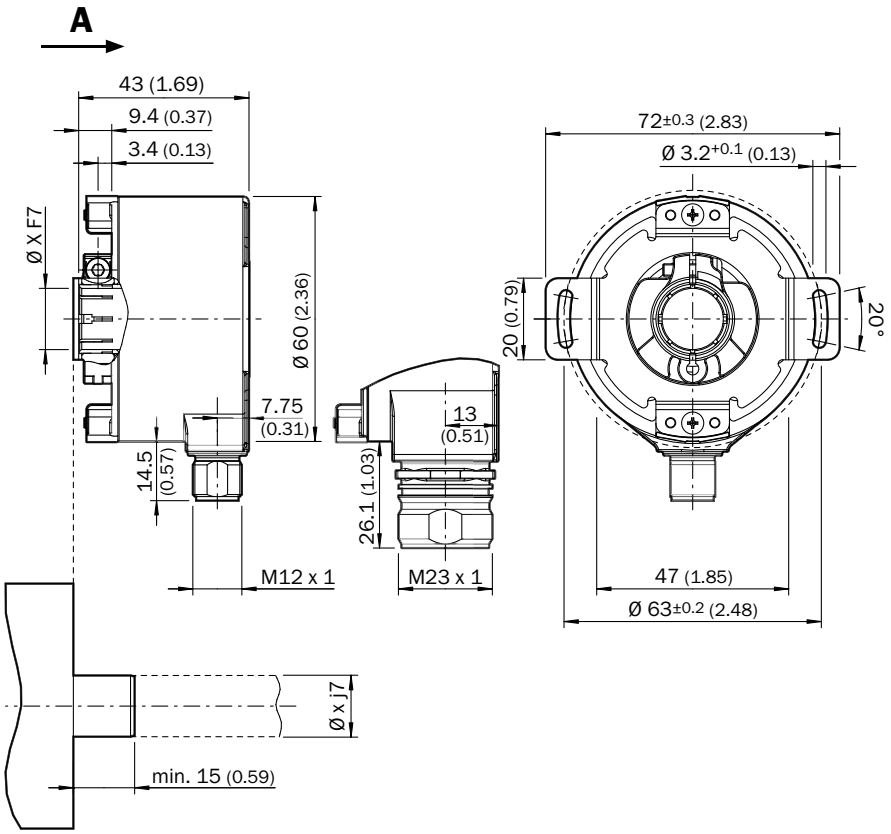
General tolerances according to DIN ISO 2768-mk

XF7 = Encoder shaft diameter, see type code

xj7 = Shaft diameter, on the customer side

G

M12 and M23 cable outlet



Customer-side

General tolerances according to DIN ISO 2768-mk
XF7 = Encoder shaft diameter, see type code
xj7 = Shaft diameter, on the customer side

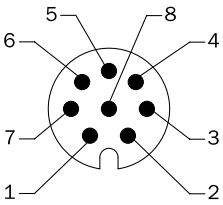
G

PIN assignment

V/$\overline{R}$ Forwards/Reverse: This input programs the counting direction for the encoder. When it is not connected, this input is set to HIGH. If the encoder shaft is rotated clockwise (to the right) as viewed when facing the shaft, it counts in ascending order. If it should count in ascending order when the shaft is rotated counterclockwise (to the left), then this connection must be permanently set to LOW level (GND).

SET This input is for electronic zeroing. If the SET cable is set to U_S for more than 250 ms after it had previously been unassigned for at least 1,000 ms or had been connected to GND, the mechanical position corresponds to the 0 value, i.e., the predetermined SET value.

M12 male connector, 8-pin and cable outlet, cable, 8-wire SSI/gray

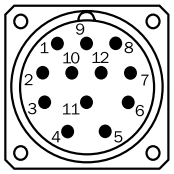


View of M12 male device connector on encoder

Pin	Wire colors	SSI signal	Explanation
1	Brown	Data–	Interface signals
2	White	Data+	Interface signals
3	Black	V/$\overline{R}$	Sequence in direction of rotation
4	Pink	SET	Electronic adjustment
5	Yellow	Clock+	Interface signals
6	Violet	Clock -	Interface signals
7	Blue	GND	Ground connection
8	Red	+U_S	Operating voltage
		Screen	Screen connected to housing on encoder side. Connected to ground on control side.

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M23 male connector, 12-pin SSI/gray



View of M23 male device connector on encoder

Pin	Signal	Explanation
1	GND	Ground connection
2	Data+	Interface signals
3	Clock+	Interface signals
4	N. C.	Not connected
5	N. C.	Not connected
6	N. C.	Not connected
7	N. C.	Not connected
8	U_S	Operating voltage
9	SET	Electronic adjustment
10	Data–	Interface signals
11	Clock–	Interface signals
12	V/$\overline{R}$	Sequence in direction of rotation
	Screen	Screen connected to housing on encoder side. Connected to ground on control side.

M23 male connector, 12-pin and cable outlet, cable, 12-wire SSI/gray + incremental

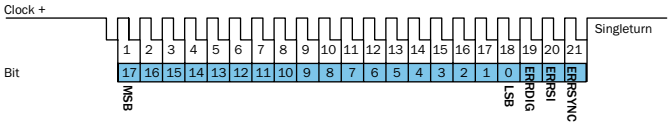
Pin	Wire colors	Signal	Explanation
1	Red	$+U_S$	Operating voltage
2	Blue	GND	Ground connection
3	Yellow	Clock+	Interface signal
4	White	Data+	Interface signal
5	Orange	SET	Electronic adjustment
6	Brown	Data–	Interface signal
7	Violet	Clock–	Interface signal
8	Black	$\overline{B}$	Signal wire
9	Orange/black	V/$\overline{R}$	Sequence in direction of rotation
10	Green	$\overline{A}$	Signal wire
11	Gray	A	Signal wire
12	Pink	B	Signal wire
		Screen	Screen connected to housing on encoder side. Connected to ground on control side.

M23 male connector, 12-pin and cable outlet, cable, 12-wire SSI/gray + sin/cos

Pin	Wire colors	Signal	Explanation
1	Red	$+U_S$	Operating voltage
2	Blue	GND	Ground connection
3	Yellow	Clock+	Interface signal
4	White	Data+	Interface signal
5	Orange	SET	Electronic adjustment
6	Brown	Data–	Interface signal
7	Violet	Clock–	Interface signal
8	Black	Sin–	Signal wire
9	Orange/black	V/$\overline{R}$	Sequence in direction of rotation
10	Green	Cos–	Signal wire
11	Gray	Cos+	Signal wire
12	Pink	Sin+	Signal wire
		Screen	Screen connected to housing on encoder side. Connected to ground on control side.

Signal outputs

Singleturn SSI data format



Bit 1–18: Position bits

- LSB: Least significant bit
- MSB: Most significant bit

Bit 19-21: Errorbits

- ERRDIG: Error message concerning speed. If this error occurs during the position forming process, it is displayed through the ERRDIG bit.
- ERRSI: Light source error.
- ERRSYNC: Contamination of the code disk or read system. A error has occurred during the position detection process since the last SSI data transmission. The errorbit is deleted during the next data transmission.

Evaluation of the error bits must be realized in the PLC.

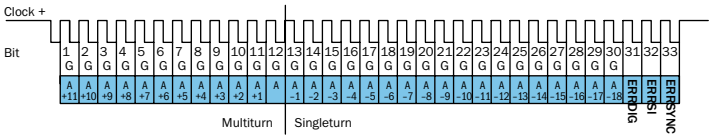
The error bits output do not have to be used by the PLC.

Example

If the absolute value encoder is adjusted to a resolution of 13 bits, 16 bits are output: 13 databits and 3 errorbits.
If the errorbits cannot be evaluated in the PLC, the control unit must be set to an encoder resolution of 13 bits. The errorbits must then be masked out at the control.

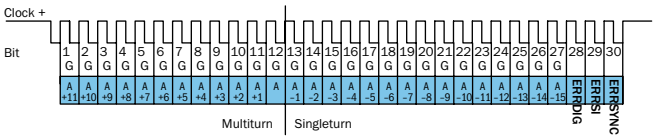
Multiturn SSI data format

30 bits



Bits 1–12: Multiturn position bits
Bits 13–30: Singleturn position bits
Bits 31–33: Errorbits

27 bits



Bit 1–12: Multiturn position bits
Bits 13–27: Singleturn position bits
Bits 28–30: Errorbits

Errorbits

- ERRDIG: Error message concerning speed. If this error occurs during the position forming process, it is displayed through the ERRDIG bit.
- ERRSI: Light source error.
- ERRSYNC: Contamination of the code disk or read system. A error has occurred during the position detection process since the last SSI data transmission. The errorbit is deleted during the next data transmission.

Evaluation of the error bits must be realized in the PLC.

The error bits output do not have to be used by the PLC. The multiturn resolution is fixed to 12 bits.

Example

If the absolute value encoder is adjusted to a resolution of 27 bits, 30 bits are output: 27 databits and 3 errorbits.
If the errorbits cannot be evaluated in the PLC, the control unit must be set to an encoder resolution of 27 bits. The errorbits must then be masked out at the control.

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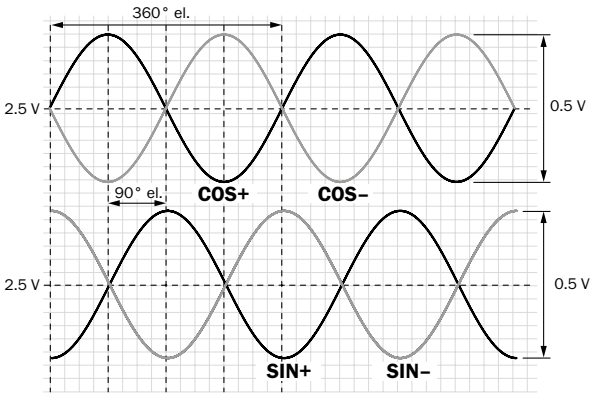
Interfaces

Electrical interfaces sin/cos 1.0 V_{SS}

Supply voltage	Output
4.5 ... 32 V	Sine 0.5 V_{SS}

Signals **before** difference at 120 Ω load

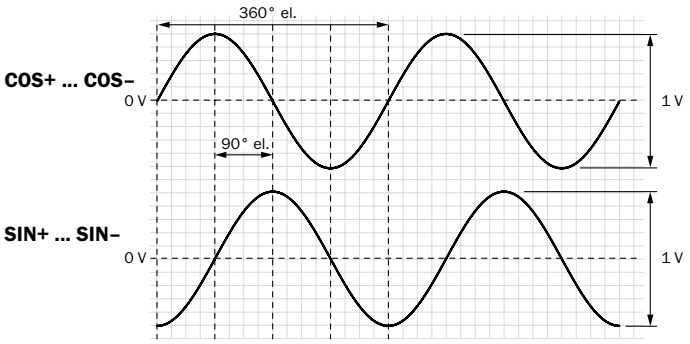
Signal diagram for clockwise shaft rotation, looking in direction "A" (shaft)



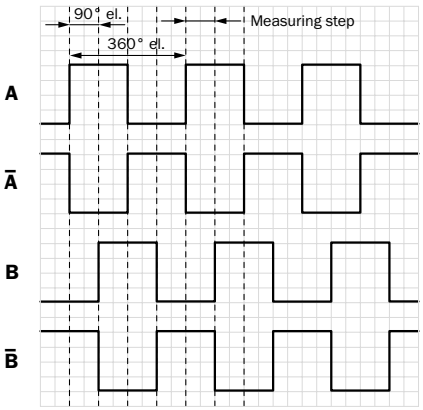
Interface signals Sin, $\overline{Sin}$, Cos, $\overline{Cos}$	Signals before difference at 120 Ω load	Signal offset
Differential analog	0.5 V_{SS} ± 20%	2.5 V ± 10%

Signal **after** difference at 120 Ω load

Signal diagram for clockwise shaft rotation, looking in direction "A" (shaft)



Incremental signal outputs for clockwise shaft rotation, looking in direction "A" (see dimensional drawing)



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Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 36 mm, including mounting kit for face mount flange	BEF-WF-36	2029164

Dimensional drawings ➜ page K-725

Flanges

Flange plate

Figure	Brief description	Type	Part no.
	Standard stator coupling	BEF-DS00XFX	2056812
	Stator coupling, 16.5 mm high	BEF-DS05XFX	2057423
	Stator coupling with hole circle diameter 63 mm	BEF-DS07XFX	2059368
	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	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 10	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	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	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	BEF-FA-036-100	2029161

Dimensional drawings ➜ page K-725

Other mounting accessories

Measuring wheels and measuring wheel systems

Figure	Brief description	Type	Part no.
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989

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Figure	Brief description	Type	Part no.
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 500 mm	BEF-MR006050R	2055225
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 200 mm	BEF-MR010020R	2055224
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 500 mm	BEF-MR010050R	2055227
	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

Dimensional drawings ➜ page K-725

Modular measuring wheel system

Brief description	Type	Part no.
Measuring wheel system, desired mounting position: left, for DBS60-S4, DFS60-S4, AFS60-S4, and AFM60-S4	BEF-MRS-10-1	2071958
Measuring wheel system, desired mounting position: right, for DBS60-S4, DFS60-S4, AFS60-S4, and AFM60-S4	BEF-MRS-10-2	2071957

Dimensional drawings ➜ page K-725

Mounting bell

Figure	Brief description	Type	Part no.
	Mounting bell for encoders with a servo flange, centering hub 50 mm, including mounting kit	BEF-MG-50	5312987

Dimensional drawings ➜ page K-725

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	BEF-WK-SF	2029166

Dimensional drawings ➜ page K-725

Miscellaneous

Figure	Brief description	Type	Part no.
	Mounting kit for servo flange encoder on the bearing block, 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
	Bearing block for hollow shaft encoder, including fixing screws	BEF-FA-B12-010	2042728
	Bearing block for servo and face mount flange encoder	BEF-FA-LB1210	2044591

Dimensional drawings ➜ page K-725

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 ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
	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 °C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	Bellows coupling, shaft diameter 10 mm/10 mm; maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular ± 4°; max. revolutions 10,000 rpm, –30° ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	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. revolutions 10,000 rpm, –30 °C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	KUP-1012-B	5312984
	Bar coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, –10 °C ... +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, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0608-S	5314179
	Bar coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; max. speed 10,000 rpm, –10 °C ... +80 °C, max. torque 80 Ncm; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0610-S	2056407
	Bar coupling, shaft diameter 8 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0810-S	5314178
	Bar coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-1010-S	2056408
	Double-loop coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0610-D	5326697
	Double-loop coupling, shaft diameter 8 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0810-D	5326704
	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 °C ... +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 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-1012-D	5326702
	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 °C ... +80 °C, max. torque 60 Ncm; material: aluminum flange, fiber-glass reinforced polyamide membrane and tempered steel coupling pin	KUP-0610-F	5312985
	Spring washer coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.4 mm, angular ± 2.5°; max. speed 12,000 rpm, –10° ... +80° C, max. torque 60 Ncm; material: aluminum flange, glass fiber-reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986

Dimensional drawings ➜ page K-725

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Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm², 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, JST, 8-pin, straight Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	0.5 m	DOL-0J08-G0M5AA6	2048589
		1.5 m	DOL-0J08-G1M5AA6	2048590
		3 m	DOL-0J08-G3M0AA6	2048591
		5 m	DOL-0J08-G5M0AA6	2048593
		10 m	DOL-0J08-G10MAA6	2048594
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm [1]	0.5 m	DOL-2308-G0M5AA6	2048595
		1.5 m	DOL-2308-G1M5AA6	2048596
		3 m	DOL-2308-G03MAA6	2048597
		5 m	DOL-2308-G05MAA6	2048598
		10 m	DOL-2308-G10MAA6	2048599
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [2]	1.5 m	DOL-2312-G1M5MD2	2062284
		3 m	DOL-2312-G03MMD2	2062300
		5 m	DOL-2312-G05MMD2	2062301
		10 m	DOL-2312-G10MMD2	2062302
		20 m	DOL-2312-G20MMD2	2062303
		30 m	DOL-2312-G30MMD2	2062304

[1] Suitable for SSI interfaces, not suitable for SSI + Incremental or SSI + Sin/Cos interfaces.

[2] Suitable for SSI + Incremental and SSI + Sin/Cos interfaces.

Dimensional drawings ➜ page K-725

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Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 8-pin, straight, A encoded, shielded, for cable diameter 4 mm ... 8 mm Head B: - Operating temperature: –40 °C ... +85 °C	DOS-1208-GA01	6045001
	Head A: female connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: –20 °C ... +130 °C	DOS-2312-G	6027538
	Head A: female connector, M23, 12-pin, 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: female connector, M23, 12-pin, angled, shielded, for cable diameter 4.2 mm ... 6.6 mm Head B: - Operating temperature: –20 °C ... +130 °C	DOS-2312-W01	2072580
	Head A: female connector, M23, 21-pin, straight, shielded, for cable diameter 5.5 mm ... 12 mm Head B: -	DOS-2321-G	6027539

Dimensional drawings ➜ page K-725

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	By the meter	LTG-2308-MWENC	6027529
	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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm	By the meter	LTG-2612-MW	6028516

Dimensional drawings ➜ page K-725

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

Dimensional drawings ➜ page K-725

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Connection cables with female and male connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: male connector, D-Sub, 9-pin, straight Cable: PUR, halogen-free, shielded, 4 x 2 x 0.15 mm²	0.5 m	DSL-2D08-G0M5AC2	2048439
	Head A: female connector, M23, 12-pin, straight Head B: male connector, D-Sub, 9-pin, straight Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm² [1]	0.5 m	DSL-3D08-G0M5AC2	2048440
	Head A: female connector, M23, 12-pin, straight Head B: male connector, D-Sub, 9-pin, straight, 8-wire[2]	0.5 m	DSL-3D08-G0M5AC4	2059270

[1] Suitable for use with SSI interfaces, not suitable for use with SSI + Incremental interface or SSI + Sin/Cos.

[2] Suitable for use with SSI + Incremental or SSI + Sin/Cos interfaces.

Dimensional drawings ➜ page K-725

Other accessories

Programming and configuration tools

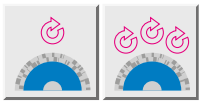
Figure	Brief description	Type	Part no.
	Programming unit USB, for programmable SICK encoders AFS60, AFM60, DFS60, VFS60, DFV60 and wire draw encoders with programmable encoder.	PGT-08-S	1036616
	Programming unit display for programmable SICK DFS60, DFV60, AFS/AFM60, AHS/AHM36 encoders, and wire draw encoders with DFS60, AFS/AFM60, and AHS/AHM36. Compact dimensions, low weight, and intuitive operation.	PGT-10-Pro	1072254

Dimensional drawings ➜ page K-725

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

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INTELLIGENT, POWERFUL, PRECISE





[1] UL 508 compliant.

More information

Fields of application G-313
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Sales kits G-318
Dimensional drawings G-321
PIN assignment. G-324
Recommended accessories. G-325

Product description

The AFS60 and AFM60 EtherNet/IP encoders from SICK are the first sensors of their kind to feature an active web server as well as to make their function blocks available for fieldbus integration. Mechanical engineers, integrators and end customers all benefit from features including simple commissioning, significantly reduced configuration time and direct, continuous access to the encoder via the machine's HMI user interface.

Furthermore, the encoders are equipped with an FTP server, which allows a direct firmware update. The web server configuration option opens up brand-new opportunities for commissioning, service and maintenance by operating personnel who have different capabilities and levels of interface knowledge

At a glance

- High-resolution, 30-bit absolute encoder
- Integrated web server and FTP server
- DLR (Device Level Ring)
- Function module
- Comprehensive diagnostic functions
- IP addressing via software or hardware
- Round axis functionality (transmission calculation)

Your benefits

- Integrated web server for easy configuration without the need for specialized interface knowledge
- FTP server for firmware updates directly on site and in existing systems
- DLR (Device Level Ring) for enhanced system throughput thanks to redundant network communication
- Status display via five duo LEDs on the sensor for a quick initial indication of the operational status
- Comprehensive diagnosis via the 32-bit fault header
- Round axis functionality for full scalability for binary and non-binary resolutions as well as not complete multiturn revolutions (transmission calculation).
- Individual IP address via DHCP or pre-defined IP address via DEC switches

→ www.mysick.com/en/AFS_AFM60_EtherNet_IP

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Palletizing systems
- Storage systems
- Packaging
- Hydraulic presses
- Printing machines
- Robots
- Rotary tables

Detailed technical data

Performance

Max. number of steps per revolution, AFS60 and AFM60	262,144 (18 bit) (maximum viewing number of resolutions, page G-315)
Max. number of revolutions	
AFS60	1
AFM60	4,096 (12 bit)
Resolution	
AFS60	18 bit
AFM60	30 bit
Error limits	± 0.03°
Repeatability	± 0.002°
Measurement increment deviation	± 0.002°
Measuring increment (360 °/ number of steps per revolution)	0.001°
Initialization time	Approx. 12 s

Interfaces

Electrical interface	EtherNet/IP
Transfer rate	10/100 MBit/s
RPI (requested packet interval)	5 ... 750 ms
Transmission media	CAT 5e cable
DLR (Device Level Ring)	✔
Encoder profile	0 x 22
Configuration data	Number of steps per revolution, number of revolutions, PRESET, counting direction, sampling rate for speed monitoring, unit for outputting the speed, acceleration, and temperature, output of scaleable limit values such as: position ranges, speed, acceleration, number of movements cw/ccw, direction chances, operating hours for power-on/motion, round axis functionality (only multiturn version), heartbeat
Available diagnostic data	Current, minimum and maximum temperature, maximum speed, power-on counter, operating hours counter for power-on/motion, counter of direction changes/number of movements cw/ number of movements ccw, minimum and maximum operating voltage, signal monitoring for single and multiturn

Electrical data

Operating voltage range	10 V DC ... 30 V DC
Max. power consumption without load	≤ 3 W
Reverse polarity protection	✔
MTTFd: mean time to dangerous failure	80 years (EN ISO 13849-1) [1]

[1] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of devices, average ambient temperature 40 °C, frequency of use 8,760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Mechanical data

Operating speed [1]	
Solid shaft	9,000 rpm (maximum viewing number of resolutions, page G-315)
Blind hollow shaft	6,000 rpm (maximum viewing number of resolutions, page G-315)
Mass	0.2 kg
Permissible shaft load, solid shaft	80 N (radial); 40 N (axial)
Permissible shaft movement of the drive element, blind hollow shaft	± 0.3 / ± 0.05 mm (radial, static/dynamic) ± 0.5 / ± 0.1 mm (axial, static/dynamic)
Rotor moment of inertia	
Solid shaft	≤ 6.2 gcm²
Blind hollow shaft	≤ 40 gcm²
Bearing lifetime	3 x 10^9 revolutions
Start up torque at 20 °C	
Solid shaft	0.5 Ncm
Blind hollow shaft	0.8 Ncm
Operating torque at 20 °C	
Solid shaft	0.3 Ncm
Blind hollow shaft	0.6 Ncm
Max. angular acceleration	5 x 10^5 rad/s²
Shaft diameter	
Face mount flange, solid shaft	10 x 19 mm, 3/8"
Servo flange, solid shaft	6 x 10 mm
Blind hollow shaft, AFM60	8, 10, 12, 14, 15 mm, 1/4", 1/2", 3/8"
Blind hollow shaft, AFS60	8, 10, 12, 14, 15 mm, 1/4", 1/2", 3/8", 5/8"
Shaft material	Stainless steel
Flange material	
Solid shaft	Aluminum
Blind hollow shaft, AFM60	Aluminum
Blind hollow shaft, AFS60	Zinc die cast
Housing material	Aluminum

[1] Take into account self-warming of 3.3 K per 1,000 rpm when designing operating temperature range

Ambient data

EMC	(according to EN 61000-6-2 and EN 61000-6-3) [1]
Enclosure rating as per IEC 60529	
Protection class housing side with connector outlet	IP 67, with mating connector fitted or sealing caps
Shaft	IP 65
Permissible relative humidity	90% (condensation of optical surfaces not permitted)
Operating temperature range	–40 °C ... +85 °C
Storage temperature range	–40 °C ... +100 °C, without packaging
Resistance to shocks (according to EN 60068-2-27)	100 g, 6 ms
Resistance to vibration (according to EN 60068-2-6)	30 g, 10 Hz ... 2,000 Hz

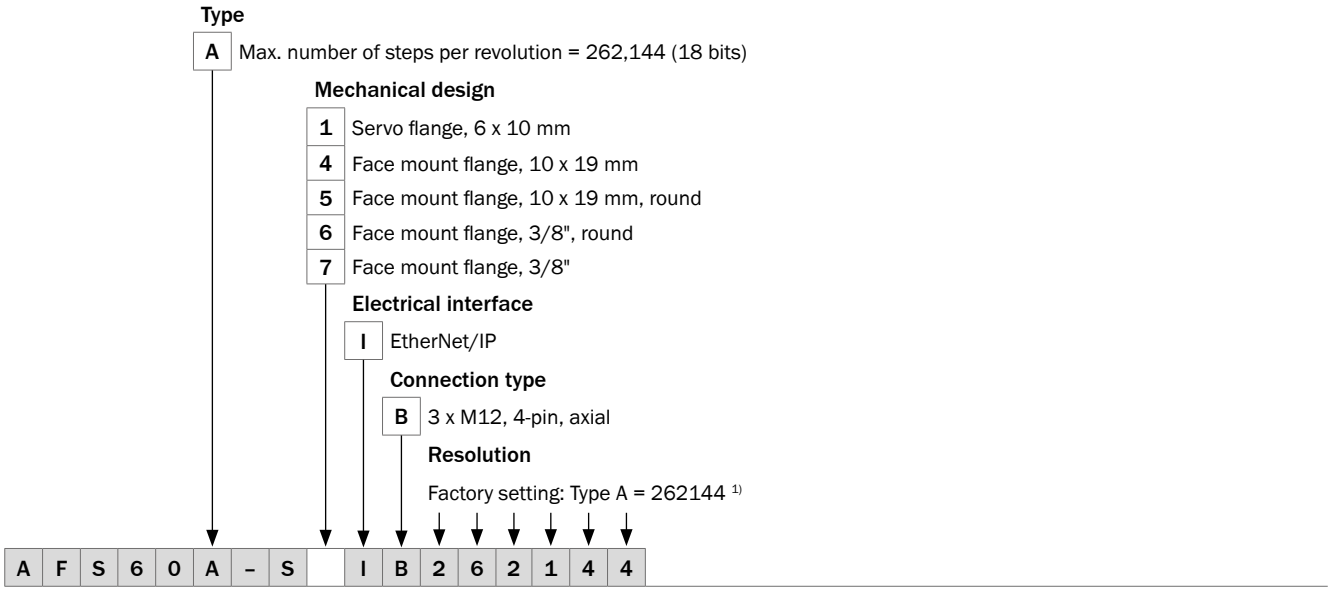
[1] The EMC according to the standards quoted is achieved if shielded cables are used.

Maximum viewing number of resolutions

The maximum singleturn resolution (= 18 bit) can be operated with the maximum operating speed (blind hollow shaft 6,000 rpm and solid shaft 9,000 rpm).

Ordering information

Type code AFS absolute encoder, singleturn, solid shaft



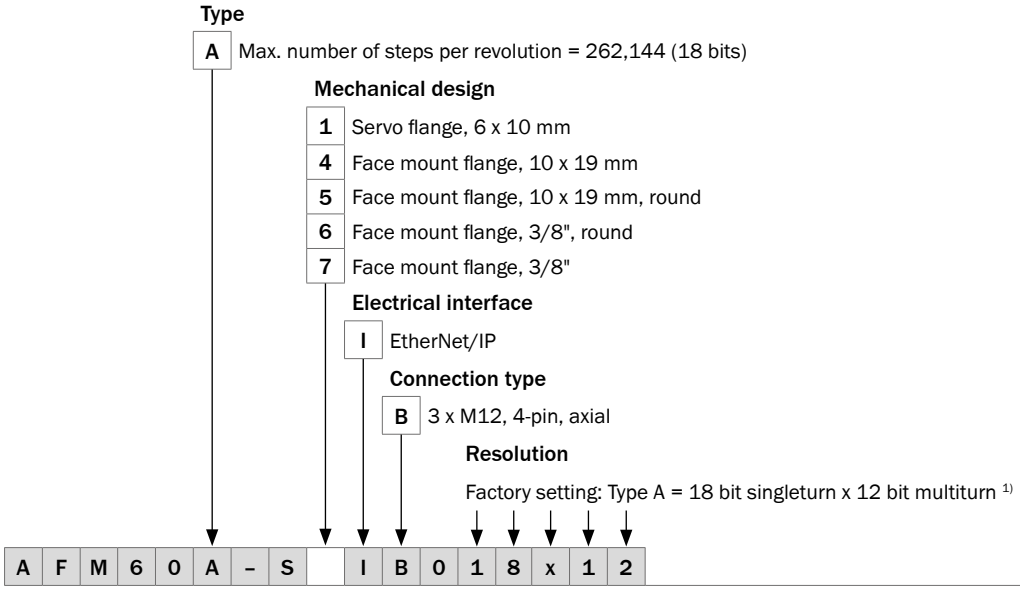
1) Number of steps programmable via control unit: Type A = 2 to 262144.

Example orders

Mechanical design	Type	Part no.
Servo flange, Ø 6 mm, length 10 mm	AFS60A-S1IB262144	1055362
Face mount flange, Ø 10 mm, length 19 mm	AFS60A-S4IB262144	1055364

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Type code AFM, multiturn absolute encoder, solid shaft



1) Programmable options for resolution via control unit.

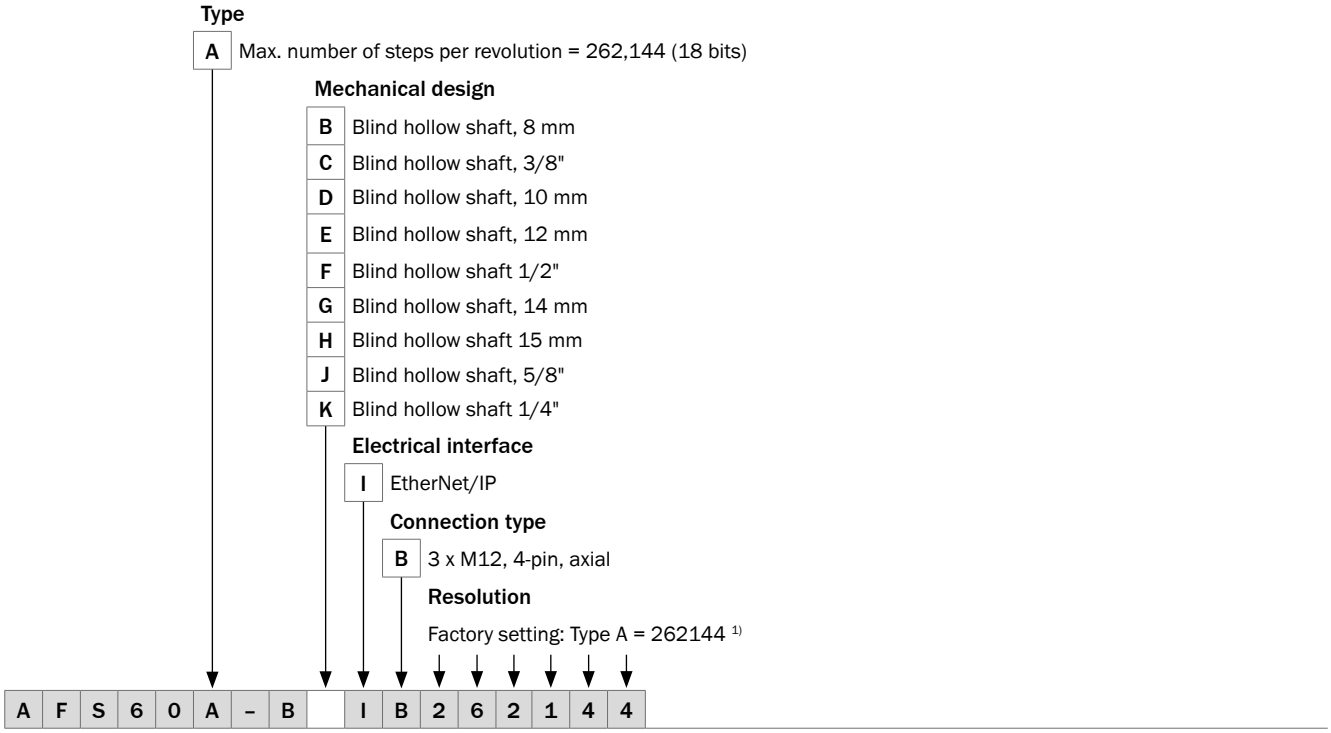
Example orders

Mechanical design	Type	Part no.
Servo flange, Ø 6 mm, length 10 mm	AFM60A-S1IB018x12	1055331
Face mount flange, Ø 10 mm, length 19 mm	AFM60A-S4IB018x12	1055334

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Type code AFS singleturn absolute encoder, solid shaft



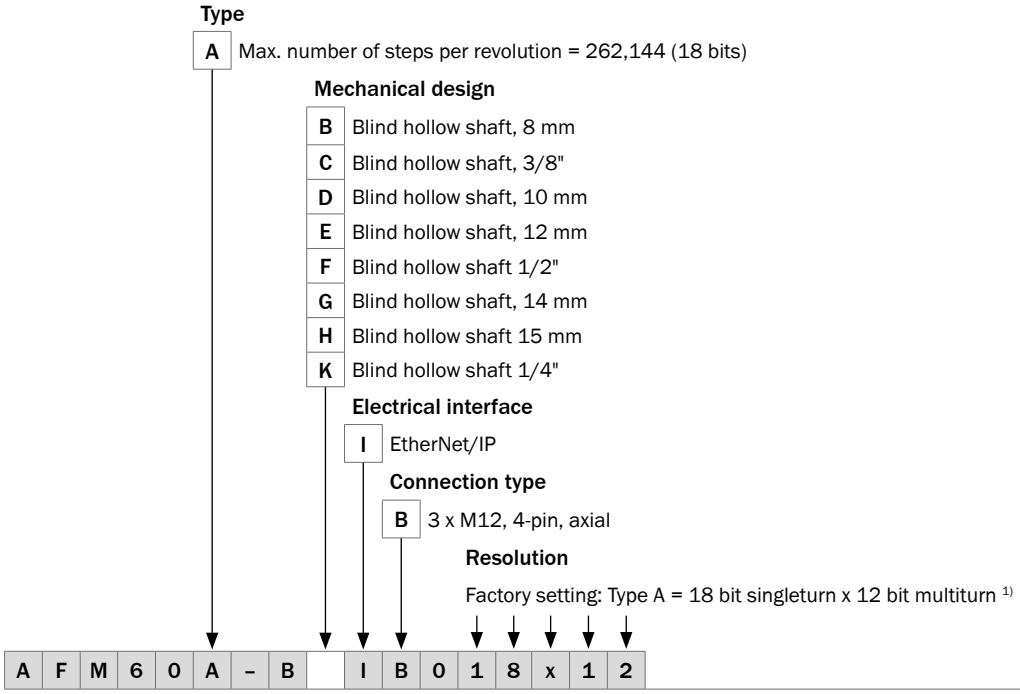
[1] Number of steps programmable via control unit: Type A = 2 to 262144.

Example orders

Mechanical design	Type	Part no.
Blind hollow shaft, 10 mm	AFS60A-BDIB262144	1055356
Blind hollow shaft, 12 mm	AFS60A-BEIB262144	1055358
Blind hollow shaft 15 mm	AFS60A-BHIB262144	1055360

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Type code AFM, multiturn absolute encoder, blind hollow shaft



1) Programmable options for resolution via control unit.

Example orders

Mechanical design	Type	Part no.
Blind hollow shaft, 10 mm	AFM60A-BDIB018x12	1055325
Blind hollow shaft, 12 mm	AFM60A-BEIB018x12	1055326
Blind hollow shaft 15 mm	AFM60A-BHIB018x12	1055328

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Sales kits

Sales kit 01

EtherNet/IP encoder

- + 1 M12 male cable connector, 4-pin, angled, (STE-1204-WE, part number 6048152)
- + 1 M12 female cable connector, 4-pin, angled, (DOS-1204-W, part number 6007303)

	Encoder type (singleturn)	Description	Type	Part no.
	AFS60A-S1IB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1IB sales kit 01	1057693
	AFS60A-S4IB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4IB sales kit 01	1057718
	AFS60A-BDIB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDIB sales kit 01	1057719
	AFS60A-BEIB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BEIB sales kit 01	1057720
	AFS60A-BHIB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHIB sales kit 01	1057721

	Encoder type (multiturn)	Description	Type	Part no.
	AFM60A-S1IB018x12	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1IB sales kit 01	1057722
	AFM60A-S4IB018x12	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4IB sales kit 01	1057723
	AFM60A-BDIB018x12	Blind hollow shaft, Ø 10 mm	AFM60A-BDIB sales kit 01	1057724
	AFM60A-BEIB018x12	Blind hollow shaft, Ø 12 mm	AFM60A-BEIB sales kit 01	1057725
	AFM60A-BHIB018x12	Blind hollow shaft, Ø 15 mm	AFM60A-BHIB sales kit 01	1057726

Sales kit 02

EtherNet/IP encoder

- + 1 M12 male cable connector, 4-pin, angled, pre-wired with 5 m cable (STL-1204-W05ME90, part number 6047913)
- + 1 M12 female cable connector, 4-pin, angled, pre-wired with 5 m cable (DOL-1204-W05MC, part number 6025904)

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	Encoder type (singleturn)	Description	Type	Part no.
	AFS60A-S1IB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1IB sales kit 02	1057737
	AFS60A-S4IB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4IB sales kit 02	1057738
	AFS60A-BDIB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDIB sales kit 02	1057739
	AFS60A-BEIB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BEIB sales kit 02	1057740
	AFS60A-BHIB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHIB sales kit 02	1057741

	Encoder type (multiturn)	Description	Type	Part no.
	AFM60A-S1IB018x12	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1IB sales kit 02	1057742
	AFM60A-S4IB018x12	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4IB sales kit 02	1057743
	AFM60A-BDIB018x12	Blind hollow shaft, Ø 10 mm	AFM60A-BDIB sales kit 02	1057744
	AFM60A-BEIB018x12	Blind hollow shaft, Ø 12 mm	AFM60A-BEIB sales kit 02	1057745
	AFM60A-BHIB018x12	Blind hollow shaft, Ø 15 mm	AFM60A-BHIB sales kit 02	1057746

Sales kit 03

EtherNet/IP encoder

- + 2 M12 male cable connectors, 4-pin, angled, (STE-1204-WE, part number 6048152)
- + 1 M12 female cable connector, 4-pin, angled, (DOS-1204-W, part number 6007303)

	Encoder type (singleturn)	Description	Type	Part no.
	AFS60A-S1IB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1IB sales kit 03	1057727
	AFS60A-S4IB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4IB sales kit 03	1057728
	AFS60A-BDIB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDIB sales kit 03	1057729
	AFS60A-BEIB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BEIB sales kit 03	1057730
	AFS60A-BHIB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHIB sales kit 03	1057731

	Encoder type (multiturn)	Description	Type	Part no.
	AFM60A-S1IB018x12	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1IB sales kit 03	1057732
	AFM60A-S4IB018x12	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4IB sales kit 03	1057733
	AFM60A-BDIB018x12	Blind hollow shaft, Ø 10 mm	AFM60A-BDIB sales kit 03	1057734
	AFM60A-BEIB018x12	Blind hollow shaft, Ø 12 mm	AFM60A-BEIB sales kit 03	1057735
	AFM60A-BHIB018x12	Blind hollow shaft, Ø 15 mm	AFM60A-BHIB sales kit 03	1057736

Sales kit 04

EtherNet/IP encoder

- + 2 M12 male cable connectors, 4-pin, angled, pre-wired with 5 m cable (STL-1204-W05ME90, part number 6047913)
- + 1 M12 female cable connector, 4-pin, angled, pre-wired with 5 m cable (DOL-1204-W05MC, part number 6025904)

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	Encoder type (singleturn)	Description	Type	Part no.
	AFS60A-S1IB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1IB sales kit 04	1057747
	AFS60A-S4IB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4IB sales kit 04	1057748
	AFS60A-BDIB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDIB sales kit 04	1057749
	AFS60A-BEIB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BEIB sales kit 04	1057750
	AFS60A-BHIB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHIB sales kit 04	1057751

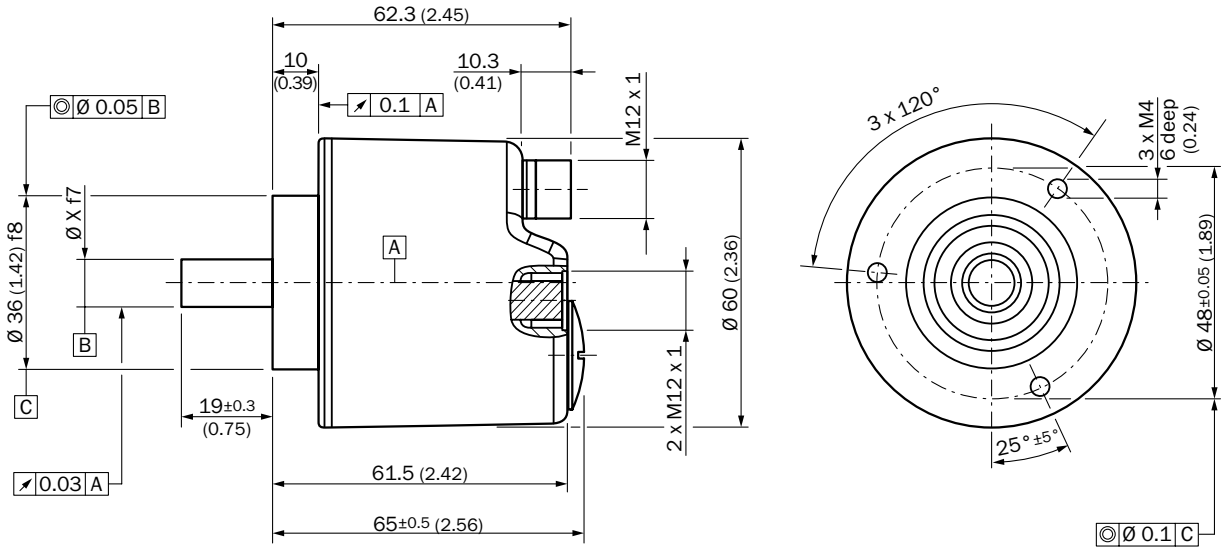
	Encoder type (multiturn)	Description	Type	Part no.
	AFM60A-S1IB018x12	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1IB sales kit 04	1057752
	AFM60A-S4IB018x12	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4IB sales kit 04	1057753
	AFM60A-BDIB018x12	Blind hollow shaft, Ø 10 mm	AFM60A-BDIB sales kit 04	1057754
	AFM60A-BEIB018x12	Blind hollow shaft, Ø 12 mm	AFM60A-BEIB sales kit 04	1057755
	AFM60A-BHIB018x12	Blind hollow shaft, Ø 15 mm	AFM60A-BHIB sales kit 04	1057756

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Dimensional drawings (dimensions in mm)

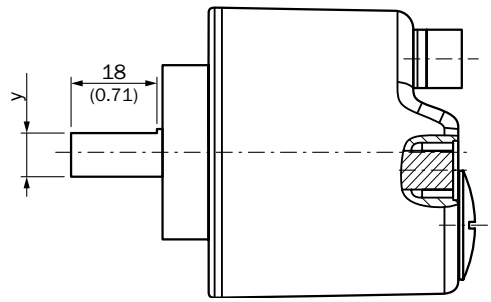
Face mount flange

Round shaft



General tolerances according to DIN ISO 2768-mk

Flat shaft

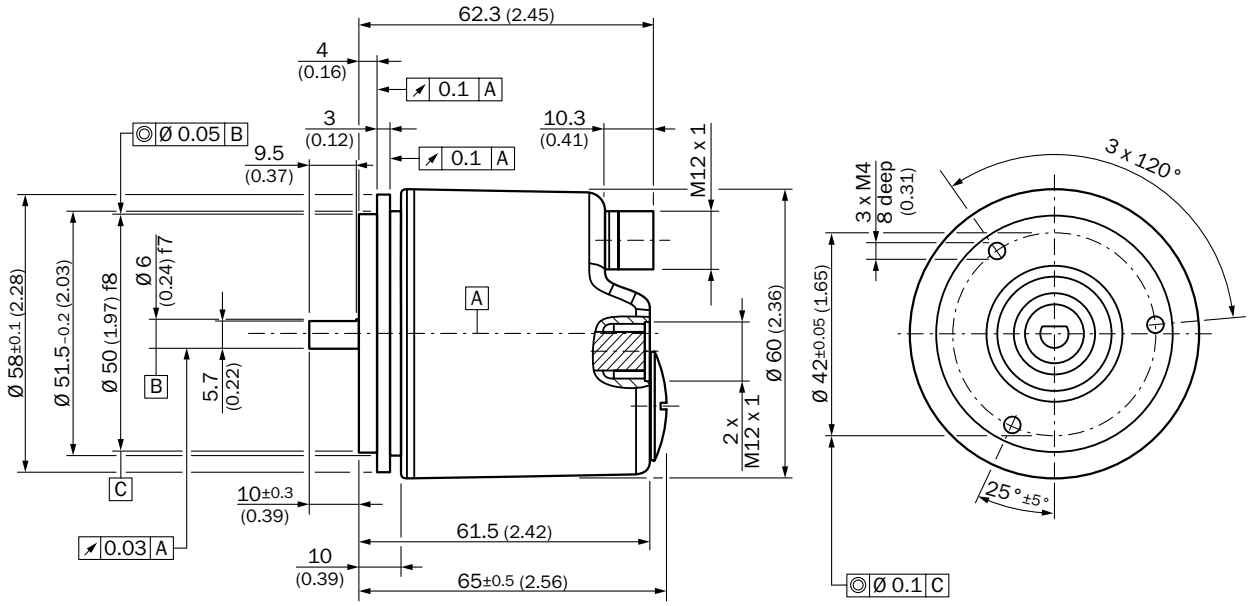


General tolerances according to DIN ISO 2768-mk

Diameter X f7	y
Face mount flange, 10 x 19 mm	9 mm
Face mount flange, 10 x 19 mm, round	–
Face mount flange, 3/8", round	–
Face mount flange, 3/8"	0.35"

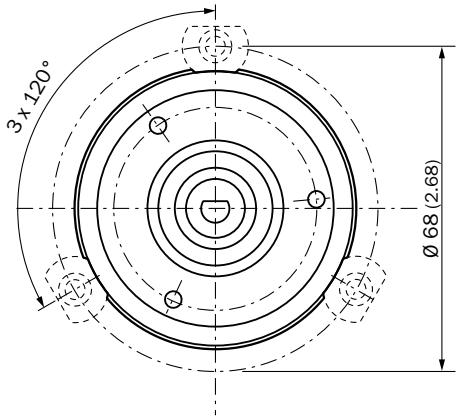
G

Servo flange

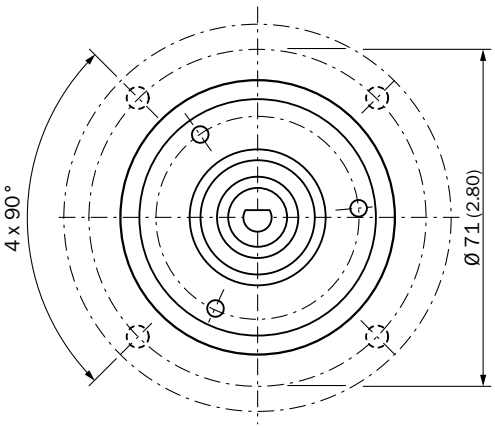


General tolerances according to DIN ISO 2768-mk

Mounting suggestion for small servo clamp
(part number 2029166)



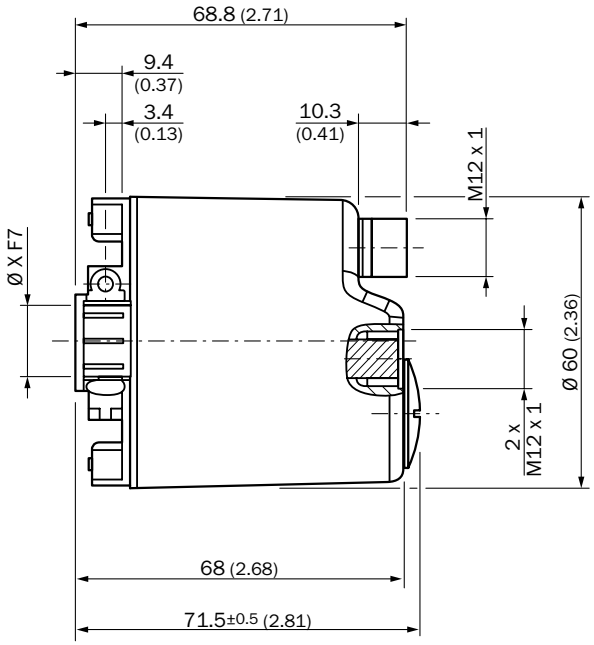
Mounting suggestion for half-shell servo clamp
(part number 2029165)

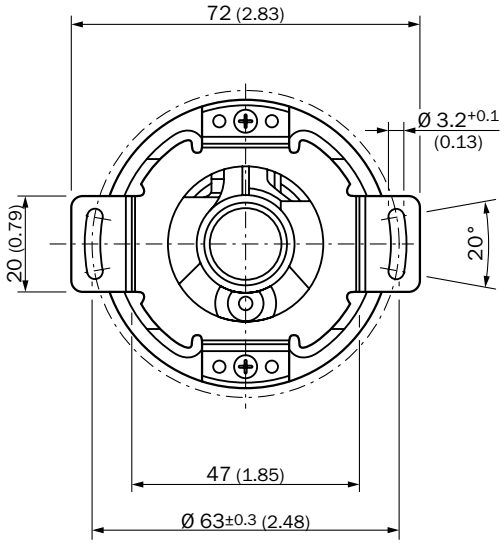


General tolerances according to DIN ISO 2768-mk

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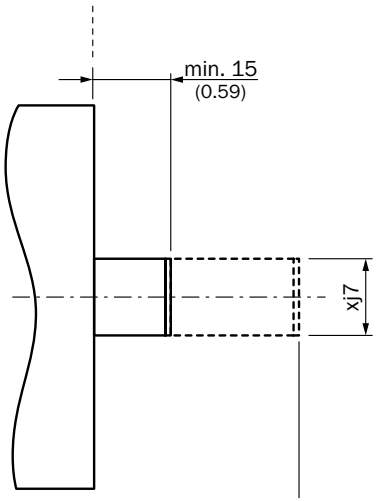
Blind hollow shaft





General tolerances according to DIN ISO 2768-mk

Mounting suggestion



General tolerances according to DIN ISO 2768-mk
xj7 = Shaft diameter, on the customer side

Diameter X F7	
AFS60 singleturn absolute encoder	**AFM60 multiturn absolute encoder**
Blind hollow shaft 1/4"	Blind hollow shaft 1/4"
Blind hollow shaft, 8 mm	Blind hollow shaft, 8 mm
Blind hollow shaft, 3/8"	Blind hollow shaft, 3/8"
Blind hollow shaft, 10 mm	Blind hollow shaft, 10 mm
Blind hollow shaft, 12 mm	Blind hollow shaft, 12 mm
Blind hollow shaft 1/2"	Blind hollow shaft 1/2"
Blind hollow shaft, 14 mm	Blind hollow shaft, 14 mm
Blind hollow shaft 15 mm	Blind hollow shaft 15 mm
Blind hollow shaft, 5/8"	

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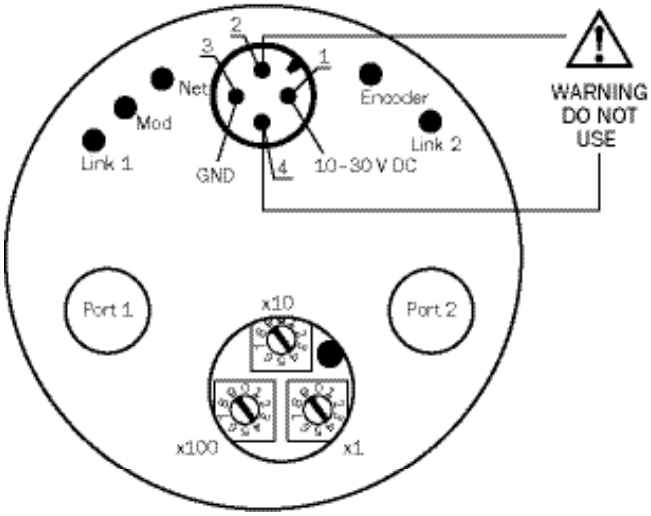
PIN assignment

M12 – 4 x D coding



Port 1				
Signal	T x D+	R x D+	T x D–	R x D–
Pin	1	2	3	4

Port 2				
Signal	T x D+	R x D+	T x D–	R x D–
Pin	1	2	3	4



M12 – 4 x A coding



Power supply				
Signal	10 ... 30 V	Not connected	GND	Not connected
Pin	1	2	3	4

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Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 36 mm, including mounting kit for face mount flange	BEF-WF-36	2029164

Dimensional drawings ➜ page K-725

Flanges

Flange plate

Figure	Brief description	Type	Part no.
	Standard stator coupling	BEF-DS00XFX	2056812
	Stator coupling, one-sided, 81 mm long with slot	BEF-DS01DFS/VFS	2047428
	Stator coupling, one-sided, 179 mm long with slot	BEF-DS02DFS/VFS	2047430
	Stator coupling, one-sided, 248 mm long with slots	BEF-DS03DFS/VFS	2047431
	Stator coupling, 16.5 mm high	BEF-DS05XFX	2057423
	Stator coupling with hole circle diameter 63 mm	BEF-DS07XFX	2059368
	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	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 10	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	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	BEF-FA-036-063REC	2034225

Dimensional drawings ➜ page K-725

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Other mounting accessories

Measuring wheels and measuring wheel systems

Figure	Brief description	Type	Part no.
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 500 mm	BEF-MR006050R	2055225
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 200 mm	BEF-MR010020R	2055224
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 500 mm	BEF-MR010050R	2055227
	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

Dimensional drawings ➜ page K-725

Modular measuring wheel system

Brief description	Type	Part no.
Measuring wheel system, desired mounting position: left, for DBS60-S4, DFS60-S4, AFS60-S4, and AFM60-S4	BEF-MRS-10-1	2071958
Measuring wheel system, desired mounting position: right, for DBS60-S4, DFS60-S4, AFS60-S4, and AFM60-S4	BEF-MRS-10-2	2071957

Dimensional drawings ➜ page K-725

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Mounting bell

Figure	Brief description	Type	Part no.
	Mounting bell for encoders with a servo flange, centering hub 50 mm, including mounting kit	BEF-MG-50	5312987

Dimensional drawings ➜ page K-725

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	BEF-WK-SF	2029166

Dimensional drawings ➜ page K-725

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Miscellaneous

Figure	Brief description	Type	Part no.
	Mounting kit for servo flange encoder on the bearing block, 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
	Bearing block for hollow shaft encoder, including fixing screws	BEF-FA-B12-010	2042728
	Bearing block for servo and face mount flange encoder	BEF-FA-LB1210	2044591

Dimensional drawings ➜ page K-725

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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 ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
	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 °C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	Bellows coupling, shaft diameter 10 mm/10 mm; maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular ± 4°; max. revolutions 10,000 rpm, –30° C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	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. revolutions 10,000 rpm, –30° C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	KUP-1012-B	5312984
	Bar coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, –10° C ... +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, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0608-S	5314179
	Bar coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; max. speed 10,000 rpm, –10° C ... +80 °C, max. torque 80 Ncm; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0610-S	2056407
	Bar coupling, shaft diameter 8 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0810-S	5314178
	Bar coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-1010-S	2056408
	Double-loop coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0610-D	5326697
	Double-loop coupling, shaft diameter 8 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0810-D	5326704
	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 °C ... +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 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-1012-D	5326702
	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 °C ... +80 °C, max. torque 60 Ncm; material: aluminum flange, fiber-glass reinforced polyamide membrane and tempered steel coupling pin	KUP-0610-F	5312985
	Spring washer coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.4 mm, angular ± 2.5°; max. speed 12,000 rpm, –10° ... +80° C, max. torque 60 Ncm; material: aluminum flange, glass fiber-reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986

Dimensional drawings ➜ page K-725

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Connectivity

Power supply

	Power supply (A-coded)
Mechanical parameters	
Number of pins	4
Cable diameter	4.7 mm
Minimum bend radius, secured in place	47 mm
Minimum bend radius, movable	47 mm
Maximum length of cable between participants	100 m
Material	
Outer sheath	PUR
Conductor	Bare copper strand
Color of outer sheath	Black RAL 9005
Cable parameters	
AWG	22
Wire cross-section	0.34 mm²
Wire colors	Brown, white, blue, black
Conductor resistance	≤ 58 Ω/km
Temperature range	
Fixed in place	–50 °C ... +80 °C
Moving	–25 °C ... +80 °C
Specific features	
Flame resistance	UL horizontal flame test/CSA FT2
Halogen-free state	PUR halogen-free
Microbe resistance	Excellent
Hydrolysis resistance	Excellent

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 4-pin, straight Head B: cable Cable: for power supply, suitable for drag chain, PUR, halogen-free, unshielded, 4 x 0.34 mm², Ø 4.7 mm	2 m	DOL-1204-G02MC	6025900
		5 m	DOL-1204-G05MC	6025901
		10 m	DOL-1204-G10MC	6025902
		25 m	DOL-1204-G25MC	6034751
	Head A: female connector, M12, 4-pin, angled Head B: cable Cable: for power supply, suitable for drag chain, PUR, halogen-free, unshielded, 4 x 0.34 mm², Ø 4.7 mm	2 m	DOL-1204-W02MC	6025903
		5 m	DOL-1204-W05MC	6025904
		10 m	DOL-1204-W10MC	6025905
		25 m	DOL-1204-W25MC	6034754

Dimensional drawings ➜ page K-725

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M12 round screw system

	Data cable (D-coded)
Mechanical parameters	
Number of pins	4
Cable diameter	6.4 mm
Minimum bend radius, secured in place	26 mm
Minimum bend radius, movable	26 mm
Maximum length of cable between participants	100 m
Material	
Outer sheath	PUR
Conductor	Bare copper strand
Color of outer sheath	Water blue RAL 5021
Electrical parameters	
Transmission properties (category)	CAT5 (IEC 11801:2002), CAT5e (TIA 568B:2001)
Cable parameters	
Cable structure	2 x 2 x AWG26/7 PIMF
Wire cross-section	0.14 mm²
Wire colors	White-green, white-orange
Conductor resistance	≤ 150 Ω/km
Shield	Braided tin-plated copper wires
Temperature range	
Fixed in place	–20 °C ... +80 °C
Moving	–20 °C ... +80 °C
Specific features	
Flame resistance	According to IEC 60332-1-2
Halogen-free state	According to IEC 60754-1
Oil resistance	According to DIN EN 60811-2-1
Other resistance	Microbe resistance in accordance with VDE 0282 Part 10 Hydrolysis resistance in accordance with DIN 53504
Smoke density	According to IEC 61034

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Connecting cables with male connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: cable Cable: PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	STL-1204-G02ME90	6045284
		5 m	STL-1204-G05ME90	6045285
		10 m	STL-1204-G10ME90	6045286
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: cable Cable: PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	STL-1204-W02ME90	6047912
		5 m	STL-1204-W05ME90	6047913
		10 m	STL-1204-W10ME90	6047914
		25 m	STL-1204-W20ME90	6047915

Dimensional drawings ➜ page K-725

Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 4-pin, straight, D-coded, shielded, for cable diameter 4 mm ... 8 mm Head B: -	DOS-1204-GE	6048153
	Head A: female connector, M12, 4-pin, angled, unshielded, for power supply, for cable diameter 3 mm ... 6.5 mm Head B: -	DOS-1204-W	6007303

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Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 4-pin, angled, D-coded, shielded, for cable diameter 4 mm ... 8 mm Head B: -	DOS-1204-WE	6048154

Dimensional drawings ➜ page K-725

Other plug connectors and cables

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 4-pin, D-coded Head B: female connector, RJ45, 8-pin Cable: shielded Switch cabinet feedthrough	Feedthrough female connector Ethernet RJ45	6048180

Dimensional drawings ➜ page K-725

Male connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: male connector, RJ45, 8-pin, straight, shielded, for cable diameter 4.5 mm ... 8 mm Head B: -	STE-0J08-GE	6048150
	Head A: male connector, M12, 4-pin, straight, D-coded, shielded, for cable diameter 4 mm ... 8 mm Head B: -	STE-1204-GE01	6048151
	Head A: male connector, M12, 4-pin, angled, D-coded, shielded, for cable diameter 4 mm ... 8 mm Head B: -	STE-1204-WE	6048152

Dimensional drawings ➜ page K-725

Connection cables with male and male connector

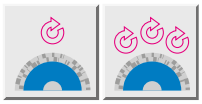
Figure	Brief description	Length of cable	Type	Part no.
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, straight, D-coded Cable: PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	SSL-1204-G02ME90	6045222
		5 m	SSL-1204-G05ME90	6045277
		10 m	SSL-1204-G10ME90	6045279
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, M12, 4-pin, straight, D-coded Cable: PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	SSL-1204-H02ME90	6047908
		5 m	SSL-1204-H05ME90	6047909
		10 m	SSL-1204-H10ME90	6047910
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, M12, 4-pin, angled, D-coded Cable: PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	SSL-1204-W02ME	6050632
		5 m	SSL-1204-W05ME	6050633
		10 m	SSL-1204-W10ME	6050634
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 8-pin, straight Cable: PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	SSL-2J04-G02ME60	6047916
		5 m	SSL-2J04-G05ME60	6047917
		10 m	SSL-2J04-G10ME60	6047918
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, RJ45, 8-pin, straight Cable: PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	SSL-2J04-H02ME	6047911
		5 m	SSL-2J04-H05ME	6045287
		10 m	SSL-2J04-H10ME	6045288

Dimensional drawings ➜ page K-725

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

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INTELLIGENT, POWERFUL, PRECISE





[1] UL 508 compliant.

More information

Fields of application G-333
Detailed technical data. G-333
Maximum viewing number of resolutions. G-335
Ordering information. G-335
Sales kits G-337
Dimensional drawings G-340
PIN assignment. G-343
Recommended accessories G-344

Product description

Intelligent diagnostic functions and rapid data transfer: High-resolution AFS/AFM60 PROFINET absolute encoders represent high-precision measurement of absolute position and speed in the area of industrial automation. Comprehensive functions for diagnosing parameters such as temperature or operating time and early error detection increase network reliability. Various configuration options, such as modification of resolution, rotational direction or unit of speed measurement simplify installation and enable customized adjustment to each application. Their compact design makes AFS/AFM60 PROFINET absolute encoders suitable for use even in applications with tight space available. Embedded switch technology ensures maximum system and equipment availability and therefore helps increase productivity

At a glance

- High-resolution 30-bit absolute encoder (18-bit singleturn and 12-bit multiturn)
- Face mount flange, servo flange and blind hollow shaft
- Connection type: 3 x M12 axial male connector
- PROFINET-IO-RT interface
- Less than 5 ms data update time
- Round axis functionality
- Alarms, warnings and diagnostics functions for speed, position, temperature, operating time, etc.
- Status display via 5 LEDs

Your benefits

- Increased productivity as a result of intelligent diagnostics functions and rapid data transfer
- Increase in network reliability due to early error detection
- Simple installation with various configuration options
- Flexible, easy setup and high resolutions for various applications with binary, integer and “decimal point” values based on round axis functionality
- Maximum system availability through embedded switch technology
- Compact and cost-efficient design

→ www.mysick.com/en/AFS_AFM60_PROFINET

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Measurement of absolute position and speed in various machines and systems used in industrial automation as well as production and process technology, for example: warehouse systems, packaging machines, hydraulic presses, printing machines, robots, rotating tables

Detailed technical data

Performance

Max. number of steps per revolution, AFS60 and AFM60	262,144 (18 bit) (maximum viewing number of resolutions, page G-335)
Max. number of revolutions	
AFM60	4,096 (12 bit)
AFS60	1
Resolution	
AFM60	18 x 12 bit
AFS60	18 bit
Error limits	≤ 0.03°
Repeatability	≤ 0.002°
Measurement increment deviation	± 0.002°
Measuring increment (360 °/ number of steps per revolution)	0.001°
Initialization time	Approx. 12 s

Interfaces

Electrical interface	PROFINET
Transfer rate	10/100 MBit/s
Transmission media	CAT 5e cable
Encoder profile	V4.1 Class3
Configuration data	Number of steps per revolution, number of revolutions, PRESET, counting direction, sampling rate for speed monitoring, unit for output of the speed value, round axis functionality (multiturn version only)
Available diagnostic data	Current, minimum and maximum temperature, maximum speed, power-on counter, operating hours counter, power-on/motion, counter of direction changes/number of movements cw/number of movements ccw, maximum operating voltage

Electrical data

Power consumption max.	3.0 W
Operating voltage range with reverse polarity protection	10 ... 30 V
Reverse polarity protection	✔
MTTFd: mean time to dangerous failure	80 years (EN ISO 13849-1) [1]

[1] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of devices, average ambient temperature 40 °C, frequency of use 8,760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

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Mechanical data

Operating speed [1]	
Solid shaft	9,000 rpm (maximum viewing number of resolutions, page G-335)
Blind hollow shaft	6,000 rpm (maximum viewing number of resolutions, page G-335)
Mass	0.2 kg
Permissible shaft load, solid shaft	80 N (radial); 40 N (axial)
Permissible shaft movement of the drive element, blind hollow shaft	± 0.3 / ± 0.05 mm (radial, static/dynamic) ± 0.5 / ± 0.1 mm (axial, static/dynamic)
Rotor moment of inertia	
Solid shaft	≤ 6.2 gcm²
Blind hollow shaft	≤ 40 gcm²
Bearing lifetime	3 x 10^9 revolutions
Start up torque at 20 °C	
Solid shaft	0.5 Ncm
Blind hollow shaft	0.8 Ncm
Operating torque at 20 °C	
Solid shaft	0.3 Ncm
Blind hollow shaft	0.6 Ncm
Max. angular acceleration	5 x 10^5 rad/s²
Shaft diameter	
Face mount flange, solid shaft	10 x 19 mm
Servo flange, solid shaft	6 x 10 mm
Blind hollow shaft, AFM60	8, 10, 12, 14, 15 mm, 1/4", 1/2", 3/8"
Blind hollow shaft, AFS60	8, 10, 12, 14, 15 mm, 1/4", 1/2", 3/8", 5/8"
Shaft material	Stainless steel
Flange material	
Solid shaft	Aluminum
Blind hollow shaft, AFM60	Aluminum
Blind hollow shaft, AFS60	Zinc die cast
Housing material	Aluminum

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

Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-3 [1]
Enclosure rating (as per IEC 60529)	IP 65, on the shaft side IP 67, on the housing side [2]
Permissible relative humidity	90% (condensation of optical surfaces not permitted)
Operating temperature range	–40 °C ... +85 °C
Storage temperature range	–40 °C ... +100 °C, without packaging
Resistance to shocks (according to EN 60068-2-27)	100 g/ 6 ms
Resistance to vibration (according to EN 60068-2-6)	30 g/ 10 Hz ... 2,000 Hz

[1] The EMC according to the standards quoted is achieved if shielded cables are used.

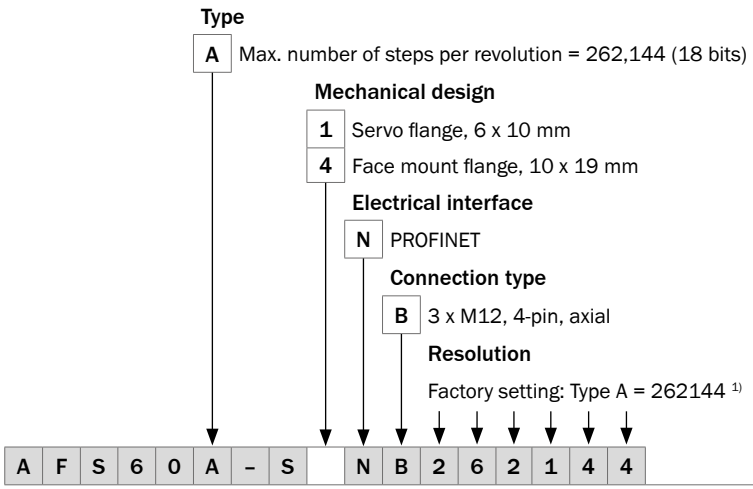
[2] When mating connector is inserted.

Maximum viewing number of resolutions

The maximum singleturn resolution (= 18 bit) can be operated with the maximum operating speed (blind hollow shaft 6,000 rpm and solid shaft 9,000 rpm).

Ordering information

Type code AFS absolute encoder, singleturn, solid shaft

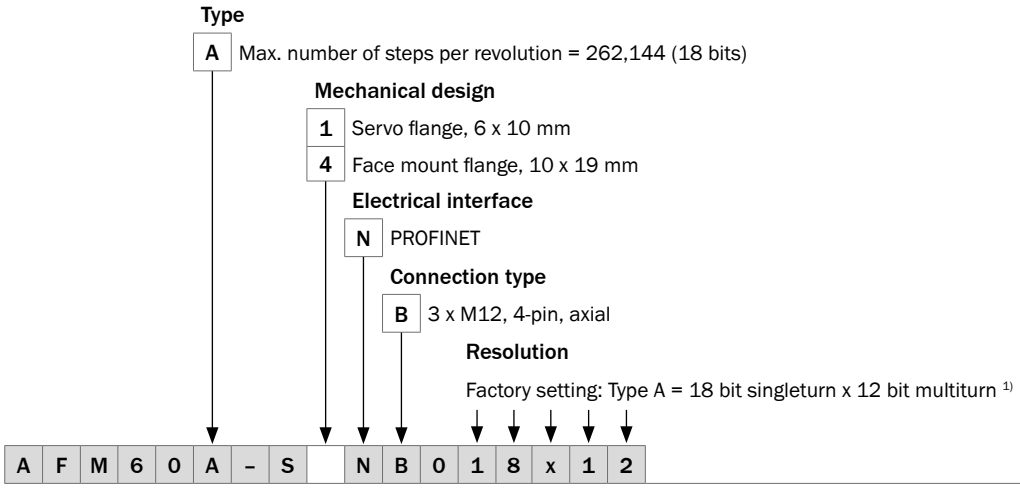


1) Number of steps programmable via control unit: Type A = 2 to 262144.

Example orders

Mechanical design	Type	Part no.
Solid shaft, servo flange, Ø 6 mm, length 10 mm	AFS60A-S1NB262144	1059051
Solid shaft, face mount flange, Ø 10 mm, length 19 mm	AFS60A-S4NB262144	1059050

Type code AFM, multiturn absolute encoder, solid shaft

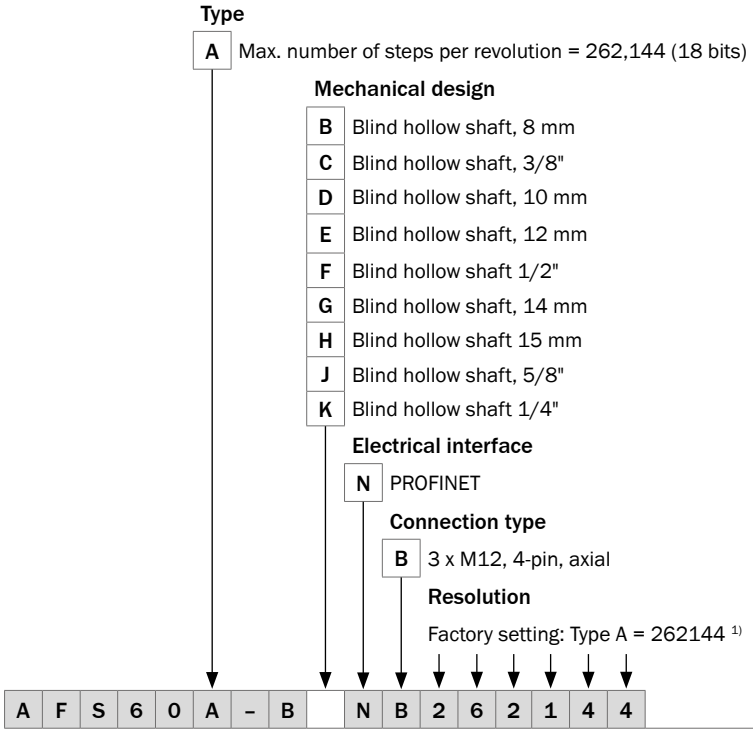


1) Programmable options for resolution via control unit.

Example orders

Mechanical design	Type	Part no.
Solid shaft, servo flange, Ø 6 mm, length 10 mm	AFM60A-S1NB018x12	1059040
Solid shaft, face mount flange, Ø 10 mm, length 19 mm	AFM60A-S4NB018x12	1059039

Type code AFS singleturn absolute encoder, solid shaft



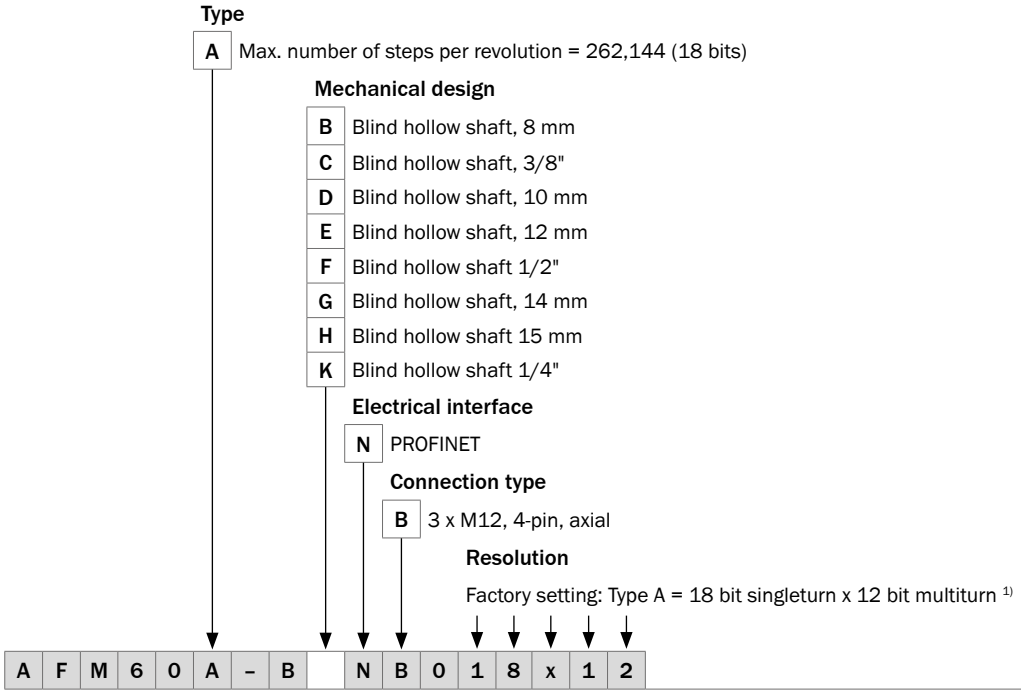
1) Number of steps programmable via control unit: Type A = 2 to 262144.

Example orders

Mechanical design	Type	Part no.
Blind hollow shaft, Ø 8 mm	AFS60A-BBNB262144	1059049
Blind hollow shaft, Ø 3/8"	AFS60A-BCNB262144	1059048
Blind hollow shaft, Ø 10 mm	AFS60A-BDNB262144	1059047
Blind hollow shaft, Ø 12 mm	AFS60A-BENB262144	1059046
Blind hollow shaft Ø 1/2"	AFS60A-BFNB262144	1059045
Blind hollow shaft, Ø 14 mm	AFS60A-BGNB262144	1059044
Blind hollow shaft, Ø 15 mm	AFS60A-BHNB262144	1059043
Blind hollow shaft, Ø 5/8"	AFS60A-BJNB262144	1059042
Blind hollow shaft Ø 1/4"	AFS60A-BKNB262144	1059041

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Type code AFM, multiturn absolute encoder, blind hollow shaft



1) Programmable options for resolution via control unit.

Example orders

Mechanical design	Type	Part no.
Blind hollow shaft, Ø 8 mm	AFM60A-BBNB018x12	1059038
Blind hollow shaft, Ø 3/8"	AFM60A-BCNB018x12	1059036
Blind hollow shaft, Ø 10 mm	AFM60A-BDNB018x12	1059035
Blind hollow shaft, Ø 12 mm	AFM60A-BENB018x12	1059034
Blind hollow shaft Ø 1/2"	AFM60A-BFNB018x12	1059033
Blind hollow shaft, Ø 14 mm	AFM60A-BGNB018x12	1059032
Blind hollow shaft, Ø 15 mm	AFM60A-BHNB018x12	1059031
Blind hollow shaft Ø 1/4"	AFM60A-BKNB018x12	1059029

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Sales kits

Sales kit 01

PROFINET encoder

- + Female connector, supply voltage, angled (DOS-1204-W, part number. 6007303)
- + Male cable connector, PROFINET signal, angled, (STE-1204-WZ, part number 6048262)

	Encoder type (singleturn)	Description	Type	Part no.
	AFS60A-S1NB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1NB sales kit 01	1059352
	AFS60A-S4NB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4NB sales kit 01	1059356
	AFS60A-BDNB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDNB sales kit 01	1059357
	AFS60A-BENB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BENB sales kit 01	1059358
	AFS60A-BHNB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHNB sales kit 01	1059359

	Encoder type (multiturn)	Description	Type	Part no.
	AFM60A-S1NB262144	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1NB sales kit 01	1059360
	AFM60A-S4NB262144	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4NB sales kit 01	1059361
	AFM60A-BDNB262144	Blind hollow shaft, Ø 10 mm	AFM60A-BDNB sales kit 01	1059362
	AFM60A-BENB262144	Blind hollow shaft, Ø 12 mm	AFM60A-BENB sales kit 01	1059363
	AFM60A-BHNB262144	Blind hollow shaft, Ø 15 mm	AFM60A-BHNB sales kit 01	1059364

Sales kit 02

PROFINET encoder

- + Female cable connector, supply voltage, angled, pre-wired with 5 m cable (DOL-1204-W05MC, part number 6025904)
- + Female cable connector, PROFINET signal, angled, pre-wired with 5 m cable (STL-1204-W05MZ90, part number 6048257)

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	Encoder type (singleturn)	Description	Type	Part no.
	AFS60A-S1NB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1NB sales kit 02	1059365
	AFS60A-S4NB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4NB sales kit 02	1059366
	AFS60A-BDNB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDNB sales kit 02	1059368
	AFS60A-BENB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BENB sales kit 02	1059369
	AFS60A-BHNB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHNB sales kit 02	1059370

	Encoder type (multiturn)	Description	Type	Part no.
	AFM60A-S1NB262144	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1NB sales kit 02	1059372
	AFM60A-S4NB262144	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4NB sales kit 02	1059373
	AFM60A-BDNB262144	Blind hollow shaft, Ø 10 mm	AFM60A-BDNB sales kit 02	1059375
	AFM60A-BENB262144	Blind hollow shaft, Ø 12 mm	AFM60A-BENB sales kit 02	1059376
	AFM60A-BHNB262144	Blind hollow shaft, Ø 15 mm	AFM60A-BHNB sales kit 02	1059377

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Sales kit 03

PROFINET encoder

- + Female connector, supply voltage, angled (DOS-1204-W, part number. 6007303)
- + 2 male cable connectors, PROFINET signal, angled, (STE-1204-WZ, part number 6048262)

	Encoder type (singleturn)	Description	Type	Part no.
	AFS60A-S1NB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1NB sales kit 03	1059379
	AFS60A-S4NB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4NB sales kit 03	1059380
	AFS60A-BDNB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDNB sales kit 03	1059381
	AFS60A-BENB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BENB sales kit 03	1059382
	AFS60A-BHNB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHNB sales kit 03	1059383

	Encoder type (multiturn)	Description	Type	Part no.
	AFM60A-S1NB262144	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1NB sales kit 03	1059384
	AFM60A-S4NB262144	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4NB sales kit 03	1059385
	AFM60A-BDNB262144	Blind hollow shaft, Ø 10 mm	AFM60A-BDNB sales kit 03	1059386
	AFM60A-BENB262144	Blind hollow shaft, Ø 12 mm	AFM60A-BENB sales kit 03	1059387
	AFM60A-BHNB262144	Blind hollow shaft, Ø 15 mm	AFM60A-BHNB sales kit 03	1059388

Sales kit 04

PROFINET encoder

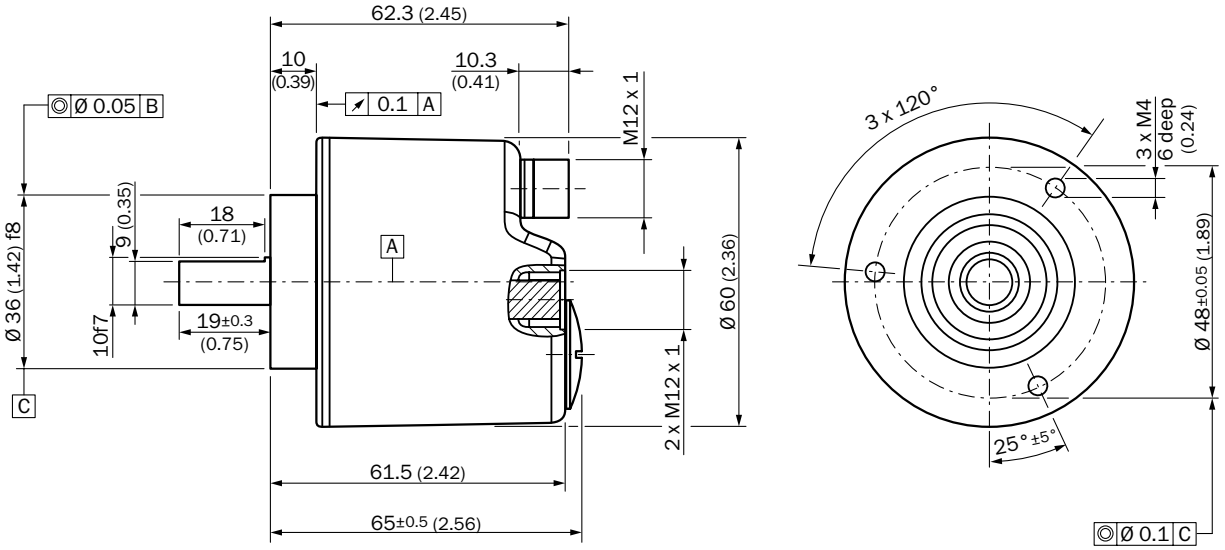
- + Female cable connector, supply voltage, angled, pre-wired with 5 m cable (DOL-1204-W05MC, part number 6025904)
- + 2 female cable connectors, PROFINET signal, angled, pre-wired with 5 m cable (STL-1204-W05MZ90, part number 6048257)

	Encoder type (singleturn)	Description	Type	Part no.
	AFS60A-S1NB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1NB sales kit 04	1059426
	AFS60A-S4NB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4NB sales kit 04	1059427
	AFS60A-BDNB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDNB sales kit 04	1059428
	AFS60A-BENB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BENB sales kit 04	1059429
	AFS60A-BHNB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHNB sales kit 04	1059430

	Encoder type (multiturn)	Description	Type	Part no.
	AFM60A-S1NB262144	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1NB sales kit 04	1059431
	AFM60A-S4NB262144	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4NB sales kit 04	1059433
	AFM60A-BDNB262144	Blind hollow shaft, Ø 10 mm	AFM60A-BDNB sales kit 04	1059434
	AFM60A-BENB262144	Blind hollow shaft, Ø 12 mm	AFM60A-BENB sales kit 04	1059437
	AFM60A-BHNB262144	Blind hollow shaft, Ø 15 mm	AFM60A-BHNB sales kit 04	1059439

Dimensional drawings (dimensions in mm)

Face mount flange



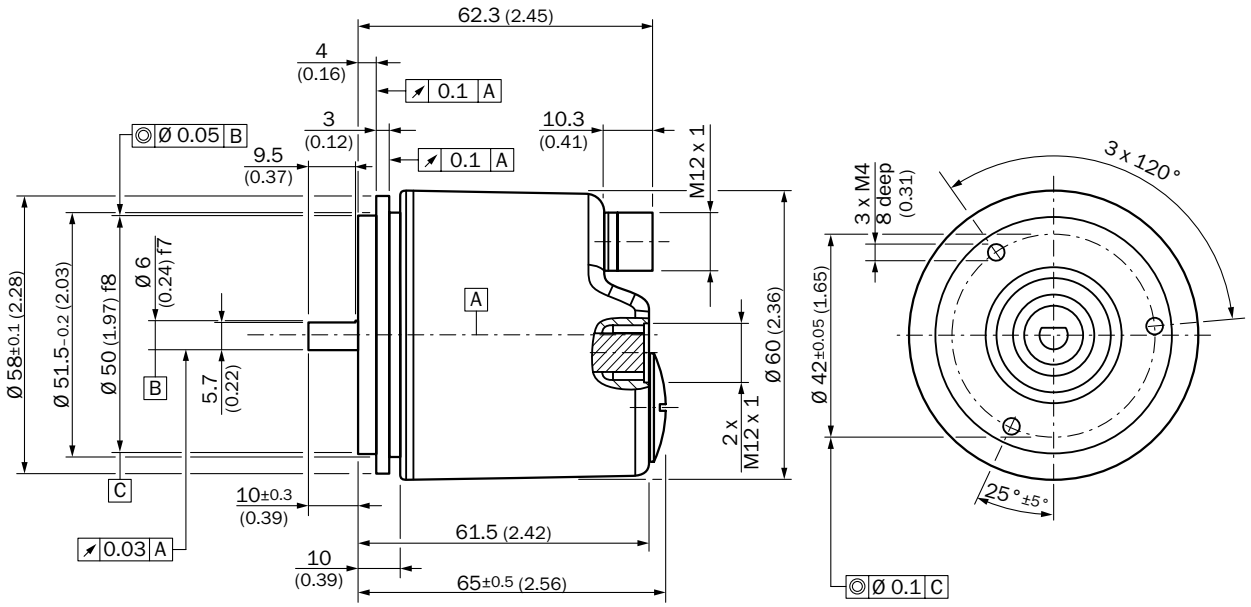
General tolerances according to DIN ISO 2768-mk

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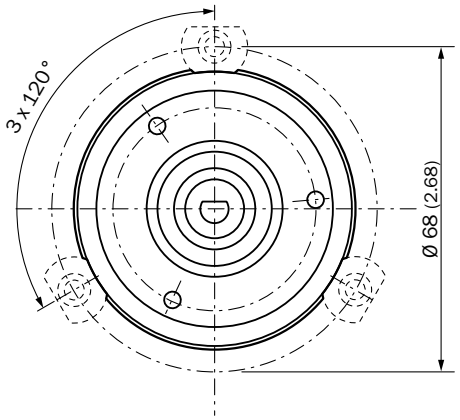
Subject to change without notice

Servo flange



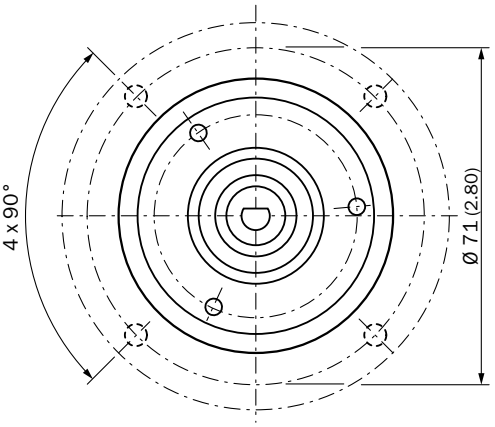
General tolerances according to DIN ISO 2768-mk

Mounting suggestion for small servo clamp (part number 2029166)



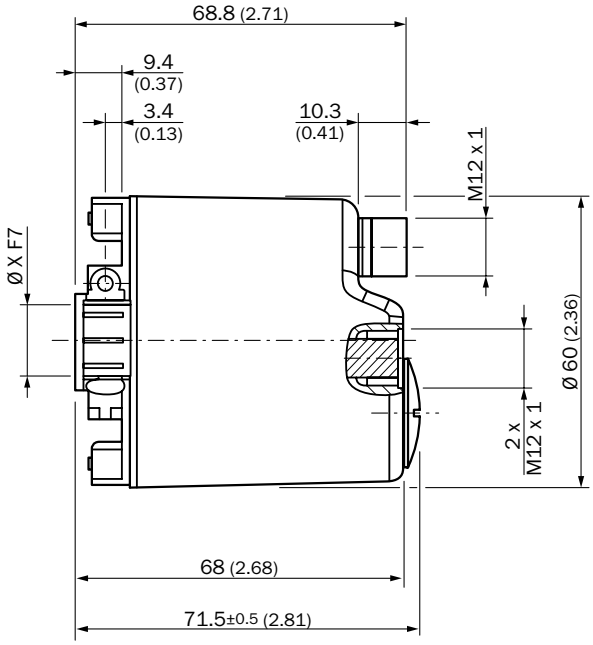
General tolerances according to DIN ISO 2768-mk

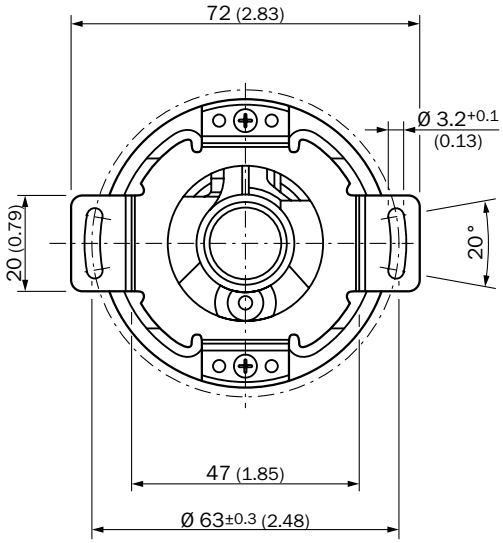
Mounting suggestion for half-shell servo clamp (part number 2029165)



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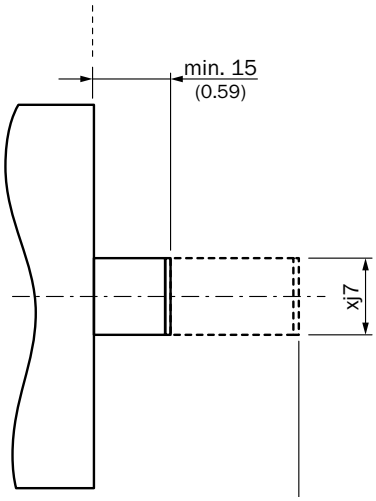
Blind hollow shaft





General tolerances according to DIN ISO 2768-mk

Mounting suggestion

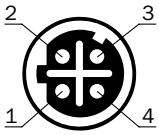


General tolerances according to DIN ISO 2768-mk
xj7 = Shaft diameter, on the customer side

Diameter X F7	
AFS60 singleturn absolute encoder	**AFM60 multiturn absolute encoder**
Blind hollow shaft 1/4"	Blind hollow shaft 1/4"
Blind hollow shaft, 8 mm	Blind hollow shaft, 8 mm
Blind hollow shaft, 3/8"	Blind hollow shaft, 3/8"
Blind hollow shaft, 10 mm	Blind hollow shaft, 10 mm
Blind hollow shaft, 12 mm	Blind hollow shaft, 12 mm
Blind hollow shaft 1/2"	Blind hollow shaft 1/2"
Blind hollow shaft, 14 mm	Blind hollow shaft, 14 mm
Blind hollow shaft 15 mm	Blind hollow shaft 15 mm
Blind hollow shaft, 5/8"	

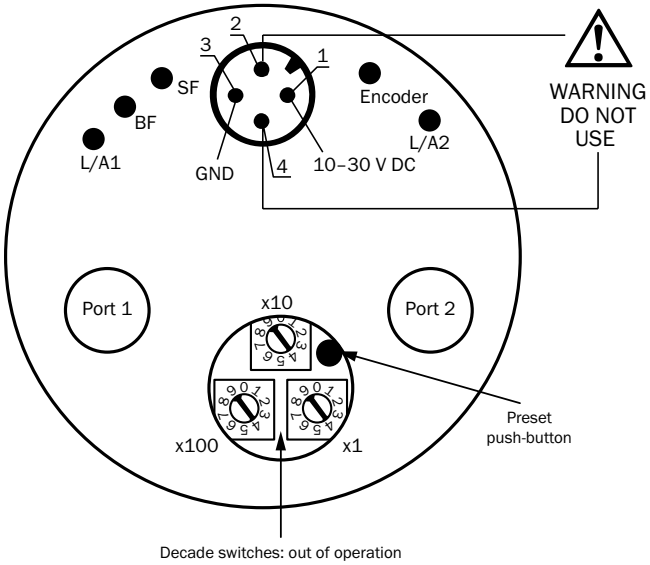
PIN assignment

M12 – 4-pin (D-coded)

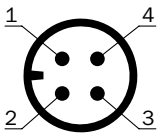


Port 1				
Signal	T x D+	R x D+	T x D–	R x D–
Pin	1	2	3	4
Wire colors	Yellow	White	Orange	Blue

Port 2				
Signal	T x D+	R x D+	T x D–	R x D–
Pin	1	2	3	4
Wire colors	Yellow	White	Orange	Blue



M12 – 4-pin (A-coded)



Supply voltage				
Signal	U_S 10 ... 30 V	Not assigned	GND	Not assigned
Pin	1	2	3	4
Wire colors	Brown	White	Blue	Black

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Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 36 mm, including mounting kit for face mount flange	BEF-WF-36	2029164

Dimensional drawings ➜ page K-725

Flanges

Flange plate

Figure	Brief description	Type	Part no.
	Standard stator coupling	BEF-DS00XFX	2056812
	Stator coupling, one-sided, 81 mm long with slot	BEF-DS01DFS/VFS	2047428
	Stator coupling, one-sided, 179 mm long with slot	BEF-DS02DFS/VFS	2047430
	Stator coupling, one-sided, 248 mm long with slots	BEF-DS03DFS/VFS	2047431
	Stator coupling, 16.5 mm high	BEF-DS05XFX	2057423
	Stator coupling with hole circle diameter 63 mm	BEF-DS07XFX	2059368
	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	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 10	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	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	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	BEF-FA-036-100	2029161

Dimensional drawings ➜ page K-725

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Other mounting accessories

Measuring wheels and measuring wheel systems

Figure	Brief description	Type	Part no.
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 200 mm	BEF-MR010020R	2055224
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 500 mm	BEF-MR010050R	2055227
	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

Dimensional drawings ➜ page K-725

Modular measuring wheel system

Brief description	Type	Part no.
Measuring wheel system, desired mounting position: left, for DBS60-S4, DFS60-S4, AFS60-S4, and AFM60-S4	BEF-MRS-10-1	2071958
Measuring wheel system, desired mounting position: right, for DBS60-S4, DFS60-S4, AFS60-S4, and AFM60-S4	BEF-MRS-10-2	2071957

Dimensional drawings ➜ page K-725

Mounting bell

Figure	Brief description	Type	Part no.
	Mounting bell for encoders with a servo flange, centering hub 50 mm, including mounting kit	BEF-MG-50	5312987

Dimensional drawings ➜ page K-725

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	BEF-WK-SF	2029166

Dimensional drawings ➜ page K-725

Miscellaneous

Figure	Brief description	Type	Part no.
	Mounting kit for servo flange encoder on the bearing block, 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
	Bearing block for hollow shaft encoder, including fixing screws	BEF-FA-B12-010	2042728
	Bearing block for servo and face mount flange encoder	BEF-FA-LB1210	2044591

Dimensional drawings ➜ page K-725

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 ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
	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 °C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	Bellows coupling, shaft diameter 10 mm/10 mm; maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular ± 4°; max. revolutions 10,000 rpm, –30° C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	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. revolutions 10,000 rpm, –30° C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	KUP-1012-B	5312984
	Bar coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, –10° C ... +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, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0608-S	5314179
	Bar coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; max. speed 10,000 rpm, –10° C ... +80 °C, max. torque 80 Ncm; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0610-S	2056407
	Bar coupling, shaft diameter 8 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0810-S	5314178
	Bar coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-1010-S	2056408
	Double-loop coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0610-D	5326697
	Double-loop coupling, shaft diameter 8 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0810-D	5326704
	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 °C ... +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 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-1012-D	5326702

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Figure	Brief description	Type	Part no.
	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 °C ... +80 °C, max. torque 60 Ncm; material: aluminum flange, fiber-glass reinforced polyamide membrane and tempered steel coupling pin	KUP-0610-F	5312985
	Spring washer coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.4 mm, angular ± 2.5°; max. speed 12,000 rpm, –10° ... +80° C, max. torque 60 Ncm; material: aluminum flange, glass fiber-reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986

Dimensional drawings ➜ page K-725

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Connectivity

Power supply

	Power supply (A-coded)
Mechanical parameters	
Number of pins	4
Cable diameter	4.7 mm
Minimum bend radius, secured in place	47 mm
Minimum bend radius, movable	47 mm
Maximum length of cable between participants	100 m
Material	
Outer sheath	PUR
Conductor	Bare copper strand
Color of outer sheath	Black RAL 9005
Cable parameters	
AWG	22
Wire cross-section	0.34 mm²
Wire colors	Brown, white, blue, black
Conductor resistance	≤ 58 Ω/km
Temperature range	
Fixed in place	–50 °C ... +80 °C
Moving	–25 °C ... +80 °C
Specific features	
Flame resistance	UL horizontal flame test/CSA FT2
Halogen-free state	PUR halogen-free
Microbe resistance	Excellent
Hydrolysis resistance	Excellent

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Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 4-pin, straight Head B: cable Cable: for power supply, suitable for drag chain, PUR, halogen-free, unshielded, 4 x 0.34 mm², Ø 4.7 mm	2 m	DOL-1204-G02MC	6025900
		5 m	DOL-1204-G05MC	6025901
		10 m	DOL-1204-G10MC	6025902
		25 m	DOL-1204-G25MC	6034751
	Head A: female connector, M12, 4-pin, angled Head B: cable Cable: for power supply, suitable for drag chain, PUR, halogen-free, unshielded, 4 x 0.34 mm², Ø 4.7 mm	2 m	DOL-1204-W02MC	6025903
		5 m	DOL-1204-W05MC	6025904
		10 m	DOL-1204-W10MC	6025905
		25 m	DOL-1204-W25MC	6034754

Dimensional drawings ➜ page K-725

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	Data cable
Mechanical parameters	
Number of pins	4
Coding type	D-coded
Cable diameter	6.50 mm
Minimum bend radius, secured in place	19.5 mm
Minimum bend radius, movable	45.5 mm
Maximum length of cable between participants	100 m
Material	
Cable material	PVC
Conductor	Tin-plated copper strand
Cable color	Green RAL 6018
Electrical parameters	
Transmission properties (category)	CAT5 (IEC 11801:2002), CAT5e (TIA 568B:2001)
Cable parameters	
Signal type	PROFINET
Cable structure	1x4xAWG22/7; SF/Q
Wire colors	White, yellow, blue, orange
Wire cross-section	0.34 mm^2
Conductor resistance	≤ 120 Ω/km
Shielding	Braided tin-plated copper wires
Temperature range	
Male connector, pre-wired with cable	
Fixed in place	–25 °C ... +60 °C
Moving	–5 °C ... +50 °C
M12 connector	
Ambient temperature (operation)	–40 °C ... +85 °C
RJ45 connector	
Ambient temperature (operation)	–10 °C ... +60 °C
Specific features	
Flame resistance	According to IEC 60332-1

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Connecting cables with male connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: cable Cable: PVC, shielded, 4 x 0.34 mm^2, Ø 6.5 mm	2 m	STL-1204-G02MZ90	6048247
		5 m	STL-1204-G05MZ90	6048248
		10 m	STL-1204-G10MZ90	6048249
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: cable Cable: PVC, shielded, 4 x 0.34 mm^2, Ø 6.5 mm	2 m	STL-1204-W02MZ90	6048256
		5 m	STL-1204-W05MZ90	6048257
		10 m	STL-1204-W10MZ90	6048258
		25 m	STL-1204-W25MZ90	6048259

Dimensional drawings ➜ page K-725

Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 4-pin, straight, D-coded, shielded, for cable diameter 4 mm ... 8 mm	DOS-1204-GZ	6048263
	Head A: female connector, M12, 4-pin, angled, unshielded, for power supply, for cable diameter 3 mm ... 6.5 mm Head B: -	DOS-1204-W	6007303
	Head A: female connector, M12, 4-pin, angled, D-coded, shielded, for cable diameter 4 mm ... 8 mm	DOS-1204-WZ	6048264

Dimensional drawings ➜ page K-725

Other plug connectors and cables

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 4-pin, D-coded Head B: female connector, RJ45, 8-pin Cable: shielded Switch cabinet feedthrough	Feedthrough female connector Ethernet RJ45	6048180

Dimensional drawings ➜ page K-725

Male connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: male connector, RJ45, 4-pin, straight, shielded, for cable diameter 4.5 mm ... 8 mm	STE-0J04-GZ	6048260
	Head A: male connector, M12, 4-pin, straight, D-coded, shielded, for cable diameter 4 mm ... 8 mm	STE-1204-GZ	6048261
	Head A: male connector, M12, 4-pin, angled, D-coded, shielded, for cable diameter 4 mm ... 8 mm	STE-1204-WZ	6048262

Dimensional drawings ➜ page K-725

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Connection cables with male and male connector

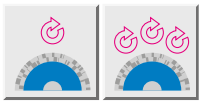
Figure	Brief description	Length of cable	Type	Part no.
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, M12, 4-pin, straight Cable: PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	SSL-1204-F02MZ90	6048250
		5 m	SSL-1204-F05MZ90	6048251
		10 m	SSL-1204-F10MZ90	6048252
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, straight Cable: PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	SSL-1204-G02MZ90	6048241
		5 m	SSL-1204-G05MZ90	6048242
		10 m	SSL-1204-G10MZ90	6048243
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, M12, 4-pin, angled, D-coded Cable: PUR, halogen-free, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	SSL-1204-W02MZ	6050635
		5 m	SSL-1204-W05MZ	6050636
		10 m	SSL-1204-W10MZ	6050637
	Head A: male connector, RJ45, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, angled Cable: PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	SSL-2J04-F02MZ	6048253
		5 m	SSL-2J04-F05MZ	6048254
		10 m	SSL-2J04-F10MZ	6048255
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 4-pin, straight Cable: PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	SSL-2J04-G02MZ60	6048244
		5 m	SSL-2J04-G05MZ60	6048245
		10 m	SSL-2J04-G10MZ60	6048246

Dimensional drawings ➜ page K-725

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

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INTELLIGENT, POWERFUL, PRECISE





[1] UL 508 compliant.

More information

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Product description

Intelligent diagnostic functions and rapid data transfer: High-resolution AFS/AFM60 EtherCAT® absolute encoders represent high-precision measurement of absolute position and speed in the area of industrial automation. Comprehensive functions for diagnosing parameters such as temperature or operating time and early error detection increase network reliability. Various configuration options, such as modification of resolution, rotational direction or unit of speed measurement simplify installation and enable customized adjustment to each application. Their compact design also makes AFS/AFM60 EtherCat® absolute encoders suitable for applications in confined spaces. Embedded switch technology ensures maximum system and equipment availability and thus contributes to increased productivity.

At a glance

- High-resolution 30-bit absolute encoder (18-bit singleturn and 12-bit multiturn)
- Face mount flange, servo flange and blind hollow shaft
- Connection type: 3 x M12 axial male connector
- On the fly data transmission rate in µs range
- EtherCAT® interface CoE (CiA DS-301) Device profile (CiA DS-406)
- Round axis functionality
- Alarms, warnings and diagnostics functions for speed, position, temperature, operating time, etc.
- Status display via 5 LEDs
- Up to 16 adjustable electronic cam switches

Your benefits

- Increased productivity as a result of intelligent diagnostics functions and rapid data transfer
- Increase in network reliability due to early error detection
- Simple installation with various configuration options
- Flexible, easy setup and high resolutions for various applications with binary, integer and “decimal point” values based on round axis functionality
- Maximum system availability through embedded switch technology
- Compact and cost-efficient design

→ www.mysick.com/en/AFS_AFM60_EtherCAT

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Measurement of absolute position and speed in various machines and systems used in industrial automation as well as production and process technology, for example: warehouse systems, packaging machines, hydraulic presses, printing machines, robots, rotating tables

Detailed technical data

Performance

Max. number of steps per revolution, AFS60 and AFM60	262,144 (18 bit) (maximum viewing number of resolutions, page G-355)
Max. number of revolutions	
AFM60	4,096 (12 bit)
AFS60	1
Resolution	
AFM60	18 x 12 bit
AFS60	18 bit
Error limits	≤ 0.03°
Repeatability	≤ 0.002°
Measurement increment deviation	≤ 0.002°
Measuring increment (360 °/ number of steps per revolution)	0.001°
Cycle time	250 µs to 100 ms [1]
Initialization time	Approx. 12 s

[1] ≤ 500 µs to 250µs in Fast Data Exchange mode.

Interfaces

Electrical interface	EtherCAT®
Bus interface	EtherCAT, CoE (CiA DS-301) [1]
Encoder profile	CiA DS-406
Transfer rate	10/100 MBit/s
Transmission media	CAT 5e cable
Configuration data	Number of steps per revolution, number of revolutions, PRESET, counting direction, sampling rate for speed monitoring, unit for output of the speed value, round axis functionality (multiturn version only), electronic cams (2 channels x 8 cams), single or multi access mode, fast data exchange mode
Available diagnostic data	Current, minimum and maximum temperature, maximum speed, positioning monitoring, power-on counter, operating hours counter for power-on/motion, counter of direction changes/ number of movements cw/number of movements ccw, minimum and maximum operating voltage, signal monitoring for single and multiturn

[1] EtherCAT® is a registered trademark and patented technology licensed by Beckhoff Automation GmbH, Germany.

Electrical data

Operating voltage range	10 V DC ... 30 V DC
Max. power consumption without load	≤ 3 W
Reverse polarity protection	✔
MTTFd: mean time to dangerous failure	80 years (EN ISO 13849-1) [1]

[1] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of devices, average ambient temperature 40 °C, frequency of use 8,760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Mechanical data

Operating speed [1]	
Solid shaft	9,000 rpm (maximum viewing number of resolutions, page G-355)
Blind hollow shaft	6,000 rpm (maximum viewing number of resolutions, page G-355)
Mass	0.2 kg
Permissible shaft load, solid shaft	80 N (radial); 40 N (axial)
Permissible shaft movement of the drive element, blind hollow shaft	± 0.3 / ± 0.05 mm (radial, static/dynamic) ± 0.5 / ± 0.1 mm (axial, static/dynamic)
Rotor moment of inertia	
Solid shaft	≤ 6.2 gcm²
Blind hollow shaft	≤ 40 gcm²
Bearing lifetime	3 x 10^9 revolutions
Start up torque at 20 °C	
Solid shaft	0.5 Ncm
Blind hollow shaft	0.8 Ncm
Operating torque at 20 °C	
Solid shaft	0.3 Ncm
Blind hollow shaft	0.6 Ncm
Max. angular acceleration	5 x 10^5 rad/s²
Shaft diameter	
Face mount flange, solid shaft	10 x 19 mm
Servo flange, solid shaft	6 x 10 mm
Blind hollow shaft, AFM60	8, 10, 12, 14, 15 mm, 1/4", 1/2", 3/8"
Blind hollow shaft, AFS60	8, 10, 12, 14, 15 mm, 1/4", 1/2", 3/8", 5/8"
Shaft material	Stainless steel
Flange material	
Solid shaft	Aluminum
Blind hollow shaft, AFM60	Aluminum
Blind hollow shaft, AFS60	Zinc die cast
Housing material	Aluminum

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

Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-3 [1]
Enclosure rating (as per IEC 60529)[2]	IP 65, on the shaft side IP 67, on the housing side
Permissible relative humidity	90% (condensation of optical surfaces not permitted)
Operating temperature range	–40 °C ... +85 °C
Storage temperature range	–40 °C ... +100 °C, without packaging
Resistance to shocks (according to EN 60068-2-27)	100 g, 6 ms
Resistance to vibration (according to EN 60068-2-6)	30 g, 10 Hz ... 2,000 Hz

[1] The EMC according to the standards quoted is achieved if shielded cables are used.

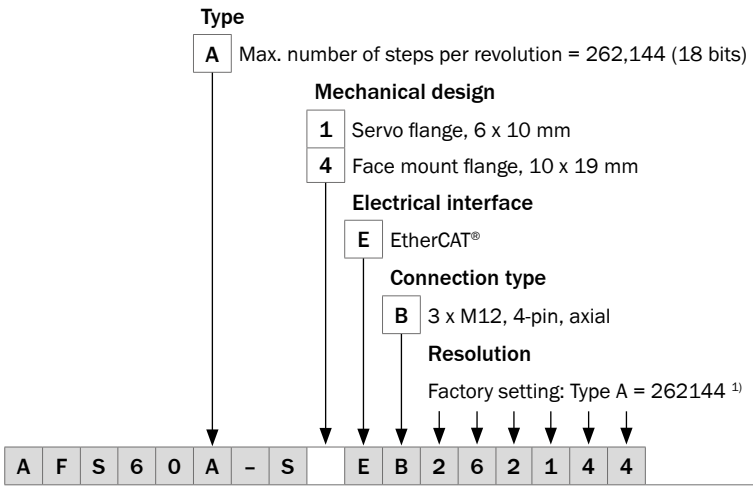
[2] When mating connector is inserted.

Maximum viewing number of resolutions

The maximum singleturn resolution (= 18 bit) can be operated with the maximum operating speed (blind hollow shaft 6,000 rpm and solid shaft 9,000 rpm).

Ordering information

Type code AFS absolute encoder, singleturn, solid shaft

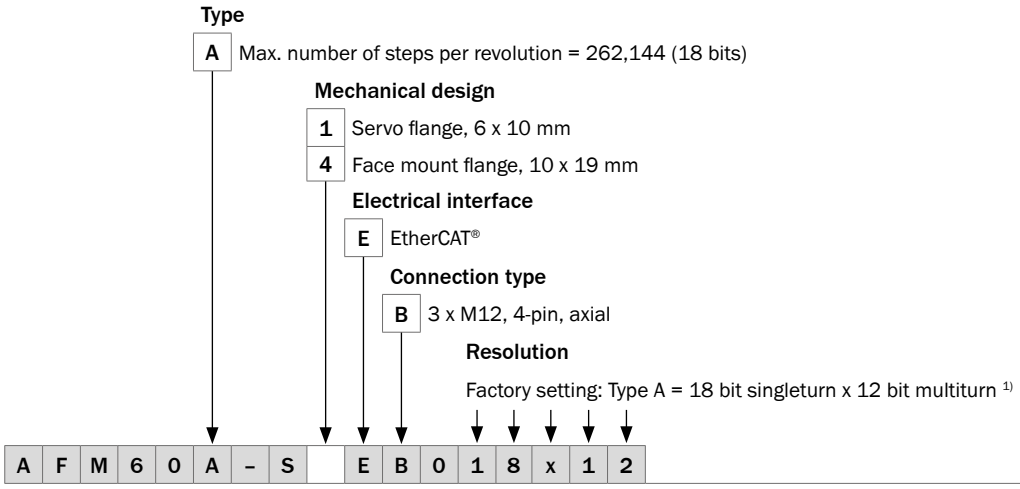


1) Number of steps programmable via control unit: Type A = 2 to 262144.

Example orders

Mechanical design	Type	Part no.
Solid shaft, servo flange, Ø 6 mm, length 10 mm	AFS60A-S1EB262144	1059072
Solid shaft, face mount flange, Ø 10 mm, length 19 mm	AFS60A-S4EB262144	1059071

Type code AFM, multiturn absolute encoder, solid shaft



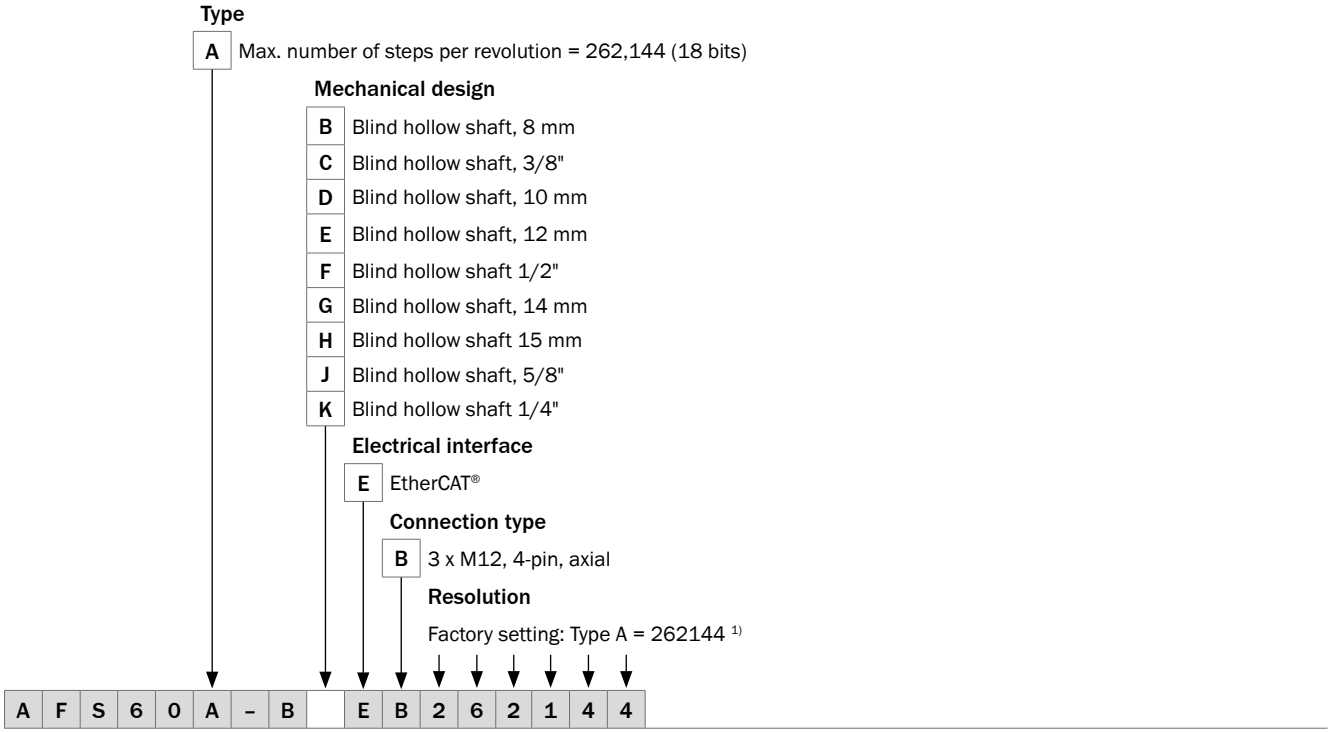
1) Programmable options for resolution via control unit.

Example orders

Mechanical design	Type	Part no.
Solid shaft, servo flange, Ø 6 mm, length 10 mm	AFM60A-S1EB018x12	1059061
Solid shaft, face mount flange, Ø 10 mm, length 19 mm	AFM60A-S4EB018x12	1059060

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Type code AFS singleturn absolute encoder, solid shaft



1) Number of steps programmable via control unit: Type A = 2 to 262144.

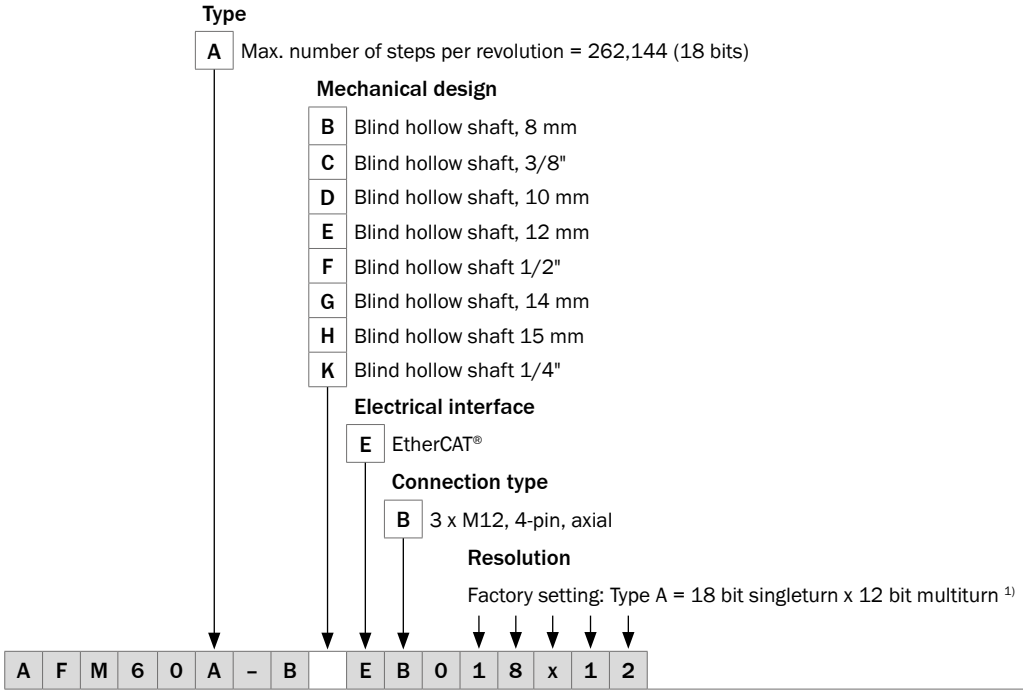
Example orders

Mechanical design	Type	Part no.
Blind hollow shaft, Ø 8 mm	AFS60A-BBEB262144	1059070
Blind hollow shaft, Ø 3/8"	AFS60A-BCEB262144	1059069
Blind hollow shaft, Ø 10 mm	AFS60A-BDEB262144	1059068
Blind hollow shaft, Ø 12 mm	AFS60A-BEEB262144	1059067
Blind hollow shaft Ø 1/2"	AFS60A-BFEB262144	1059066
Blind hollow shaft, Ø 14 mm	AFS60A-BGEB262144	1059065
Blind hollow shaft, Ø 15 mm	AFS60A-BHEB262144	1059064
Blind hollow shaft, Ø 5/8"	AFS60A-BJEB262144	1059063
Blind hollow shaft Ø 1/4"	AFS60A-BKEB262144	1059062

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Type code AFM, multiturn absolute encoder, blind hollow shaft



1) Programmable options for resolution via control unit.

Example orders

Mechanical design	Type	Part no.
Blind hollow shaft, Ø 8 mm	AFM60A-BBEB018x12	1059059
Blind hollow shaft, Ø 3/8"	AFM60A-BCEB018x12	1059058
Blind hollow shaft, Ø 10 mm	AFM60A-BDEB018x12	1059057
Blind hollow shaft, Ø 12 mm	AFM60A-BEEB018x12	1059056
Blind hollow shaft Ø 1/2"	AFM60A-BFEB018x12	1059055
Blind hollow shaft, Ø 14 mm	AFM60A-BGEB018x12	1059054
Blind hollow shaft, Ø 15 mm	AFM60A-BHEB018x12	1059053
Blind hollow shaft Ø 1/4"	AFM60A-BKEB018x12	1059052

Sales kits

Sales kit 01

EtherCAT® encoder

- + Female connector, supply voltage, angled (DOS-1204-W, part number. 6007303)
- + Male cable connector, EtherCAT® signal, angled, (STE-1204-WZ, part number 6048262)

	Encoder type (singleturn)	Description	Type	Part no.
	AFS60A-S1EB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1EB sales kit 01	1060469
	AFS60A-S4EB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4EB sales kit 01	1060470
	AFS60A-BDEB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDEB sales kit 01	1060471
	AFS60A-BEEB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BEEB sales kit 01	1060472
	AFS60A-BHEB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHEB sales kit 01	1060473

	Encoder type (multiturn)	Description	Type	Part no.
	AFM60A-S1EB018x12	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1EB sales kit 01	1060474
	AFM60A-S4EB018x12	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4EB sales kit 01	1060475
	AFM60A-BDEB018x12	Blind hollow shaft, Ø 10 mm	AFM60A-BDEB sales kit 01	1060476
	AFM60A-BEEB018x12	Blind hollow shaft, Ø 12 mm	AFM60A-BEEB sales kit 01	1060477
	AFM60A-BHEB018x12	Blind hollow shaft, Ø 15 mm	AFM60A-BHEB sales kit 01	1060478

Sales kit 02

EtherCAT® encoder

- + Female cable connector, supply voltage, angled, pre-wired with 5 m cable (DOL-1204-W05MC, part number 6025904)
- + Female cable connector, EtherCAT® signal, angled, pre-wired with 5 m cable (STL-1204-W05MZ90, part number 6048257)

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	Encoder type (singleturn)	Description	Type	Part no.
	AFS60A-S1EB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1EB sales kit 02	1060479
	AFS60A-S4EB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4EB sales kit 02	1060480
	AFS60A-BDEB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDEB sales kit 02	1060481
	AFS60A-BEEB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BEEB sales kit 02	1060482
	AFS60A-BHEB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHEB sales kit 02	1060483

	Encoder type (multiturn)	Description	Type	Part no.
	AFM60A-S1EB018x12	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1EB sales kit 02	1060484
	AFM60A-S4EB018x12	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4EB sales kit 02	1060485
	AFM60A-BDEB018x12	Blind hollow shaft, Ø 10 mm	AFM60A-BDEB sales kit 02	1060486
	AFM60A-BEEB018x12	Blind hollow shaft, Ø 12 mm	AFM60A-BEEB sales kit 02	1060487
	AFM60A-BHEB018x12	Blind hollow shaft, Ø 15 mm	AFM60A-BHEB sales kit 02	1060488

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Sales kit 03

EtherCAT® encoder

- + Female connector, supply voltage, angled (DOS-1204-W, part number. 6007303)
- + 2 male cable connectors, EtherCAT® signal, angled, (STE-1204-WZ, part number 6048262)

	Encoder type (singleturn)	Description	Type	Part no.
	AFS60A-S1EB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1EB sales kit 03	1060489
	AFS60A-S4EB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4EB sales kit 03	1060490
	AFS60A-BDEB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDEB sales kit 03	1060491
	AFS60A-BEEB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BEEB sales kit 03	1060492
	AFS60A-BHEB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHEB sales kit 03	1060493

	Encoder type (multiturn)	Description	Type	Part no.
	AFM60A-S1EB018x12	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1EB sales kit 03	1060495
	AFM60A-S4EB018x12	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4EB sales kit 03	1060496
	AFM60A-BDEB018x12	Blind hollow shaft, Ø 10 mm	AFM60A-BDEB sales kit 03	1060497
	AFM60A-BEEB018x12	Blind hollow shaft, Ø 12 mm	AFM60A-BEEB sales kit 03	1060498
	AFM60A-BHEB018x12	Blind hollow shaft, Ø 15 mm	AFM60A-BHEB sales kit 03	1060499

Sales kit 04

EtherCAT® encoder

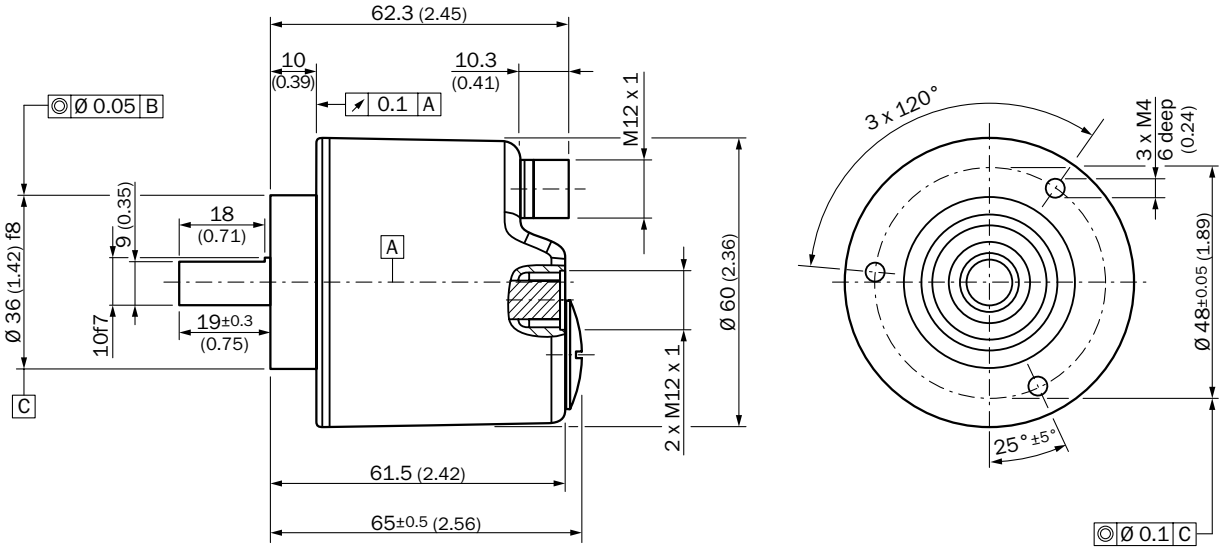
- + Female cable connector, supply voltage, angled, pre-wired with 5 m cable (DOL-1204-W05MC, part number 6025904)
- + 2 female cable connectors, EtherCAT® signal, angled, pre-wired with 5 m cable (STL-1204-W05MZ90, part number 6048257)

	Encoder type (singleturn)	Description	Type	Part no.
	AFS60A-S1EB262144	Solid shaft, servo flange, 6 x 10 mm	AFS60A-S1EB sales kit 04	1060500
	AFS60A-S4EB262144	Solid shaft, face mount flange, 10 x 19 mm	AFS60A-S4EB sales kit 04	1060501
	AFS60A-BDEB262144	Blind hollow shaft, Ø 10 mm	AFS60A-BDEB sales kit 04	1060502
	AFS60A-BEEB262144	Blind hollow shaft, Ø 12 mm	AFS60A-BEEB sales kit 04	1060503
	AFS60A-BHEB262144	Blind hollow shaft, Ø 15 mm	AFS60A-BHEB sales kit 04	1060504

	Encoder type (multiturn)	Description	Type	Part no.
	AFM60A-S1EB018x12	Solid shaft, servo flange, 6 x 10 mm	AFM60A-S1EB sales kit 04	1060505
	AFM60A-S4EB018x12	Solid shaft, face mount flange, 10 x 19 mm	AFM60A-S4EB sales kit 04	1060506
	AFM60A-BDEB018x12	Blind hollow shaft, Ø 10 mm	AFM60A-BDEB sales kit 04	1060507
	AFM60A-BEEB018x12	Blind hollow shaft, Ø 12 mm	AFM60A-BEEB sales kit 04	1060508
	AFM60A-BHEB018x12	Blind hollow shaft, Ø 15 mm	AFM60A-BHEB sales kit 04	1060509

Dimensional drawings (dimensions in mm)

Face mount flange



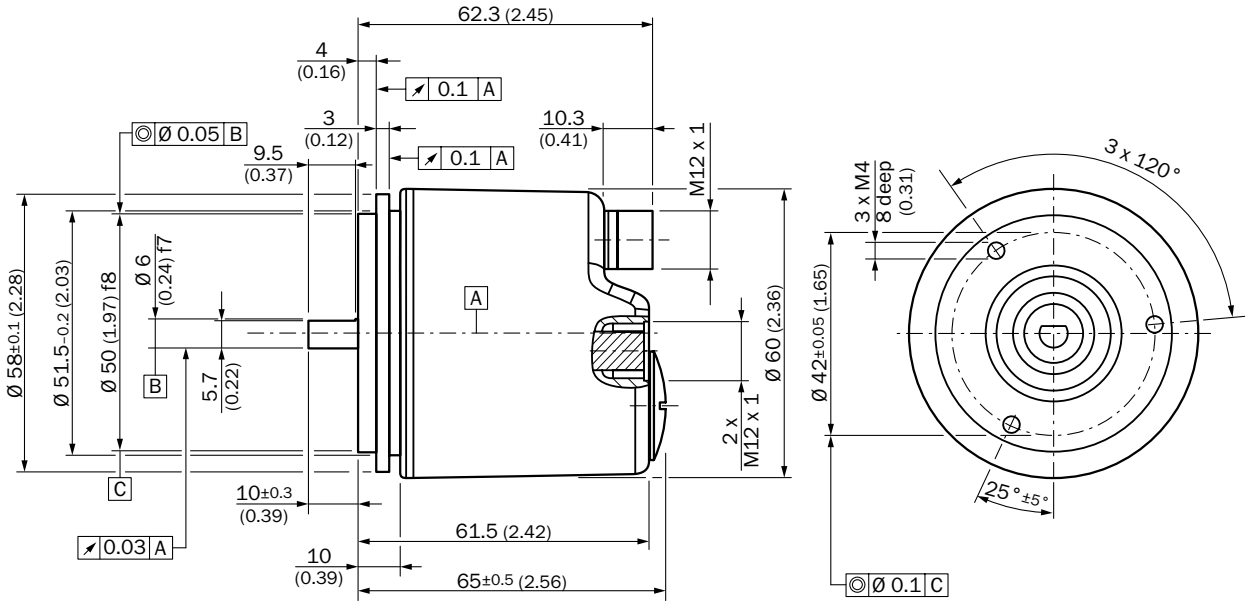
General tolerances according to DIN ISO 2768-mk

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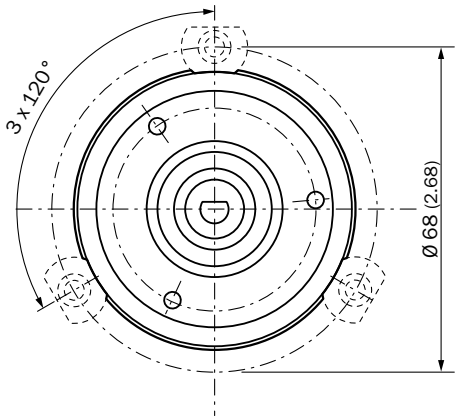
Subject to change without notice

Servo flange

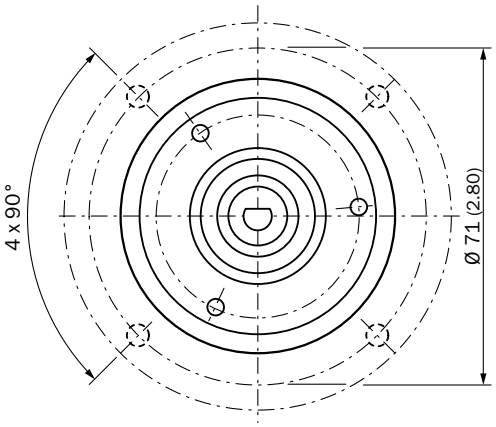


General tolerances according to DIN ISO 2768-mk

Mounting suggestion for small servo clamp (part number 2029166)



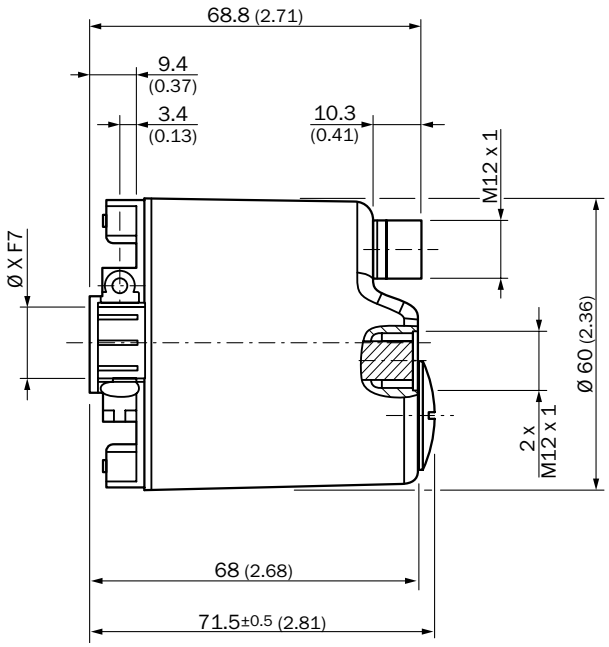
Mounting suggestion for half-shell servo clamp (part number 2029165)

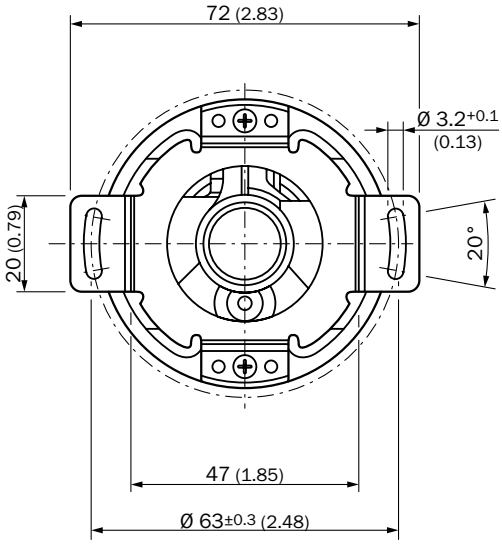


General tolerances according to DIN ISO 2768-mk

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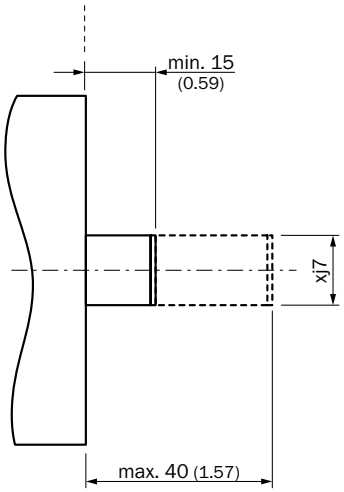
Blind hollow shaft





General tolerances according to DIN ISO 2768-mk

Mounting suggestion



General tolerances according to DIN ISO 2768-mk
xj7 = Shaft diameter, on the customer side

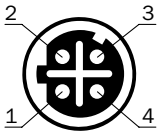
Diameter X F7	
AFS60 singleturn absolute encoder	**AFM60 multiturn absolute encoder**
Blind hollow shaft 1/4"	Blind hollow shaft 1/4"
Blind hollow shaft, 8 mm	Blind hollow shaft, 8 mm
Blind hollow shaft, 3/8"	Blind hollow shaft, 3/8"
Blind hollow shaft, 10 mm	Blind hollow shaft, 10 mm
Blind hollow shaft, 12 mm	Blind hollow shaft, 12 mm
Blind hollow shaft 1/2"	Blind hollow shaft 1/2"
Blind hollow shaft, 14 mm	Blind hollow shaft, 14 mm
Blind hollow shaft 15 mm	Blind hollow shaft 15 mm
Blind hollow shaft, 5/8"	

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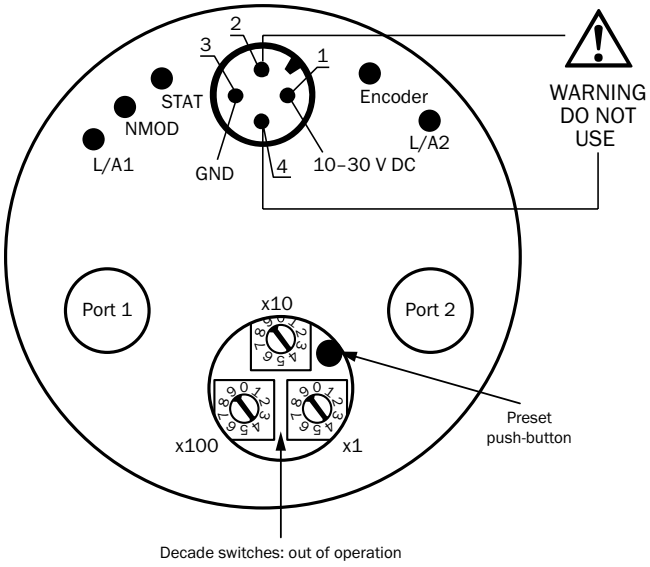
PIN assignment

M12 – 4-pin (D-coded)

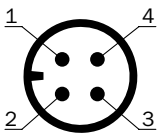


Port 1				
Signal	T x D+	R x D+	T x D–	R x D–
Pin	1	2	3	4
Wire colors	Yellow	White	Orange	Blue

Port 2				
Signal	T x D+	R x D+	T x D–	R x D–
Pin	1	2	3	4
Wire colors	Yellow	White	Orange	Blue



M12 – 4-pin (A-coded)



Supply voltage				
Signal	U_S 10 ... 30 V	Not assigned	GND	Not assigned
Pin	1	2	3	4
Wire colors	Brown	White	Blue	Black

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Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 36 mm, including mounting kit for face mount flange	BEF-WF-36	2029164

Dimensional drawings ➜ page K-725

Flanges

Flange plate

Figure	Brief description	Type	Part no.
	Standard stator coupling	BEF-DS00XFX	2056812
	Stator coupling, one-sided, 81 mm long with slot	BEF-DS01DFS/VFS	2047428
	Stator coupling, one-sided, 179 mm long with slot	BEF-DS02DFS/VFS	2047430
	Stator coupling, one-sided, 248 mm long with slots	BEF-DS03DFS/VFS	2047431
	Stator coupling, 16.5 mm high	BEF-DS05XFX	2057423
	Stator coupling with hole circle diameter 63 mm	BEF-DS07XFX	2059368
	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	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 10	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	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	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	BEF-FA-036-100	2029161

Dimensional drawings ➜ page K-725

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Other mounting accessories

Measuring wheels and measuring wheel systems

Figure	Brief description	Type	Part no.
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 200 mm	BEF-MR010020R	2055224
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 500 mm	BEF-MR010050R	2055227
	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

Dimensional drawings ➜ page K-725

Modular measuring wheel system

Brief description	Type	Part no.
Measuring wheel system, desired mounting position: left, for DBS60-S4, DFS60-S4, AFS60-S4, and AFM60-S4	BEF-MRS-10-1	2071958
Measuring wheel system, desired mounting position: right, for DBS60-S4, DFS60-S4, AFS60-S4, and AFM60-S4	BEF-MRS-10-2	2071957

Dimensional drawings ➜ page K-725

Mounting bell

Figure	Brief description	Type	Part no.
	Mounting bell for encoders with a servo flange, centering hub 50 mm, including mounting kit	BEF-MG-50	5312987

Dimensional drawings ➜ page K-725

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	BEF-WK-SF	2029166

Dimensional drawings ➜ page K-725

Miscellaneous

Figure	Brief description	Type	Part no.
	Mounting kit for servo flange encoder on the bearing block, 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
	Bearing block for hollow shaft encoder, including fixing screws	BEF-FA-B12-010	2042728
	Bearing block for servo and face mount flange encoder	BEF-FA-LB1210	2044591

Dimensional drawings ➜ page K-725

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 ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
	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 °C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	Bellows coupling, shaft diameter 10 mm/10 mm; maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular ± 4°; max. revolutions 10,000 rpm, –30° C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	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. revolutions 10,000 rpm, –30° C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	KUP-1012-B	5312984
	Bar coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, –10° C ... +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, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0608-S	5314179
	Bar coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; max. speed 10,000 rpm, –10° C ... +80 °C, max. torque 80 Ncm; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0610-S	2056407
	Bar coupling, shaft diameter 8 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0810-S	5314178
	Bar coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-1010-S	2056408
	Double-loop coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0610-D	5326697
	Double-loop coupling, shaft diameter 8 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0810-D	5326704
	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 °C ... +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 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-1012-D	5326702

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Figure	Brief description	Type	Part no.
	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 °C ... +80 °C, max. torque 60 Ncm; material: aluminum flange, fiber-glass reinforced polyamide membrane and tempered steel coupling pin	KUP-0610-F	5312985
	Spring washer coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.4 mm, angular ± 2.5°; max. speed 12,000 rpm, –10° ... +80° C, max. torque 60 Ncm; material: aluminum flange, glass fiber-reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986

Dimensional drawings ➜ page K-725

Connectivity

Power supply

	Power supply (A-coded)
Mechanical parameters	
Number of pins	4
Cable diameter	4.7 mm
Minimum bend radius, secured in place	47 mm
Minimum bend radius, movable	47 mm
Maximum length of cable between participants	100 m
Material	
Outer sheath	PUR
Conductor	Bare copper strand
Color of outer sheath	Black RAL 9005
Cable parameters	
AWG	22
Wire cross-section	0.34 mm²
Wire colors	Brown, white, blue, black
Conductor resistance	≤ 58 Ω/km
Temperature range	
Fixed in place	–50 °C ... +80 °C
Moving	–25 °C ... +80 °C
Specific features	
Flame resistance	UL horizontal flame test/CSA FT2
Halogen-free state	PUR halogen-free
Microbe resistance	Excellent
Hydrolysis resistance	Excellent

Plug connectors and cables

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Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 4-pin, straight Head B: cable Cable: for power supply, suitable for drag chain, PUR, halogen-free, unshielded, 4 x 0.34 mm², Ø 4.7 mm	2 m	DOL-1204-G02MC	6025900
		5 m	DOL-1204-G05MC	6025901
		10 m	DOL-1204-G10MC	6025902
		25 m	DOL-1204-G25MC	6034751
	Head A: female connector, M12, 4-pin, angled Head B: cable Cable: for power supply, suitable for drag chain, PUR, halogen-free, unshielded, 4 x 0.34 mm², Ø 4.7 mm	2 m	DOL-1204-W02MC	6025903
		5 m	DOL-1204-W05MC	6025904
		10 m	DOL-1204-W10MC	6025905
		25 m	DOL-1204-W25MC	6034754

Dimensional drawings ➜ page K-725

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	Data cable
Mechanical parameters	
Number of pins	4
Coding type	D-coded
Cable diameter	6.50 mm
Minimum bend radius, secured in place	19.5 mm
Minimum bend radius, movable	45.5 mm
Maximum length of cable between participants	100 m
Material	
Cable material	PVC
Conductor	Tin-plated copper strand
Cable color	Green RAL 6018
Electrical parameters	
Transmission properties (category)	CAT5 (IEC 11801:2002), CAT5e (TIA 568B:2001)
Cable parameters	
Signal type	EtherCAT®
Cable structure	1x4xAWG22/7; SF/Q
Wire colors	White, yellow, blue, orange
Wire cross-section	0.34 mm²
Conductor resistance	≤ 120 Ω/km
Shielding	Braided tin-plated copper wires
Temperature range	
Male connector, pre-wired with cable	
Fixed in place	–25 °C ... +60 °C
Moving	–5 °C ... +50 °C
M12 connector	
Ambient temperature (operation)	–40 °C ... +85 °C
RJ45 connector	
Ambient temperature (operation)	–10 °C ... +60 °C
Specific features	
Flame resistance	According to IEC 60332-1

Connecting cables with male connector

Figure	Brief description		Type	Part no.
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: cable Cable: PROFINET, EtherCAT, PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	STL-1204-G02MZ90	6048247
		5 m	STL-1204-G05MZ90	6048248
		10 m	STL-1204-G10MZ90	6048249
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: cable Cable: PROFINET, EtherCAT, PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	STL-1204-W02MZ90	6048256
		5 m	STL-1204-W05MZ90	6048257
		10 m	STL-1204-W10MZ90	6048258
		25 m	STL-1204-W25MZ90	6048259

Dimensional drawings ➜ page K-725

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Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 4-pin, straight, D-coded, shielded, for cable diameter 4 mm ... 8 mm	DOS-1204-GZ	6048263
	Head A: female connector, M12, 4-pin, angled, unshielded, for power supply, for cable diameter 3 mm ... 6.5 mm Head B: -	DOS-1204-W	6007303
	Head A: female connector, M12, 4-pin, angled, D-coded, shielded, for cable diameter 4 mm ... 8 mm	DOS-1204-WZ	6048264

Dimensional drawings ➜ page K-725

Other plug connectors and cables

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 4-pin, D-coded Head B: female connector, RJ45, 8-pin Cable: Ethernet, EtherCAT, shielded Switch cabinet feedthrough	Feedthrough female connector Ethernet RJ45	6048180

Dimensional drawings ➜ page K-725

Male connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: male connector, RJ45, 4-pin, straight, shielded, for cable diameter 4.5 mm ... 8 mm	STE-0J04-GZ	6048260
	Head A: male connector, M12, 4-pin, straight, D-coded, shielded, for cable diameter 4 mm ... 8 mm	STE-1204-GZ	6048261
	Head A: male connector, M12, 4-pin, angled, D-coded, shielded, for cable diameter 4 mm ... 8 mm Head B: -	STE-1204-WE	6048262

Dimensional drawings ➜ page K-725

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Connection cables with male and male connector

Figure	Brief description		Type	Part no.
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, M12, 4-pin, straight Cable: PROFINET, EtherCAT, PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	SSL-1204-F02MZ90	6048250
		5 m	SSL-1204-F05MZ90	6048251
		10 m	SSL-1204-F10MZ90	6048252
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, straight Cable: PROFINET, EtherCAT, PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	SSL-1204-G02MZ90	6048241
		5 m	SSL-1204-G05MZ90	6048242
		10 m	SSL-1204-G10MZ90	6048243
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, M12, 4-pin, angled, D-coded Cable: PROFINET, EtherCAT, PUR, halogen-free, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	SSL-1204-W02MZ	6050635
		5 m	SSL-1204-W05MZ	6050636
		10 m	SSL-1204-W10MZ	6050637
	Head A: male connector, RJ45, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, angled Cable: PROFINET, EtherCAT, PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	SSL-2J04-F02MZ	6048253
		5 m	SSL-2J04-F05MZ	6048254
		10 m	SSL-2J04-F10MZ	6048255
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 4-pin, straight Cable: PROFINET, EtherCAT, PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	SSL-2J04-G02MZ60	6048244
		5 m	SSL-2J04-G05MZ60	6048245
		10 m	SSL-2J04-G10MZ60	6048246

Dimensional drawings ➜ page K-725

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

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COMPACT, RUGGED, POWERFUL



Product description

The A3M60 PROFIBUS is an extremely rugged absolute multiturn encoder with a 60 mm housing. Maximum reliability even in the harshest of ambient conditions is attained by means of magnetic scanning, both with singleturn and multiturn detection. New singleturn technology combines the durability of a magnetic sensor with high resolutions, previously only possible with optical systems. The innovative gearless multiturn technology keeps the number of moving components on the A3M60 to a minimum. This results in a longer service life with low maintenance costs and consequently, optimum system availability. The highly compact technology in single and multiturn detection provides the user a space-saving and cost-efficient solution. Together with the integrated PROFIBUS interface, the A3M60 is particularly suited for applications where installation space is tight

At a glance

- Rugged absolute multiturn encoder with up to 31 bits (14-bit singleturn and 17-bit multiturn)
- Face mount flange, servo flange or blind hollow shaft
- Compact design (<70 mm)
- Integrated PROFIBUS interface with DP V0, V1, and V2 functionality (depending on type)
- Connectivity: 3 x M12 male connectors
- Protection class up to IP67
- Operating temperature: -30 to +80 °C (depending on type)

Your benefits

- Maximum system availability, even under extreme ambient conditions
- Reduced maintenance costs due to wear-free magnetic singleturn and multiturn scanning
- Space-saving and cost-efficient design - the best solution, particularly when installation space is limited
- High productivity thanks to fast communication and position calculation
- Immune to contamination and condensation – ideal for tough ambient conditions
- High performance at a cost-efficient price

More information

Fields of application G-373
Detailed technical data. G-373
Type code. G-375
Ordering information. G-375
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Dimensional drawings G-378
PIN assignment. G-378
Recommended accessories G-380

→ www.mysick.com/en/A3M60_PROFIBUS

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Measurement of absolute position in various machines and systems such as pallet handling machines, high-bay warehouses, cranes, presses, printing machines

Detailed technical data

Performance

	Basic	Advanced
Max. number of steps per revolution	8,192	16,384
Max. number of revolutions	8,192	131,072
Resolution	13 bit x 13 bit	14 bit x 17 bit
Error limits	± 0.5°, (at room temperature)	± 0.35°, (at room temperature)
Repeatability	± 0.25°, at room temperature	± 0.15°, at room temperature
Measuring step (360 °/ number of steps per revolution)	0.022°	
Initialization time	Approx. 1 s [1]	

[1] Corresponds to the amount of time that passes after connecting the supply voltage until the data word can be read in correctly.

Interfaces

	Basic	Advanced
Electrical interface	PROFIBUS DP	
Bus interface	PROFIBUS (RS485)	
Data protocol	PROFIBUS DP V0	PROFIBUS DP V0 and DP V1 + V2
Data transmission rate (baud rate)	≤ 12 MBaud	
Bus termination	Through DIP switch or external resistor	
Status information	Through status LEDs	
SET (electronic adjustment)	Via PRESET pushbutton or protocol	
Configuration data	Number of steps per revolution, number of revolutions, PRESET, counting direction	Number of steps per revolution, number of revolutions, PRESET, counting direction, sampling rate for calculating position, unit for output of the speed value, round axis functionality
Available diagnostic data	–	Maximum speed, power-on counter, operating hours counter power-on/motion, counter of direction changes/number of movements cw/ number of movements

Electrical data

Operating voltage range	10 V ... 32 V
Power consumption max.	1.5 W
Reverse polarity protection	✔
MTTFd: mean time to dangerous failure	60 years (EN ISO 13849-1) [1]

[1] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of devices, average ambient temperature 40 °C, frequency of use 8,760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Mechanical data

	Basic	Advanced
Shaft diameter		
Face mount flange	10 x 19 mm	
Servo flange	6 x 10 mm	
Blind hollow shaft	8, 10, 12, 14, 15 mm and 3/8", 1/2", 5/8"	
Shaft material	Stainless steel	

Flange material	Aluminum	
Housing material	Aluminum	
Mass		
Face mount flange, servo flange	0.28 kg	
Blind hollow shaft	0.28 kg	
Start up torque at 20 °C		
Face mount flange, servo flange	1 Ncm with shaft seal	
Blind hollow shaft	1 Ncm	2 Ncm
Operating torque at 20 °C		
Face mount flange, servo flange	0.8 Ncm	0.8 Ncm
Blind hollow shaft	0.8 Ncm	1.6 Ncm
Permissible shaft loading		
Face mount flange, servo flange	80 N radial 40 N axial	
Permissible shaft movement of the drive element, static/dynamic		
Blind hollow shaft	± 0.3/ ± 0.1 mm radial ± 0.5/ ± 0.2 mm axial	
Max. angular acceleration	≤ 500,000 rad/s²	
Operating speed		
Face mount flange, servo flange	6,000 rpm	9,000 rpm
Blind hollow shaft	6,000 rpm	9,000 rpm
Self-warming at maximum speed		
Face mount flange	30k	30k
Servo flange	15k	25k
Blind hollow shaft	45k	35k
Rotor moment of inertia		
Face mount flange, servo flange	11.4 gcm²	
Blind hollow shaft	20.8 gcm²	
Bearing lifetime	3 x 10^9 revolutions	

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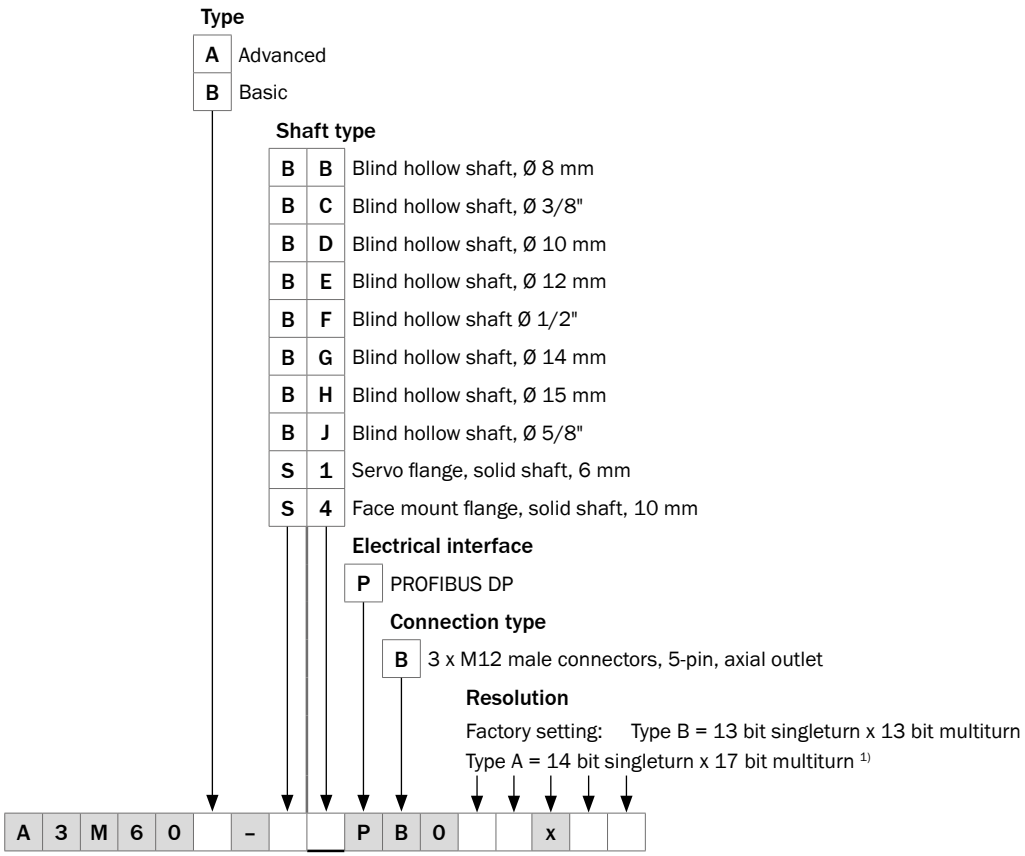
Ambient data

	Basic	Advanced
EMC	According to EN 61000-6-2 and EN 61000-6-3	
Enclosure rating (as per IEC 60529) [1]	IP 67, housing IP 65, shaft	IP 67, housing IP 67, shaft
Permissible relative humidity	95% (condensation not permitted)	
Operating temperature range	–10 °C ... +70 °C	–30 °C ... +80 °C
Storage temperature range	–40 °C ... +100 °C	
Resistance to shocks (according to EN 60068-2-27)	100 g/6 ms	
Resistance to vibration (according to EN 60068-2-6)	30 g/10 Hz ... 2,000 Hz	

[1] When mating connector is inserted.

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Type code



1) Number of steps programmable via control unit: Type A = 2 to 262144.

Ordering information

Mechanical design/shaft diameter	Resolution	Type	Part no.
Solid shaft, face mount flange, Ø 10 mm, length 19 mm	8,192 x 8,192	A3M60B-S4PB013X13	1038826
Solid shaft, servo flange, Ø 6 mm, length 10 mm	8,192 x 8,192	A3M60B-S1PB013X13	1051018
Blind hollow shaft / 8 mm	8,192 x 8,192	A3M60B-BBPB013X13	1051016
Blind hollow shaft, / 10 mm	8,192 x 8,192	A3M60B-BDPB013X13	1038824
Blind hollow shaft, / 12 mm	8,192 x 8,192	A3M60B-BEPB013X13	1038825
Blind hollow shaft / 15 mm	8,192 x 8,192	A3M60B-BHPB013X13	1051017
Blind hollow shaft / 3/8"	8,192 x 8,192	A3M60B-BCPB013X13	1053327
Blind hollow shaft / 1/2"	8,192 x 8,192	A3M60B-BFPB013X13	1053328
Blind hollow shaft / 14 mm	8,192 x 8,192	A3M60B-BGPB013X13	1051325
Blind hollow shaft / 5/8"	8,192 x 8,192	A3M60B-BJPB013X13	1053329
Solid shaft, face mount flange, Ø 10 mm, length 19 mm	16,384 x 131,072	A3M60A-S4PB014X17	1053341
Solid shaft, servo flange, Ø 6 mm, length 10 mm	16,384 x 131,072	A3M60A-S1PB014X17	1053342
Blind hollow shaft / 8 mm	16,384 x 131,072	A3M60A-BBPB014X17	1053330
Blind hollow shaft / 3/8"	16,384 x 131,072	A3M60A-BCPB014X17	1053334
Blind hollow shaft / 10 mm	16,384 x 131,072	A3M60A-BDPB014X17	1053331
Blind hollow shaft / 12 mm	16,384 x 131,072	A3M60A-BEPB014X17	1053332
Blind hollow shaft / 1/2"	16,384 x 131,072	A3M60A-BFPB014X17	1053335
Blind hollow shaft / 14 mm	16,384 x 131,072	A3M60A-BGPB014X17	1053336
Blind hollow shaft / 15 mm	16,384 x 131,072	A3M60A-BHPB014X17	1053333
Blind hollow shaft / 5/8"	16,384 x 131,072	A3M60A-BJPB014X17	1053337

Sales kits

Sales kit 01

A3M60 PROFIBUS

- + M12 female cable connector, 4-pin, angled, (DOS-1204-W, part number 6007303)
- + PROFIBUS IN: M12 female cable connector, 5-pin, angled, shielded (DOS-1205-WQ, part number 6041429)

	Encoder type (singleturn)	Description	Type	Part no.
	A3M60B-S4PB013x13	Solid shaft, face mount flange, 10 x 19 mm	A3M60B-S4P sales kit 01	1052488
	A3M60B-S1PB013x13	Solid shaft, servo flange, 6 x 10 mm	A3M60B-S1P sales kit 01	1052489
	A3M60B-BBPB013x13	Blind hollow shaft, Ø 8 mm	A3M60B-BBP sales kit 01	1052477
	A3M60B-BDPB013x13	Blind hollow shaft, Ø 10 mm	A3M60B-BDP sales kit 01	1052478
	A3M60B-BEPB013x13	Blind hollow shaft, Ø 12 mm	A3M60B-BEP sales kit 01	1052479
	A3M60B-BHPB013x13	Blind hollow shaft, Ø 15 mm	A3M60B-BHP sales kit 01	1052486
	A3M60B-BGPB013x13	Blind hollow shaft, Ø 14 mm	A3M60B-BGP sales kit 01	1053975

Sales kit 02

A3M60 PROFIBUS

- + M12 female cable connector, 5-pin, angled, (DOL-1202-W05MC, part number 6042067)
- + PROFIBUS IN: M12 female cable connector, 5-pin, angled (DOL-1205-W05MQ, part number 6041423)

	Encoder type (singleturn)	Description	Type	Part no.
	A3M60B-S4PB013x13	Solid shaft, face mount flange, 10 x 19 mm	A3M60B-S4P sales kit 02	1052492
	A3M60B-S1PB013x13	Solid shaft, servo flange, 6 x 10 mm	A3M60B-S1P sales kit 02	1052506
	A3M60B-BBPB013x13	Blind hollow shaft, Ø 8 mm	A3M60B-BBP sales kit 02	1052490
	A3M60B-BDPB013x13	Blind hollow shaft, Ø 10 mm	A3M60B-BDP sales kit 02	1052491
	A3M60B-BEPB013x13	Blind hollow shaft, Ø 12 mm	A3M60B-BEP sales kit 02	1052493
	A3M60B-BHPB013x13	Blind hollow shaft, Ø 15 mm	A3M60B-BHP sales kit 02	1052494
	A3M60B-BGPB013x13	Blind hollow shaft, Ø 14 mm	A3M60B-BGP sales kit 02	1053976

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Sales kit 03

A3M60 PROFIBUS

- + M12 female cable connector, 4-pin, angled, (DOS-1204-W, part number 6007303)
- + PROFIBUS IN: M12 female cable connector, 5-pin, angled, shielded, B-coded (DOS-1205-WQ, part number 6041429)
- + PROFIBUS OUT: M12 male cable connector, 5-pin, angled (STE-1205-WQ, part number 6041428)

	Encoder type (singleturn)	Description	Type	Part no.
	A3M60B-S4PB013x13	Solid shaft, face mount flange, 10 x 19 mm	A3M60B-S4P sales kit 03	1052513
	A3M60B-S1PB013x13	Solid shaft, servo flange, 6 x 10 mm	A3M60B-S1P sales kit 03	1052514
	A3M60B-BBPB013x13	Blind hollow shaft, Ø 8 mm	A3M60B-BBP sales kit 03	1052507
	A3M60B-BDPB013x13	Blind hollow shaft, Ø 10 mm	A3M60B-BDP sales kit 03	1052508
	A3M60B-BEPB013x13	Blind hollow shaft, Ø 12 mm	A3M60B-BEP sales kit 03	1052509
	A3M60B-BHPB013x13	Blind hollow shaft, Ø 15 mm	A3M60B-BHP sales kit 03	1052510
	A3M60B-BGPB013x13	Blind hollow shaft, Ø 14 mm	A3M60B-BGP sales kit 03	1053977

Sales kit 04

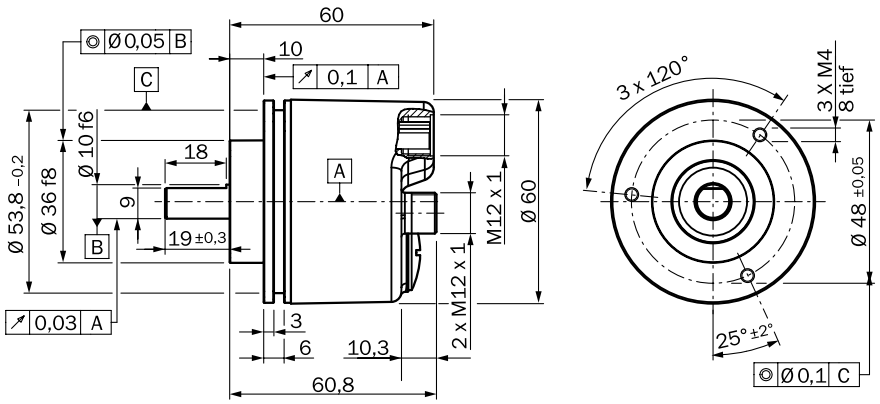
A3M60 PROFIBUS

- + M12 female cable connector, 5-pin, angled, (DOL-1202-W05MC, part number 6042067)
- + PROFIBUS IN: M12 female cable connector, 5-pin, angled (DOL-1205-W05MQ, part number 6041423)
- + PROFIBUS OUT: M12 male cable connector, 5-pin, angled (STL-1205-W05MQ, part number 6041426)

	Encoder type (singleturn)	Description	Type	Part no.
	A3M60B-S4PB013x13	Solid shaft, face mount flange, 10 x 19 mm	A3M60B-S4P sales kit 04	1052519
	A3M60B-S1PB013x13	Solid shaft, servo flange, 6 x 10 mm	A3M60B-S1P sales kit 04	1052520
	A3M60B-BBPB013x13	Blind hollow shaft, Ø 8 mm	A3M60B-BBP sales kit 04	1052515
	A3M60B-BDPB013x13	Blind hollow shaft, Ø 10 mm	A3M60B-BDP sales kit 04	1052516
	A3M60B-BEPB013x13	Blind hollow shaft, Ø 12 mm	A3M60B-BEP sales kit 04	1052517
	A3M60B-BHPB013x13	Blind hollow shaft, Ø 15 mm	A3M60B-BHP sales kit 04	1052518
	A3M60B-BGPB013x13	Blind hollow shaft, Ø 14 mm	A3M60B-BGP sales kit 04	1053978

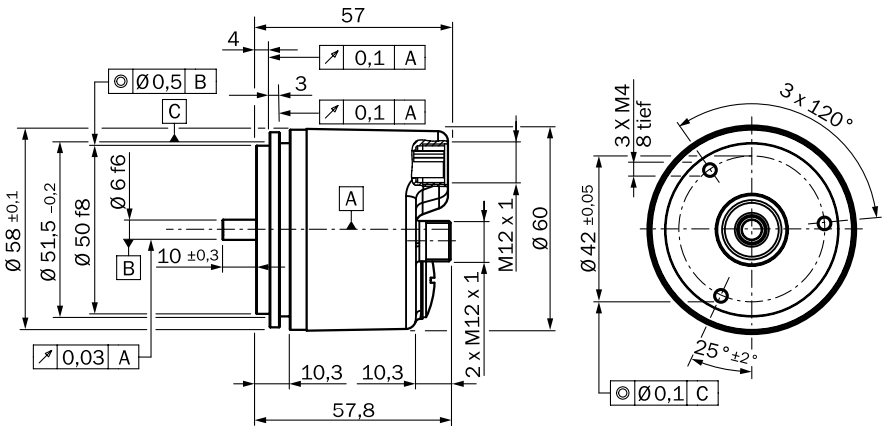
Dimensional drawings (dimensions in mm)

Face mount flange



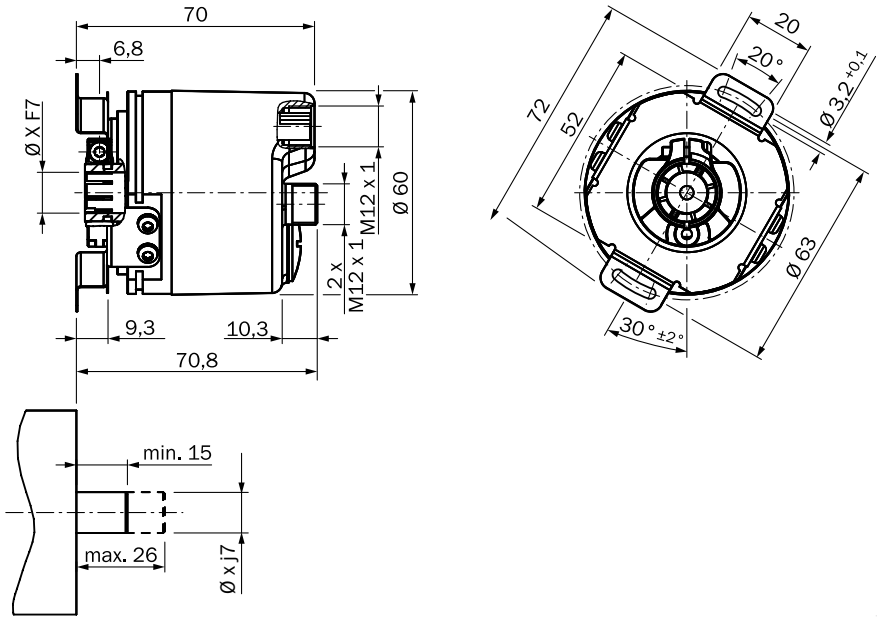
General tolerances according to DIN ISO 2768-mk

Servo flange



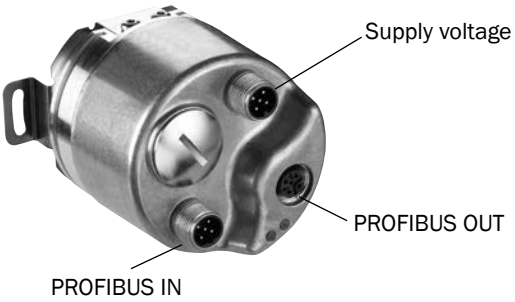
General tolerances according to DIN ISO 2768-mk

Blind hollow shaft

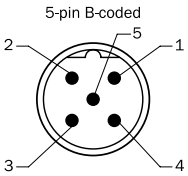


General tolerances according to DIN ISO 2768-mk
XF7 = Encoder shaft diameter, see type code
xj7 = Shaft diameter, on the customer side

PIN assignment



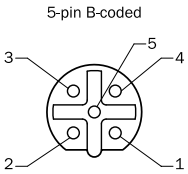
PROFIBUS IN



PIN	Explanation
1	Not assigned
2	PROFIBUS Data A
3	Not assigned
4	PROFIBUS Data B
5	Screen

WARNING: Connect screen to housing.

PROFIBUS OUT



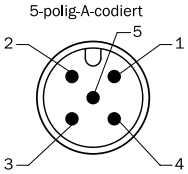
PIN	Explanation
1	+5 V (2P5) [1]
2	PROFIBUS Data A
3	0 V (2M) [1]
4	PROFIBUS Data B
5	Screen

[1] For external bus termination.

WARNING: Connect screen to housing.

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Supply voltage



PIN	Explanation
1	Operating voltage
2	Do not connect
3	Ground (0 V)
4	Do not connect
5	Not assigned

Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 36 mm, including mounting kit for face mount flange	BEF-WF-36	2029164

Dimensional drawings ➜ page K-725

Flanges

Flange plate

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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	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 10	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	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	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	BEF-FA-036-100	2029161

Dimensional drawings ➜ page K-725

Other mounting accessories

Measuring wheels and measuring wheel systems

Figure	Brief description	Type	Part no.
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278

Dimensional drawings ➜ page K-725

Mounting bell

Figure	Brief description	Type	Part no.
	Mounting bell for encoders with a servo flange, centering hub 50 mm, including mounting kit	BEF-MG-50	5312987

Dimensional drawings ➜ page K-725

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	BEF-WK-SF	2029166

Dimensional drawings ➜ page K-725

Miscellaneous

Figure	Brief description	Type	Part no.
	Mounting kit for servo flange encoder on the bearing block, 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
	Bearing block for hollow shaft encoder, including fixing screws	BEF-FA-B12-010	2042728
	Bearing block for servo and face mount flange encoder	BEF-FA-LB1210	2044591

Dimensional drawings ➜ page K-725

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 ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
	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 °C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	Bellows coupling, shaft diameter 10 mm/10 mm; maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular ± 4°; max. revolutions 10,000 rpm, –30° C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	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. revolutions 10,000 rpm, –30° C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	KUP-1012-B	5312984
	Bar coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, –10° C ... +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, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0608-S	5314179
	Bar coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; max. speed 10,000 rpm, –10° C ... +80 °C, max. torque 80 Ncm; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0610-S	2056407
	Bar coupling, shaft diameter 8 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0810-S	5314178
	Bar coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-1010-S	2056408
	Double-loop coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0610-D	5326697
	Double-loop coupling, shaft diameter 8 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0810-D	5326704
	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 °C ... +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 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-1012-D	5326702
	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 °C ... +80 °C, max. torque 60 Ncm; material: aluminum flange, fiber-glass reinforced polyamide membrane and tempered steel coupling pin	KUP-0610-F	5312985
	Spring washer coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.4 mm, angular ± 2.5°; max. speed 12,000 rpm, –10° ... +80° C, max. torque 60 Ncm; material: aluminum flange, glass fiber-reinforced polyamide membrane and hardened steel coupling pin	KUP-1010-F	5312986

Dimensional drawings ➜ page K-725

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Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 5-pin, angled Head B: cable Cable: for power supply, PUR, halogen-free, shielded, 3 x 0.34 mm², Ø 4.2 mm	5 m	DOL-1202-W05MC	6042067
		10 m	DOL-1202-W10MC	6042068
	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: for power supply, suitable for drag chain, PUR, halogen-free, shielded, 5 x 0.34 mm², Ø 5.9 mm	5 m	DOL-1205-G05MAC	6036384
		10 m	DOL-1205-G10MAC	6036385
		20 m	DOL-1205-G20MAC	6036386
	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 2 x 0.34 mm², Ø 8.0 mm	5 m	DOL-1205-G05MQ	6026006
		10 m	DOL-1205-G10MQ	6026008
		12 m	DOL-1205-G12MQ	6032636
		15 m	DOL-1205-G15MQ	6032637
		20 m	DOL-1205-G20MQ	6032638
		30 m	DOL-1205-G30MQ	6032639
		50 m	DOL-1205-G50MQ	6032861
	Head A: female connector, M12, 5-pin, angled, B-coded Head B: cable Cable: suitable for drag chain, PUR, shielded, 2 x 0.64 mm², Ø 7.8 mm	5 m	DOL-1205-W05MQ	6041423
		10 m	DOL-1205-W10MQ	6041425

Dimensional drawings ➜ page K-725

Connecting cables with male connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: male connector, M12, 5-pin, straight, B-coded Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 2 x 0.34 mm², Ø 8.0 mm Wire shielding: AL-PT foil, total shield, tin-plated C shield	5 m	STL-1205-G05MQ	6026005
		10 m	STL-1205-G10MQ	6026007
		12 m	STL-1205-G12MQ	6032635
	Head A: male connector, M12, 5-pin, angled, B-coded Head B: cable Cable: suitable for drag chain, PUR, shielded, 2 x 0.64 mm², Ø 7.8 mm	5 m	STL-1205-W05MQ	6041426
		10 m	STL-1205-W10MQ	6041427

Dimensional drawings ➜ page K-725

Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 4-pin, straight, unshielded, for power supply, for cable diameter 4 mm ... 6 mm Head B: -	DOS-1204-G	6007302
	Head A: female connector, M12, 4-pin, angled, unshielded, for power supply, for cable diameter 3 mm ... 6.5 mm Head B: -	DOS-1204-W	6007303
	Head A: female connector, M12, 5-pin, straight, B-coded, shielded, for cable diameter 4 mm ... 9 mm Head B: -	DOS-1205-GQ	6021353
	Head A: female connector, M12, 5-pin, angled, B-coded, shielded, for cable diameter 4 mm ... 8 mm Head B: -	DOS-1205-WQ	6041429

Dimensional drawings ➜ page K-725

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, shielded, 2 x 0.25 mm², Ø 8.0 mm	By the meter	LTG-2102-MW	6021355

Other plug connectors and cables

Figure	Brief description	Type	Part no.
	A3M60 accessories sales set comprising: Female cable connector supply voltage M12 angled (6007303) Female cable connector M12 angled (6041429) Male cable connector M12 angled (6041428)	DOS-3XM12-W	2058177
	Head A: male connector, M12, 4-pin, straight, B-coded Cable: terminator	STE-END-Q	6021156

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Dimensional drawings ➜ page K-725

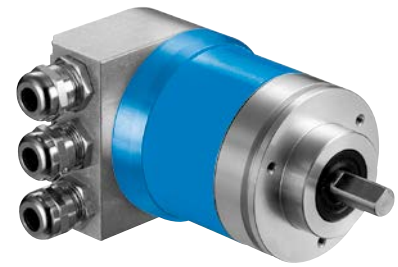
Male connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: male connector, M12, 5-pin, straight, B-coded, shielded, for cable diameter 4 mm ... 9 mm Head B: -	STE-1205-GQ	6021354
	Head A: male connector, M12, 5-pin, angled, B-coded, shielded, for cable diameter 4 mm ... 8 mm Head B: -	STE-1205-WQ	6041428

Dimensional drawings ➜ page K-725

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

RELIABLE, ESTABLISHED, AND MODULAR



Product description

The ATM60 PROFIBUS absolute multiturn encoder from SICK provides reliable positional and speed information even in harsh ambient conditions, with a resolution of up to 26 bits. This product family, which is proven in its field, is based on the principle of magnetic measurement. The 13 bit singleturn range is scanned by a sensor using permanent magnetic elements. The 13 bit multiturn range consists of a magnetic reduction gear.

Equipped with a zero set pushbutton, the encoder can be easily set to zero or to any other user-programmed value on site. The connection adapter, which can be removed from the device, enables simple user maintenance and mounting. With its magnetic scanning, rugged IP 67-rated housing and high level of resistance to shock and vibration, the ATM60 is optimally suited for use in harsh conditions.

At a glance

- Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits
- Mechanical interface: face mount flange, servo flange, blind hollow shaft, and extensive adapter accessories
- Zero-set and preset functions via hardware or software
- Electrical interface: PROFIBUS DP as per IEC61158 / RS 485 , electrically isolated.
- Electronically adjustable, configurable resolution
- Magnetic scanning

Your benefits

- Fewer variants are required since one freely programmable encoder offers all singleturn and multiturn resolutions
- Easy setup due to various connectivity options (3x PG, 3x M12)
- Maintenance-free encoder, long service life
- Application flexibility due to easily interchangeable collets for the blind hollow shaft
- Quick commissioning using the zero set/preset function either at the press of the button on the device or via software
- Increased productivity due to highly reliable shock and vibration resistance
- Worldwide availability and service ensure quick and reliable customer service

More information

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Detailed technical data. G-387
Type code. G-389
Ordering information. G-389
Dimensional drawings G-390
PIN assignment. G-392
Mandatory accessories. G-393
Recommended accessories G-394

→ www.mysick.com/en/ATM60_PROFIBUS

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Measurement of absolute position in various machines and system such as wind power and solar plants, material transport equipment, textile machines, packaging systems, rollers, harbor facilities, printing machines

Detailed technical data

Performance

Max. number of steps per revolution	≤ 8,192
Max. number of revolutions	≤ 8,192
Resolution	13 bit x 13 bit
Error limits	± 0.25 °
Repeatability	0.1 °
Measurement step	0.043 °
Initialization time	1,250 ms [1]

[1] Valid positional data can be read once this time has elapsed.

Interfaces

Electrical interface	PROFIBUS
Bus interface	PROFIBUS DP, RS–485 [1] [2] [3]
Set (electronic adjustment)	Via PRESET pushbutton or protocol
Data protocol	Profile for encoder (07hex) – Class 2
Address setting	0 ... 127, DIP switch or protocol
Data transmission rate (baud rate)	9.6 kBaud to 12 Mbaud, autodetect
Status information	LED green (running), LED red (bus activity)
Bus termination	DIP switch [4]

[1] EN 50 170-2.

[2] DIN 19245 Part 1-3.

[3] Electrically isolated through optocoupler.

[4] Should only be connected in the final device.

Electrical data

Connection type	Bus adapter with cable screw fixings or round connectors [1]
Operating voltage range	10 V ... 32 V
Max. power consumption without load	≤ 2 W
MTTFd: mean time to dangerous failure	150 years (EN ISO 13849-1) [2]

[1] Please order the Profibus adapter separately.

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

Mechanical data

Shaft diameter	
Face mount flange	10 mm x 19 mm
Servo flange	6 mm x 10 mm
Blind hollow shaft	6 mm, 8 mm, 10 mm, 12 mm, 14 mm, 15 mm, 1/4", 3/8", 1/2" [1]
Mass [2]	0.59 kg
Shaft material	Stainless steel
Flange material	Aluminum

[1] Order collets for 6, 8, 10, 12 and 14 mm or 1/4", 3/8" and 1/2" as separate extra accessories. No collets are necessary for 15 mm shaft diameter.

[2] Relates to devices with cable outlet.

[3] Take into account self-warming of 3.3 K per 1,000 rpm when designing operating temperature range

Housing material	Aluminum die cast
Start up torque with shaft seal at 20 °C	
Face mount flange, servo flange	2.5 Ncm
Blind hollow shaft	1.2 Ncm
Start up torque without shaft seal at 20 °C	
Face mount flange, servo flange	0.5 Ncm
Operating torque with shaft seal at 20 °C	
Face mount flange, servo flange	1.8 Ncm
Blind hollow shaft	0.8 Ncm
Operating torque without shaft seal at 20 °C	
Face mount flange, servo flange	0.3 Ncm
Permissible shaft movement, axial static/ dynamic	
Blind hollow shaft	± 0.5 mm, ± 0.2 mm
Permissible shaft movement, radial static/ dynamic	
Blind hollow shaft	± 0.3 mm, ± 0.1 mm
Permissible shaft loading	
Solid shaft	300 N (radial) 50 N (axial)
Rotor moment of inertia	35 gcm² 55 gcm²
Bearing lifetime	3.6 x 10^9 revolutions
Max. angular acceleration	≤ 500,000 rad/s²
Operating speed [3]	
Face mount flange, servo flange	6,000 rpm
Blind hollow shaft	3,000 rpm

[1] Order collets for 6, 8, 10, 12 and 14 mm or 1/4", 3/8" and 1/2" as separate extra accessories. No collets are necessary for 15 mm shaft diameter.

[2] Relates to devices with cable outlet.

[3] Take into account self-warming of 3.3 K per 1,000 rpm when designing operating temperature range

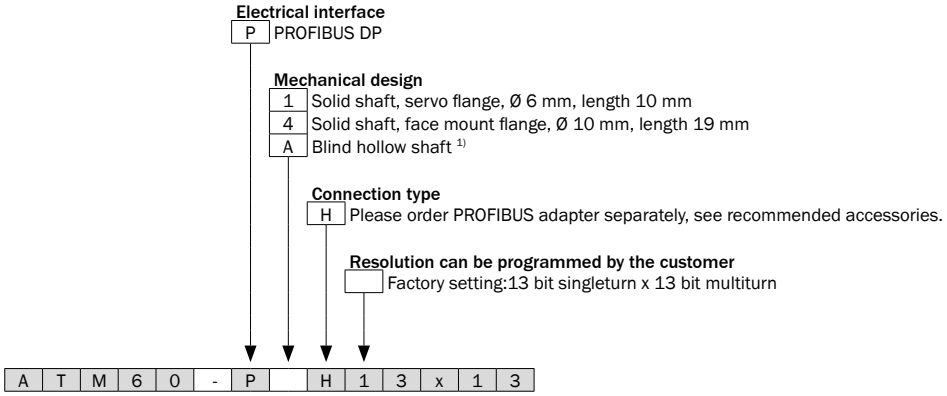
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Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-3
Enclosure rating	IP 67 with shaft seal (acc. to IEC 60529) [1] IP 43 without shaft seal, not sealed on encoder flange (acc. to IEC 60529) [1] IP 66 without shaft seal, sealed on encoder flange (acc. to IEC 60529) [1]
Permissible relative humidity	98%
Operating temperature range	–20 °C ... +85 °C
Storage temperature range	–40 °C ... +100 °C, without packaging
Resistance to shocks	100 g, 6 ms (according to EN 60068-2-27)
Resistance to vibrations	20 g, 10 Hz ... 2,000 Hz (according to EN 60068-2-6)

[1] When mating connector is inserted.

Type code



1) Order collet for 6, 8, 10, 12 and 14 mm or 1/4", 3/8" and 1/2" as separate extra accessories (see recommended accessories). No collets are necessary for 15 mm shaft diameter.

Ordering information

Solid shaft, face mount flange

Shaft diameter	Electrical interface	Connection type	Number of steps	Resolution	Programmable	Type	Part no.
Ø 10 mm, length 19 mm	10 V ... 32 V, PROFIBUS	Bus adapter with cable screw fixings or round connectors	≤ 8,192	8,192 x 8,192	✔	ATM60-P4H13X13	1030013

Solid shaft, servo flange

Shaft diameter	Electrical interface	Connection type	Number of steps	Resolution	Programmable	Type	Part no.
Ø 6 mm, length 10 mm	10 V ... 32 V, PROFIBUS	Bus adapter with cable screw fixings or round connectors	≤ 8,192	8,192 x 8,192	✔	ATM60-P1H13X13	1030014

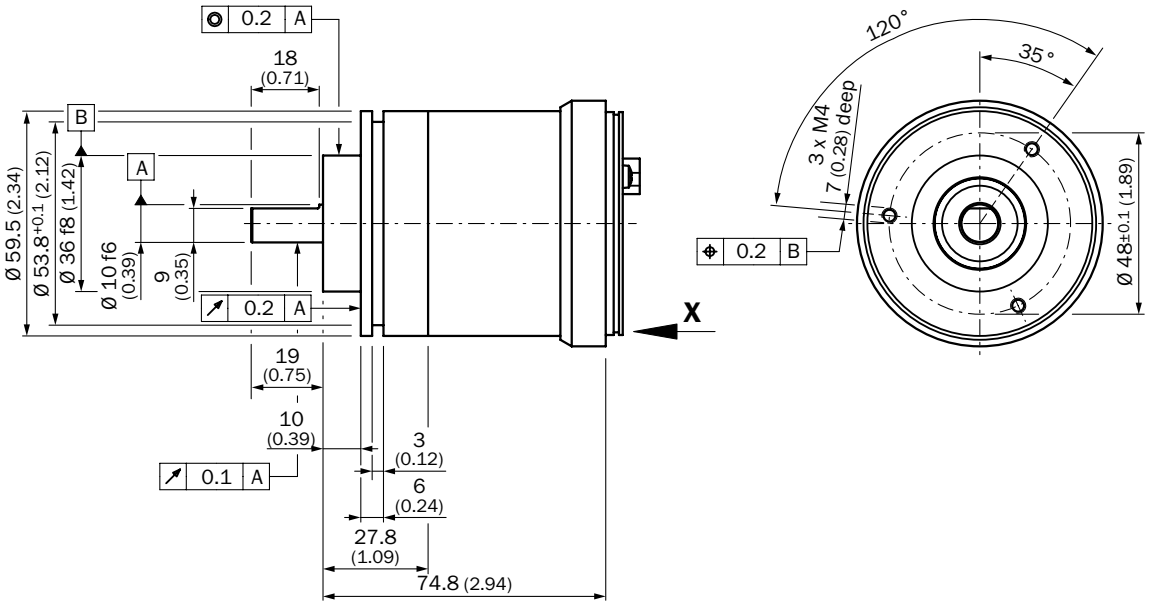
Blind hollow shaft

Shaft diameter	Electrical interface	Connection type	Number of steps	Resolution	Programmable	Type	Part no.
6 mm, 8 mm, 10 mm, 12 mm, 14 mm, 15 mm 1/4", 3/8", 1/2" 1)	10 V ... 32 V, PROFIBUS	Bus adapter with cable screw fixings or round connectors	≤ 8,192	8,192 x 8,192	✔	ATM60-PAH13X13	1030015

1) Order collets for 6, 8, 10, 12 and 14 mm or 1/4", 3/8" and 1/2" as separate extra accessories. No collets are necessary for 15 mm shaft diameter.

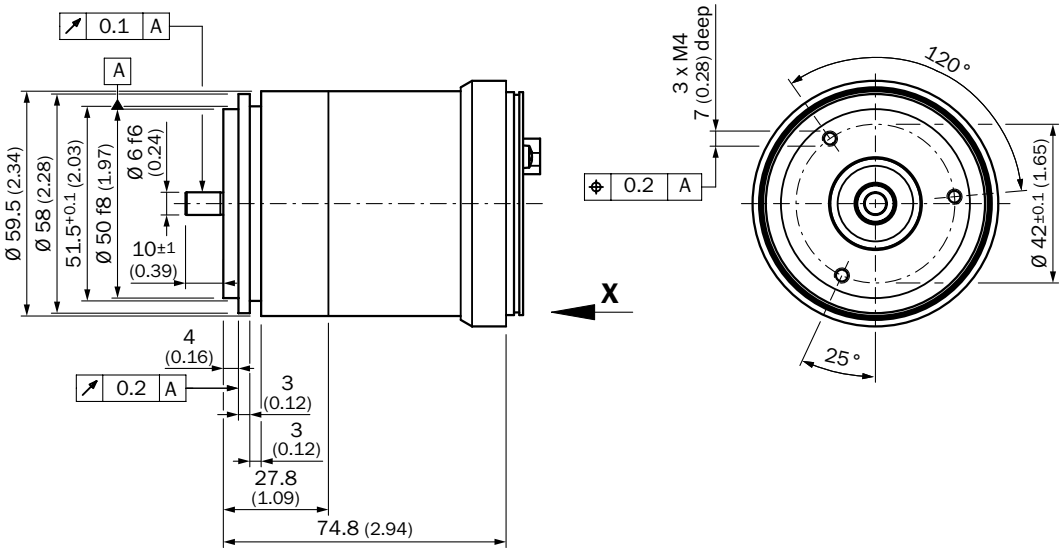
Dimensional drawings (dimensions in mm)

Face mount flange



General tolerances according to DIN ISO 2768-mk

Servo flange



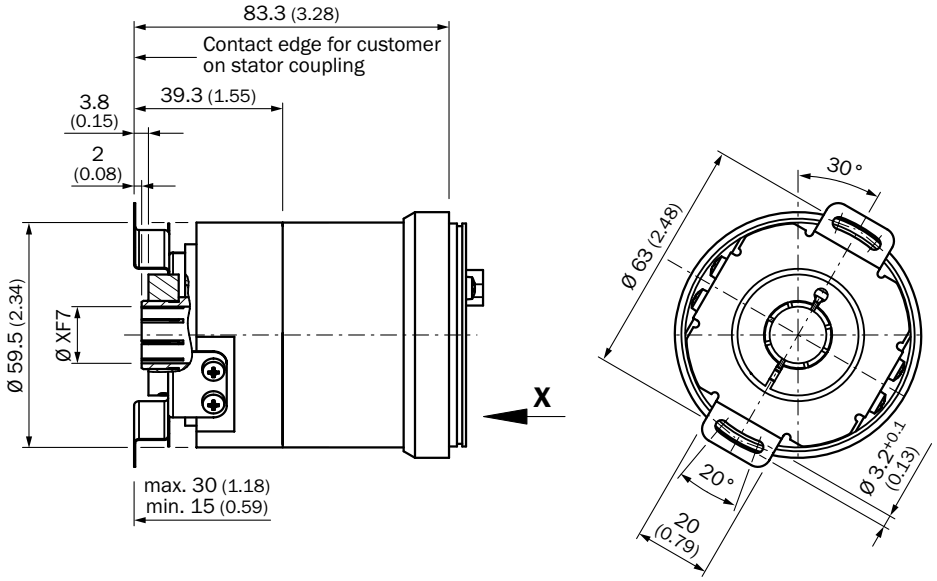
General tolerances according to DIN ISO 2768-mk

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Blind hollow shaft



General tolerances according to DIN ISO 2768-mk

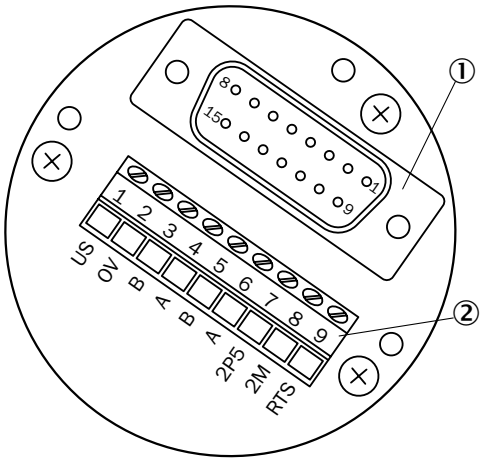
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PIN assignment

Terminal strip	Male connector, 4 pin	Male connector, 5 pin	Female connector, 5 pin	Signal	Explanation
1	1	–	–	U_S (24 V)	Operating voltage 10 ... 32 V
2	3	–	–	0 V (GND)	Ground (0 V)
3	–	–	4	B	B cable PROFIBUS DP (out)
4	–	–	2	A	A cable PROFIBUS DP (out)
5	–	4	–	B	B cable PROFIBUS DP (in)
6	–	2	–	A	A cable PROFIBUS DP (in)
7	–	–	1	2P5 [2]	+ 5 V (potential free)
8	–	–	3	2M [2]	0 V (potential free)
–	2	1	–	N. C.	–
–	4	3	–	N. C.	–
–	–	5	5	Screen	Housing potential

[1] Encoders with a PROFIBUS adapter are equipped with screws (metric/PG) for connecting bus and supply cables. The adapter is unscrewed from the full device to connect the cables. The following figure shows how the pins are assigned within the adapter.

[2] Use for external bus terminations or to supply the sender/receiver with a optical fiber transmission.



① = Internal plug connector to the encoder
② = External connection to the bus

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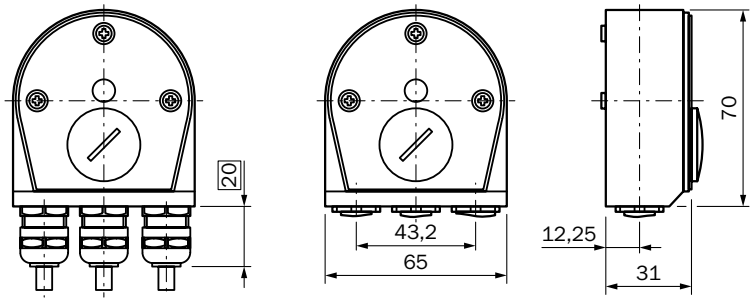
Mandatory accessories

Adapters and distributors

Bus adapters

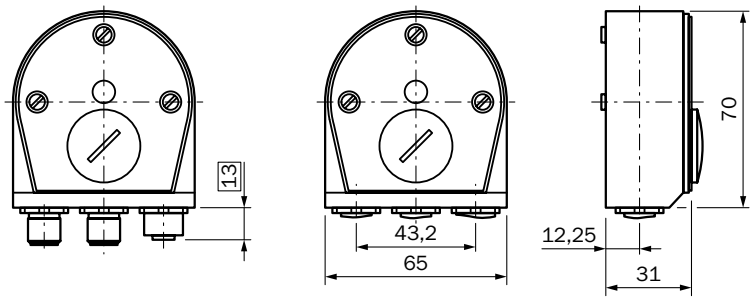
Figure	Brief description	Type	Part no.
	PROFIBUS DP, connection adapter KR3, 3 x PG	AD-ATM60-KA3PR	2029225
	PROFIBUS DP, connection adapter SR3, 3 x M12, 5-pin	AD-ATM60-SR3PR	2031985

AD-ATM60-KA3PR



General tolerances according to DIN ISO 2768-mk

AD-ATM60-SR3PR



General tolerances according to DIN ISO 2768-mk

Shaft adaptation

Collets and clamping rings

Figure	Brief description	Type	Part no.
	Collet for blind hollow shaft, shaft diameter 6 mm, external diameter 15 mm	SPZ-006-AD-A	2029174
	Collet for blind hollow shaft, shaft diameter 8 mm, external diameter 15 mm	SPZ-008-AD-A	2029176
	Collet for blind hollow shaft, shaft diameter 10 mm, external diameter 15 mm	SPZ-010-AD-A	2029178
	Collet for blind hollow shaft, shaft diameter 12 mm, external diameter 15 mm	SPZ-012-AD-A	2029179
	Collet for blind hollow shaft, shaft diameter 14 mm, external diameter 15 mm	SPZ-014-AD-A	2048863
	Collet for blind hollow shaft, shaft diameter 1/2" (12.7 mm), external diameter 15 mm	SPZ-1E2-AD-A	2029180
	Collet for blind hollow shaft, shaft diameter 1/4" (6.35 mm), external diameter 15 mm	SPZ-1E4-AD-A	2029175
	Collet for blind hollow shaft, shaft diameter 3/8" (9.525 mm), external diameter 15 mm	SPZ-3E8-AD-A	2029177

Dimensional drawings ➜ page K-725

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Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 36 mm, including mounting kit for face mount flange	BEF-WF-36	2029164

Dimensional drawings ➜ page K-725

Flanges

Flange plate

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	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 10	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	BEF-FA-036-060RSA	2029163
	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 100 mm servo flange with 60 mm centering hub, aluminum	BEF-FA-036-100	2029161

Dimensional drawings ➜ page K-725

Other mounting accessories

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Measuring wheels and measuring wheel systems

Figure	Brief description	Type	Part no.
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278

Dimensional drawings ➜ page K-725

Mounting bell

Figure	Brief description	Type	Part no.
	Mounting bell for encoders with a servo flange, centering hub 50 mm, including mounting kit	BEF-MG-50	5312987

Dimensional drawings ➜ page K-725

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	BEF-WK-SF	2029166

Dimensional drawings ➜ page K-725

Miscellaneous

Figure	Brief description	Type	Part no.
	Mounting kit for servo flange encoder on the bearing block, 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
	Bearing block for hollow shaft encoder, including fixing screws	BEF-FA-B12-010	2042728
	Bearing block for servo and face mount flange encoder	BEF-FA-LB1210	2044591

Dimensional drawings ➜ page K-725

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 ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
	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 °C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	Bellows coupling, shaft diameter 10 mm/10 mm; maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular ± 4°; max. revolutions 10,000 rpm, -30° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	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. revolutions 10,000 rpm, -30° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	KUP-1012-B	5312984
	Bar coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle ± 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, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0608-S	5314179
	Bar coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 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 8 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0810-S	5314178
	Bar coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-1010-S	2056408

Figure	Brief description	Type	Part no.
	Double-loop coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0610-D	5326697
	Double-loop coupling, shaft diameter 8 mm/10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0810-D	5326704
	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 °C ... +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 °C ... +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-1012-D	5326702
	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, fiber-glass reinforced polyamide membrane and tempered steel coupling pin	KUP-0610-F	5312985
	Spring washer coupling, shaft diameter 10 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-1010-F	5312986

Dimensional drawings ➜ page K-725

Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 2 x 0.34 mm², Ø 8.0 mm	5 m	DOL-1205-G05MQ	6026006
		10 m	DOL-1205-G10MQ	6026008
		12 m	DOL-1205-G12MQ	6032636
		15 m	DOL-1205-G15MQ	6032637
		20 m	DOL-1205-G20MQ	6032638
		30 m	DOL-1205-G30MQ	6032639
		50 m	DOL-1205-G50MQ	6032861
	Head A: female connector, M12, 4-pin, straight Head B: cable Cable: for power supply, suitable for drag chain, PVC, unshielded, 4 x 0.25 mm², Ø 5.0 mm	5 m	DOL-1204-G05M	6009866

Dimensional drawings ➜ page K-725

Connecting cables with male connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: male connector, M12, 5-pin, straight, B-coded Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 2 x 0.34 mm², Ø 8.0 mm Wire shielding: AL-PT foil, total shield, tin-plated C shield	5 m	STL-1205-G05MQ	6026005
		10 m	STL-1205-G10MQ	6026007
		12 m	STL-1205-G12MQ	6032635

Dimensional drawings ➜ page K-725

Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 4-pin, straight, unshielded, for power supply, for cable diameter 4 mm ... 6 mm Head B: -	DOS-1204-G	6007302
	Head A: female connector, M12, 5-pin, straight, B-coded, shielded, for cable diameter 4 mm ... 9 mm Head B: -	DOS-1205-GQ	6021353

Dimensional drawings ➜ page K-725

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, shielded, 2 x 0.25 mm², Ø 8.0 mm	By the meter	LTG-2102-MW	6021355

Other plug connectors and cables

Figure	Brief description	Type	Part no.
	Head A: male connector, M12, 4-pin, straight, B-coded Cable: terminator	STE-END-Q	6021156

Dimensional drawings ➜ page K-725

Male connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: male connector, M12, 5-pin, straight, B-coded, shielded, for cable diameter 4 mm ... 9 mm Head B: -	STE-1205-GQ	6021354

Dimensional drawings ➜ page K-725

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

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RELIABLE, ESTABLISHED, AND MODULAR



Product description

The ATM60 absolute multiturn encoder from SICK has an SSI data interface and provides reliable positional information even in harsh ambient conditions, with a resolution of up to 26 bits. This product family, which is proven in its field, is based on the principle of magnetic measurement. The 13 bit singleturn range is scanned by a sensor using permanent magnetic elements. The 13 bit multiturn range consists of a magnetic reduction gear. Equipped with a zero set pushbutton, the encoder can be easily set to zero or to any other user-programmed value on site. Configuration of the SSI encoder is easy using the RS422 interface. With its magnetic scanning, rugged IP 67-rated housing and high level of resistance to shock and vibration, the ATM60 is optimally suited for use in harsh conditions.

At a glance

- Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits
- Mechanical interface: face mount flange, servo flange, blind hollow shaft, and extensive adapter accessories
- Zero-set and preset functions via hardware or software
- Electrical interface: SSI with gray or binary code type
- Electronically adjustable, configurable resolution
- Round axis function (optional) also for non-binary resolutions (per revolution) and decimal numbers (number of revolutions)
- Magnetic scanning

Your benefits

- Fewer variants are required since one freely programmable encoder offers all singleturn and multiturn resolutions
- Easy setup due to various electrical connection adapters (cable, M23)
- Maintenance-free encoder, long service life
- Application flexibility due to easily interchangeable collets for the blind hollow shaft
- Quick commissioning using the zero set/preset function either at the press of the button on the device or via software
- Increased productivity due to highly reliable shock and vibration resistance
- Worldwide availability and service ensure quick and reliable customer service

More information

Fields of application G-399
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Recommended accessories G-406

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For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Measurement of absolute position in various machines and system such as wind power and solar plants, material transport equipment, textile machines, packaging systems, rollers, harbor facilities, printing machines

Detailed technical data

Performance

Max. number of steps per revolution	≤ 8,192
Max. number of revolutions	≤ 8,192
Resolution	13 x 12 bit or 12 x 13 bit
Error limits	± 0.25 °
Repeatability	0.1 °
Measurement step	0.043 °
Initialization time	1,050 ms [1]

[1] Valid positional data can be read once this time has elapsed.

Interfaces

Electrical interface	SSI
Signal wire	Potential-free with a 12-pin M23 male connector for the housing or a 12-wire cable
Interface signals	Clock +, Clock -, Data +, Data- [1] Programming interface: RS-422
Clock frequency	1 MHz [2]
Set (electronic adjustment)	H active (L = 0 - 4.7 V, H = 10 - Us V)
CW/CCW (counting sequence when turning)	L active (L = 0 - 1.5 V, H = 2.0 - Us V)
Configuration data	Number of steps per revolution Number of revolutions Code type Electronic adjustment

[1] For higher clock frequencies, choose synchronous SSI.

[2] Min. LOW level (Clock +): 500 ns.

Electrical data

Operating voltage range	10 V ... 32 V
Max. power consumption without load	≤ 0.8 W
Code type	Gray, binary
Code sequence	CW/CCW
Supply voltage	10 ... 32 V
Reverse polarity protection	✔
MTTFd: mean time to dangerous failure	150 years (EN ISO 13849-1) [1]

[1] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of devices, average ambient temperature 40 °C, frequency of use 8,760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Mechanical data

Shaft diameter	
Face mount flange	10 x 19 mm
Servo flange	6 x 10 mm
Blind hollow shaft [1]	6, 8, 10, 12, 14, 15 mm and 1/4", 3/8", 1/2"
Shaft material	Stainless steel
Flange material	Aluminum
Housing material	Aluminum
Mass [2]	
Face mount flange, servo flange	0.5 kg
Blind hollow shaft	0.4 kg
Start up torque at 20 °C	
Face mount flange, servo flange	2.5 Ncm with shaft seal
Face mount flange, servo flange	0.5 Ncm without shaft seal
Blind hollow shaft	1.2 Ncm with shaft seal
Operating torque at 20 °C	
Face mount flange, servo flange	1.8 Ncm with shaft seal
Face mount flange, servo flange	0.3 Ncm without shaft seal
Blind hollow shaft	0.8 Ncm with shaft seal
Permissible shaft loading	
Face mount flange, servo flange	300 N radial 50 N axial
Permissible shaft movement of the drive element, static/dynamic	
Blind hollow shaft	± 0.3/ ± 0.1 mm radial ± 0.5/ ± 0.2 mm axial
Max. angular acceleration	≤ 500,000 rad/s²
Operating speed [3]	
Face mount flange, servo flange	6,000 rpm
Blind hollow shaft	3,000 rpm
Rotor moment of inertia	
Face mount flange, servo flange	35 gcm²
Blind hollow shaft	55 gcm²
Bearing lifetime	3.6 x 10^9 revolutions

[1] Order collets for 6, 8, 10, 12 and 14 mm or 1/4", 3/8" and 1/2" as separate extra accessories. No collets are necessary for 15 mm shaft diameter.

[2] Relates to devices with cable outlet.

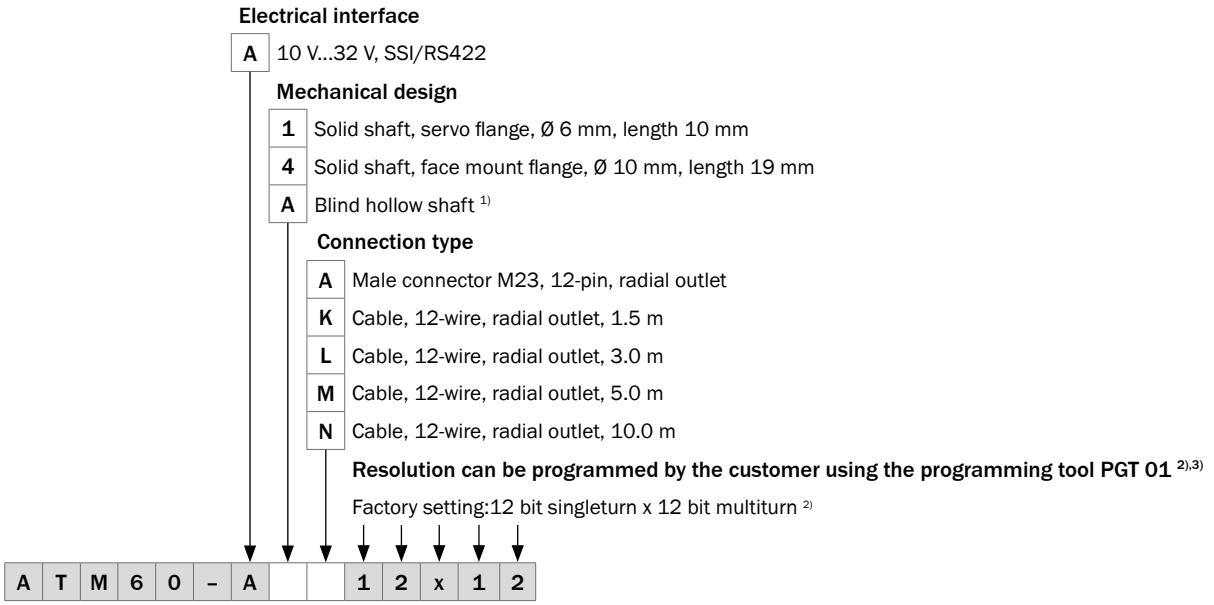
[3] Take into account self-warming of 3.3 K per 1,000 rpm when designing operating temperature range

Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-3
Enclosure rating (as per IEC 60529) [1]	IP 67, with shaft seal IP 43, without shaft seal, not sealed on encoder flange IP 65, without shaft seal, not sealed on encoder flange
Permissible relative humidity	98%
Operating temperature range	–20 °C ... +85 °C
Storage temperature range	–40 °C ... +100 °C, without packaging
Resistance to shocks	100 g/6 ms (according to EN 60068-2-27)
Resistance to vibrations	20 g / 10 Hz - 2,000 Hz (according to EN 60068-2-6)

[1] When mating connector is inserted.

Type code



1) Order collet for 6, 8, 10, 12 and 14 mm or 1/4", 3/8" and 1/2" as separate extra accessories (see recommended accessories). No collets are necessary for 15 mm shaft diameter.

2) Ex-works configuration: 4,096 steps x 4,096 revolutions, Gray-Code, Set = 0. Other configurations on request.

3) Maximum permissible resolution: 25 bit (12 bit singleturn x 13 bit multiturn or 13 bit singleturn x 12 bit multiturn).

Ordering information

Solid shaft, servo flange

- **Shaft diameter:** 6 mm, length 10 mm
- **Electrical interface:** 10 V ... 32 V, SSI
- **Number of steps:** ≤ 4,096
- **Resolution:** 4,096 x 4,096
- **Programmable:** ✔

Connection type	Type	Part no.
M23 male connector, 12-pin, radial	ATM60-A1A12X12	1030005
Cable, 12-wire, radial, 1.5 m	ATM60-A1K12X12	1030006
Cable, 12-wire, radial, 3 m	ATM60-A1L12X12	1030007
Cable, 12-wire, radial, 5 m	ATM60-A1M12X12	1030008
Cable, 12-wire, radial, 10 m	ATM60-A1N12X12	1032925

Solid shaft, face mount flange

- **Shaft diameter:** 10 mm, length 19 mm
- **Electrical interface:** 10 V ... 32 V, SSI
- **Number of steps:** ≤ 4,096
- **Resolution:** 4,096 x 4,096
- **Programmable:** ✔

Connection type	Type	Part no.
M23 male connector, 12-pin, radial	ATM60-A4A12X12	1030001
Cable, 12-wire, radial, 1.5 m	ATM60-A4K12X12	1030002
Cable, 12-wire, radial, 3 m	ATM60-A4L12X12	1030003
Cable, 12-wire, radial, 5 m	ATM60-A4M12X12	1030004
Cable, 12-wire, radial, 10 m	ATM60-A4N12X12	1032915

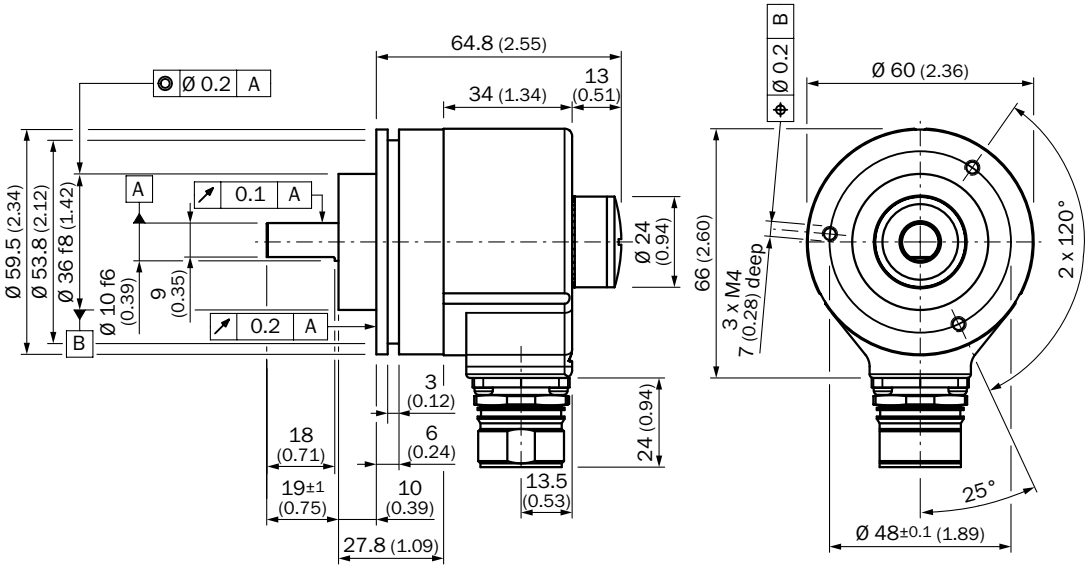
Blind hollow shaft

- **Shaft diameter:** 6 mm, 8 mm, 10 mm, 12 mm, 14 mm, 15 mm 1/4", 3/8", 1/2" (order collets for 6, 8, 10, 12 and 14 mm or 1/4", 3/8" and 1/2" as separate accessories. No collets are necessary for 15 mm shaft diameter).
- **Electrical interface:** 10 V ... 32 V, SSI
- **Number of steps:** ≤ 4,096
- **Resolution:** 4,096 x 4,096
- **Programmable:** ✔

Connection type	Type	Part no.
M23 male connector, 12-pin, radial	ATM60-AAA12X12	1030009
Cable, 12-wire, radial, 1.5 m	ATM60-AAK12X12	1030010
Cable, 12-wire, radial, 3 m	ATM60-AAL12X12	1030011
Cable, 12-wire, radial, 5 m	ATM60-AAM12X12	1030012
Cable, 12-wire, radial, 10 m	ATM60-AAN12X12	1033169

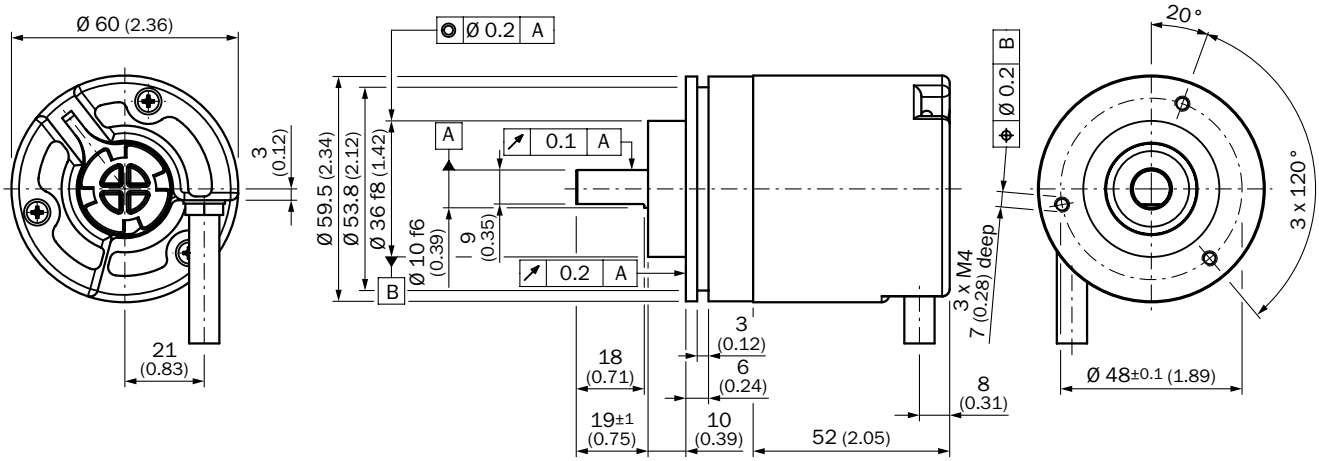
Dimensional drawings (dimensions in mm)

Face mount flange, male connector



General tolerances according to DIN ISO 2768-mk

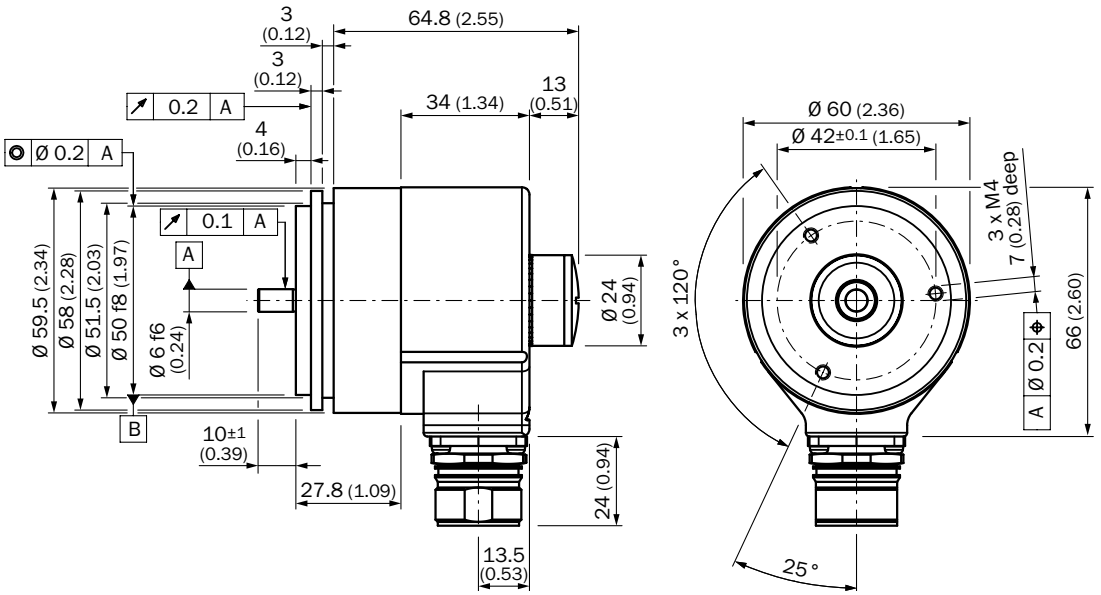
Face mount flange, cable



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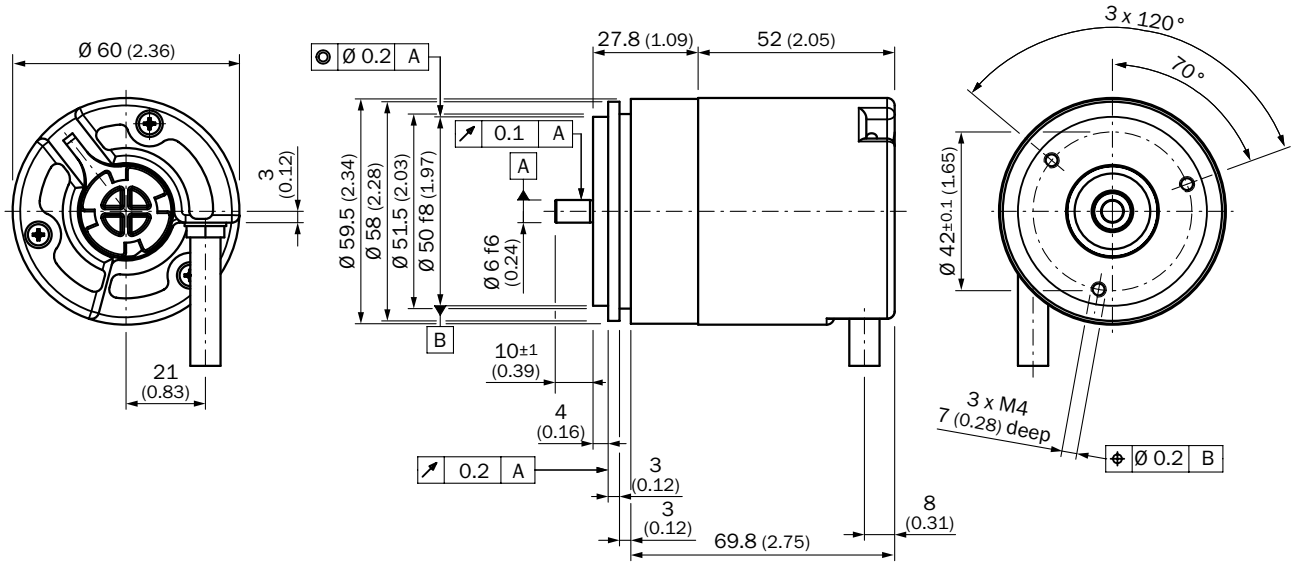
General tolerances according to DIN ISO 2768-mk

Servo flange, male connector



General tolerances according to DIN ISO 2768-mk

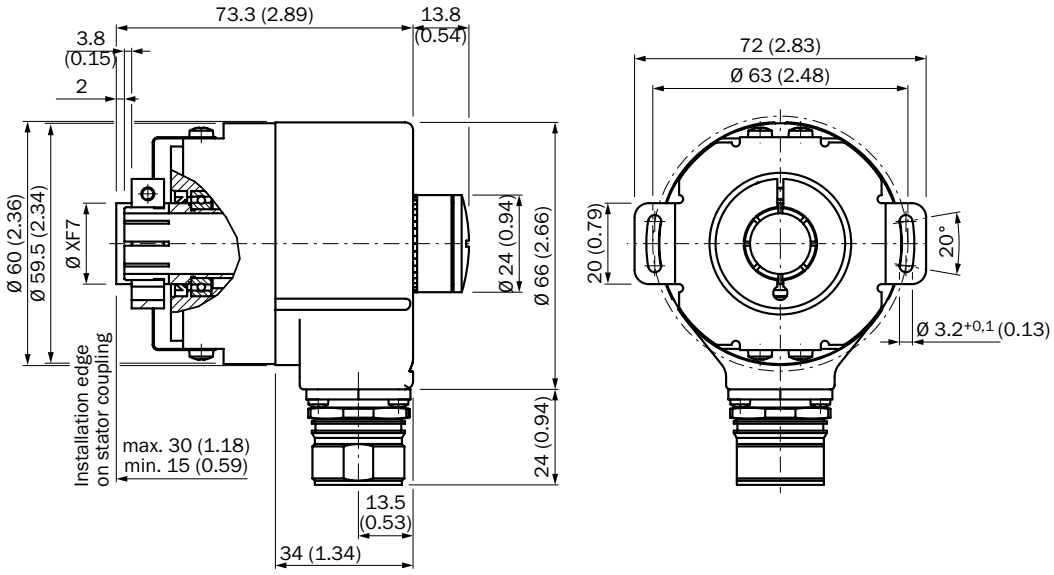
Servo flange, cable



General tolerances according to DIN ISO 2768-mk

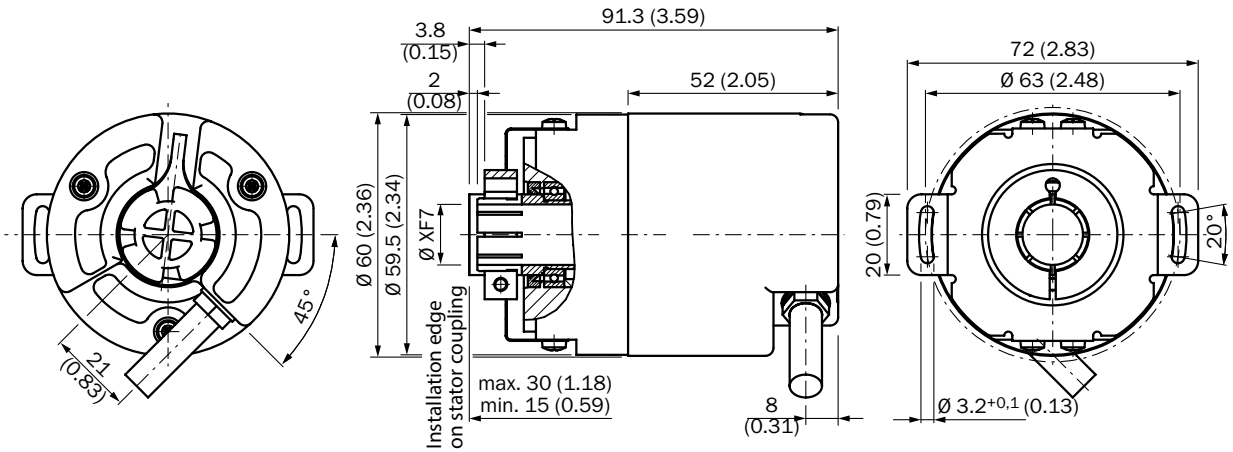
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Blind hollow shaft, male connector



General tolerances according to DIN ISO 2768-mk

Blind hollow shaft, cable



General tolerances according to DIN ISO 2768-mk

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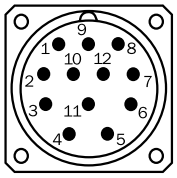
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PIN assignment

PIN	Signal	Wire colors (cable outlet)	Explanation
1	GND	Blue	Ground connection
2	Data +	White	Interface signals
3	Clock +	Yellow	Interface signals
4	R x D +	Gray	RS-422 programming cable
5	R x D –	Green	RS-422 programming cable
6	T x D +	Pink	RS-422 programming cable
7	T x D –	Black	RS-422 programming cable
8	U_S	Red	Operating voltage
9	SET [1]	Orange	Electronic adjustment
10	Data –	Brown	Interface signals
11	Clock –	Violet	Interface signals
12	V/$\overline{R}$ [2]	Orange/black	Sequence in direction of rotation
	Screen		Housing potential

[1] SET = This input activates the electronic zero set. If the SET cable is set to US for more than 100 ms, the mechanical position corresponds to the 0 value, i.e., the predetermined SET value.

[2] V/$\overline{R}$ = Forwards/Reverse: This input programs the counting direction for the encoder. When it is not connected, this input is set to HIGH. If the encoder shaft is rotated clockwise (to the right) as viewed when facing the shaft, it counts in ascending order. If it should count in ascending order when the shaft is rotated counterclockwise (to the left), then this connection must be permanently set to LOW level (GND).



View of M23 male device connector on encoder

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Mandatory accessories

Shaft adaptation

Collets and clamping rings

Figure	Brief description	Type	Part no.
	Collet for blind hollow shaft, shaft diameter 6 mm, external diameter 15 mm	SPZ-006-AD-A	2029174
	Collet for blind hollow shaft, shaft diameter 8 mm, external diameter 15 mm	SPZ-008-AD-A	2029176
	Collet for blind hollow shaft, shaft diameter 10 mm, external diameter 15 mm	SPZ-010-AD-A	2029178
	Collet for blind hollow shaft, shaft diameter 12 mm, external diameter 15 mm	SPZ-012-AD-A	2029179
	Collet for blind hollow shaft, shaft diameter 14 mm, external diameter 15 mm	SPZ-014-AD-A	2048863
	Collet for blind hollow shaft, shaft diameter 1/2" (12.7 mm), external diameter 15 mm	SPZ-1E2-AD-A	2029180
	Collet for blind hollow shaft, shaft diameter 1/4" (6.35 mm), external diameter 15 mm	SPZ-1E4-AD-A	2029175
	Collet for blind hollow shaft, shaft diameter 3/8" (9.525 mm), external diameter 15 mm	SPZ-3E8-AD-A	2029177

Dimensional drawings ➜ page K-725

Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 36 mm, including mounting kit for face mount flange	BEF-WF-36	2029164

Dimensional drawings ➜ page K-725

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Flanges

Flange plate

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	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 10	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	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	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	BEF-FA-036-100	2029161

Dimensional drawings ➜ page K-725

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Other mounting accessories

Measuring wheels and measuring wheel systems

Figure	Brief description	Type	Part no.
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278

Dimensional drawings ➜ page K-725

Mounting bell

Figure	Brief description	Type	Part no.
	Mounting bell for encoders with a servo flange, centering hub 50 mm, including mounting kit	BEF-MG-50	5312987

Dimensional drawings ➜ page K-725

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	BEF-WK-SF	2029166

Dimensional drawings ➜ page K-725

Miscellaneous

Figure	Brief description	Type	Part no.
	Mounting kit for servo flange encoder on the bearing block, 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
	Bearing block for hollow shaft encoder, including fixing screws	BEF-FA-B12-010	2042728
	Bearing block for servo and face mount flange encoder	BEF-FA-LB1210	2044591

Dimensional drawings ➜ page K-725

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 ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
	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 °C ... +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	Bellows coupling, shaft diameter 10 mm/10 mm; maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular ± 4°; max. revolutions 10,000 rpm, -30° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	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. revolutions 10,000 rpm, -30° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	KUP-1012-B	5312984
	Bar coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle ± 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, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°, max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0608-S	5314179
	Bar coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 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 8 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0810-S	5314178
	Bar coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-1010-S	2056408
	Double-loop coupling, shaft diameter 6 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-0610-D	5326697
	Double-loop coupling, shaft diameter 8 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-0810-D	5326704
	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
	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, fiber-glass reinforced polyamide membrane and tempered steel coupling pin	KUP-0610-F	5312985
	Spring washer coupling, shaft diameter 10 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-1010-F	5312986

Dimensional drawings ➜ page K-725

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Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm	1.5 m	DOL-2312-G1M5MA1	2029200
		3 m	DOL-2312-G03MMA1	2029201
		5 m	DOL-2312-G05MMA1	2029202
		10 m	DOL-2312-G10MMA1	2029203
		20 m	DOL-2312-G20MMA1	2029204
		30 m	DOL-2312-G30MMA1	2029205

Dimensional drawings ➜ page K-725

Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: –20 °C ... +130 °C	DOS-2312-G	6027538
	Head A: female connector, M23, 12-pin, 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: female connector, M23, 12-pin, angled, shielded, for cable diameter 4.2 mm ... 6.6 mm Head B: - Operating temperature: –20 °C ... +130 °C	DOS-2312-W01	2072580
	Head A: female connector, M23, 21-pin, straight, shielded, for cable diameter 5.5 mm ... 12 mm Head B: -	DOS-2321-G	6027539

Dimensional drawings ➜ page K-725

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	By the meter	LTG-2308-MWENC	6027529
	Head A: cable Head B: cable Cable: PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.5 mm	By the meter	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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm	By the meter	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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm	By the meter	LTG-2612-MW	6028516

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Male connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	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 ➜ page K-725

Other accessories

Programming and configuration tools

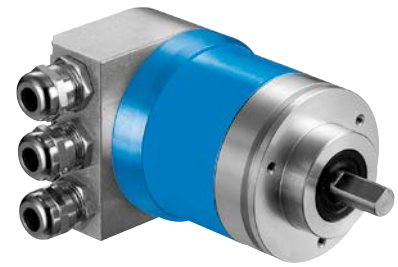
Figure	Brief description	Type	Part no.
	Programming tool for ATM60, ATM90 and KH53 SSI	PGT-01-S	1030111

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

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RELIABLE, ESTABLISHED, AND MODULAR



Product description

The ATM60 CANopen absolute multiturn encoder from SICK provides reliable positional and speed information even in harsh ambient conditions, with a resolution of up to 26 bits. This product family, which is proven in its field, is based on the principle of magnetic measurement. The 13 bit singleturn range is scanned by a sensor using permanent magnetic elements. The 13 bit multiturn range consists of a magnetic reduction gear. Equipped with a zero set pushbutton, the encoder can be easily set to zero or to any other user-programmed value on site. The connection adapter, which can be removed from the device, enables simple user maintenance and mounting. With its magnetic scanning, rugged IP 67-rated housing and high level of resistance to shock and vibration, the ATM60 is optimally suited for use in harsh conditions.

At a glance

- Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits
- Mechanical interface: face mount, servo flange, blind hollow shaft, adapter accessories
- Zero-set and preset functions via hardware/software
- Electrical interface: CAN specification 2. 0B, electrically isolated; DS 301, V4.01, DSP 406, V2.0, Class 2
- Electronically adjustable, configurable resolution
- Network status info via duo LED
- Magnetic scanning

Your benefits

- Fewer variants are required since one freely programmable encoder offers all singleturn and multiturn resolutions
- Easy setup due to various connectivity options (1 to 3x PG, 2x M12)
- Maintenance-free encoder, long service life
- Application flexibility due to easily interchangeable collets for the blind hollow shaft
- Quick commissioning using the zero set/preset function either at the press of the button on the device or via software
- Increased productivity due to highly reliable shock and vibration resistance
- Worldwide availability and service ensure quick and reliable customer service

More information

Fields of application G-413
Detailed technical data. G-413
Type code. G-415
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Mandatory accessories. G-418
Recommended accessories G-419

→ www.mysick.com/en/ATM60_CANopen

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Measurement of absolute position in various machines and system such as wind power and solar plants, material transport equipment, textile machines, packaging systems, rollers, harbor facilities, printing machines

Detailed technical data

Performance

Max. number of steps per revolution	≤ 8,192
Max. number of revolutions	≤ 8,192
Resolution	13 bit x 13 bit
Error limits	± 0.25 °
Repeatability	0.1 °
Measurement step	0.043 °
Initialization time	1,250 ms [1]

[1] Valid positional data can be read once this time has elapsed.

Interfaces

Electrical interface	ISO-DIN 11898, electrically isolated [1] [2]
Bus interface	CANopen
Set (electronic adjustment)	Via PRESET pushbutton or protocol
Data protocol	Communication profile DS 301 V4.0, device profile DSP 406 V 2.0
Address setting (NODE ID)	0 ... 63, DIP switch or protocol
Data transmission rate (baud rate)	10 ; 20; 50; 125; 250; 500 kBaud 1 MBaud; DIP switch or protocol,
Status information	2-color LED for CAN controller status
Bus termination	DIP switch [2]

[1] CAN High Speed.

[2] CAN specification 2.0 B.

[3] Should only be connected in the final device.

Electrical data

Connection type	Bus adapter with cable screw fixings or round connectors [1]
Operating voltage range	10 V ... 32 V
Max. power consumption without load	≤ 2 W
Reverse polarity protection	✔
MTTFd: mean time to dangerous failure	150 years (EN ISO 13849-1) [2]

[1] Please order the CANbus adapter separately.

[2] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of devices, average ambient temperature 40 °C, frequency of use 8,760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Mechanical data

Shaft diameter	
Face mount flange	10 x 19 mm
Servo flange	6 x 10 mm
Blind hollow shaft [1]	6, 8, 10, 12, 14, 15 mm and 1/4", 3/8", 1/2"
Shaft material	Stainless steel
Flange material	Aluminum
Housing material	Aluminum
Mass [2]	
Face mount flange, servo flange	0.59 kg
Blind hollow shaft	0.59 kg
Start up torque at 20 °C	
Face mount flange, servo flange	2.5 Ncm with shaft seal
Face mount flange, servo flange	0.5 Ncm without shaft seal
Blind hollow shaft	1.2 Ncm with shaft seal
Operating torque at 20 °C	
Face mount flange, servo flange	1.8 Ncm with shaft seal
Face mount flange, servo flange	0.3 Ncm without shaft seal
Blind hollow shaft	0.8 Ncm with shaft seal
Permissible shaft loading	
Face mount flange, servo flange	300 N radial 50 N axial
Permissible shaft movement of the drive element, static/dynamic	
Blind hollow shaft	± 0.3/ ± 0.1 mm radial ± 0.5/ ± 0.2 mm axial
Max. angular acceleration	≤ 500,000 rad/s²
Operating speed [3]	
Face mount flange, servo flange	6,000 rpm
Blind hollow shaft	3,000 rpm
Rotor moment of inertia	
Face mount flange, servo flange	35 gcm²
Blind hollow shaft	55 gcm²
Bearing lifetime	3.6 x 10^9 revolutions

[1] Order collets for 6, 8, 10, 12 and 14 mm or 1/4", 3/8" and 1/2" as separate extra accessories. No collets are necessary for 15 mm shaft diameter.

[2] Relates to devices with cable outlet.

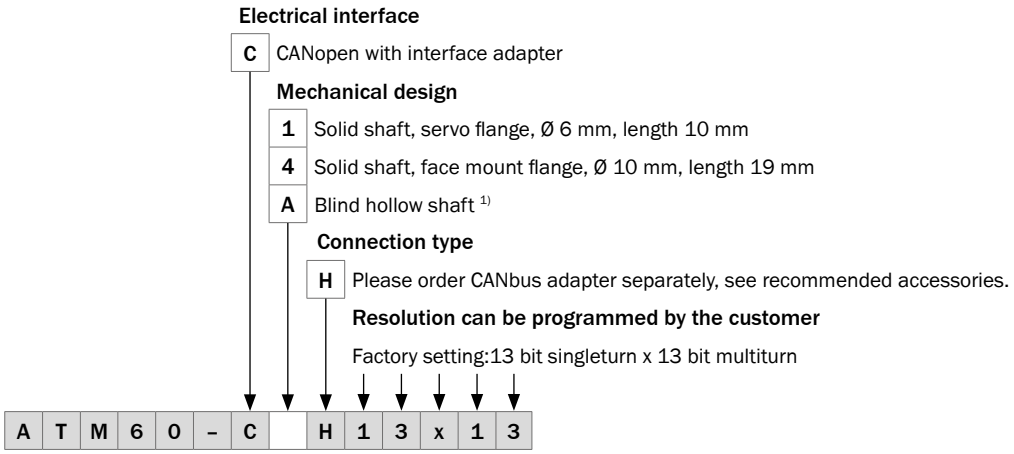
[3] Take into account self-warming of 3.3 K per 1,000 rpm when designing operating temperature range

Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-3
Enclosure rating	IP 67 with shaft seal (acc. to IEC 60529) [1] IP 43 without shaft seal, not sealed on encoder flange (acc. to IEC 60529) IP 66 without shaft seal, sealed on encoder flange (acc. to IEC 60529)
Permissible relative humidity	98%
Operating temperature range	–20 °C ... +85 °C
Storage temperature range	–40 °C ... +100 °C, without packaging
Resistance to shocks	100 g, 6 ms (according to EN 60068-2-27)
Resistance to vibrations	20 g, 10 Hz ... 2,000 Hz (according to EN 60068-2-6)

[1] When mating connector is inserted.

Type code



1) Order collet for 6, 8, 10, 12 and 14 mm or 1/4", 3/8" and 1/2" as separate extra accessories (see recommended accessories). No collets are necessary for 15 mm shaft diameter.

Ordering information

Solid shaft, servo flange

Shaft diameter	Electrical interface	Connection type	Number of steps	Resolution	Type	Part no.
Ø 6 mm, length 10 mm	10 V ... 32 V, CANopen	Bus adapter with cable screw fixings or round connectors	≤ 8,192	8,192 x 8,192	ATM60-C1H13X13	1030025

Solid shaft, face mount flange

Shaft diameter	Electrical interface	Connection type	Number of steps	Resolution	Type	Part no.
Ø 10 mm, length 19 mm	10 V ... 32 V, CANopen	Bus adapter with cable screw fixings or round connectors	≤ 8,192	8,192 x 8,192	ATM60-C4H13X13	1030024

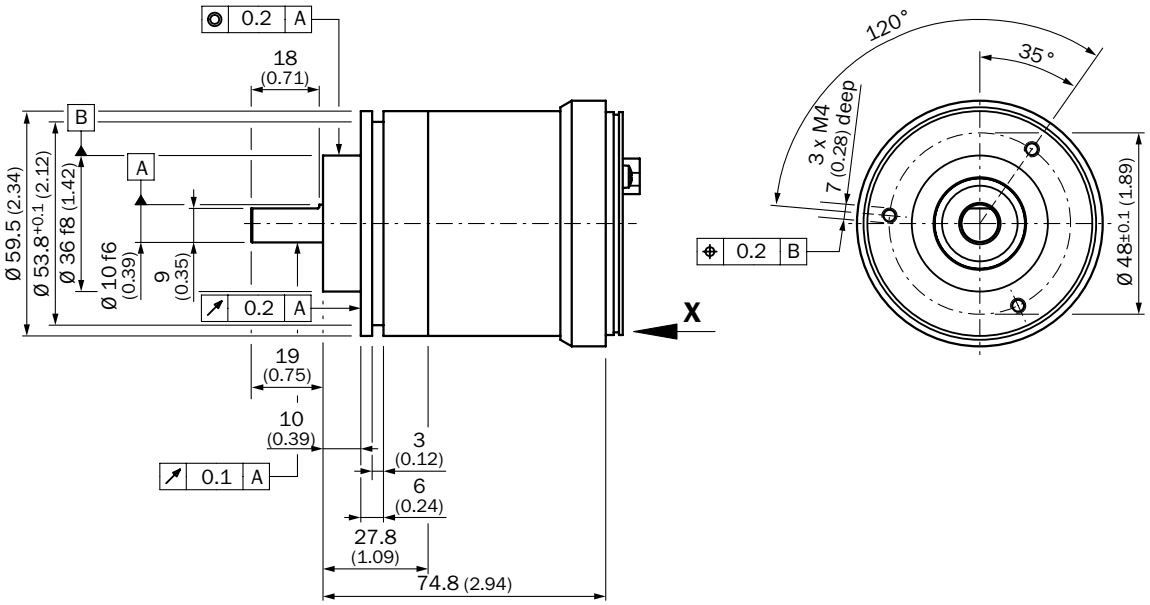
Blind hollow shaft

Shaft diameter	Electrical interface	Connection type	Number of steps	Resolution	Type	Part no.
6 mm, 8 mm, 10 mm, 12 mm, 14 mm, 15 mm, 1/4", 3/8", 1/2" 1)	10 V ... 32 V, CANopen	Bus adapter with cable screw fixings or round connectors	≤ 8,192	8,192 x 8,192	ATM60-CAH13X13	1030026

1) Order collets for 6, 8, 10, 12 and 14 mm or 1/4", 3/8" and 1/2" as separate extra accessories. No collets are necessary for 15 mm shaft diameter.

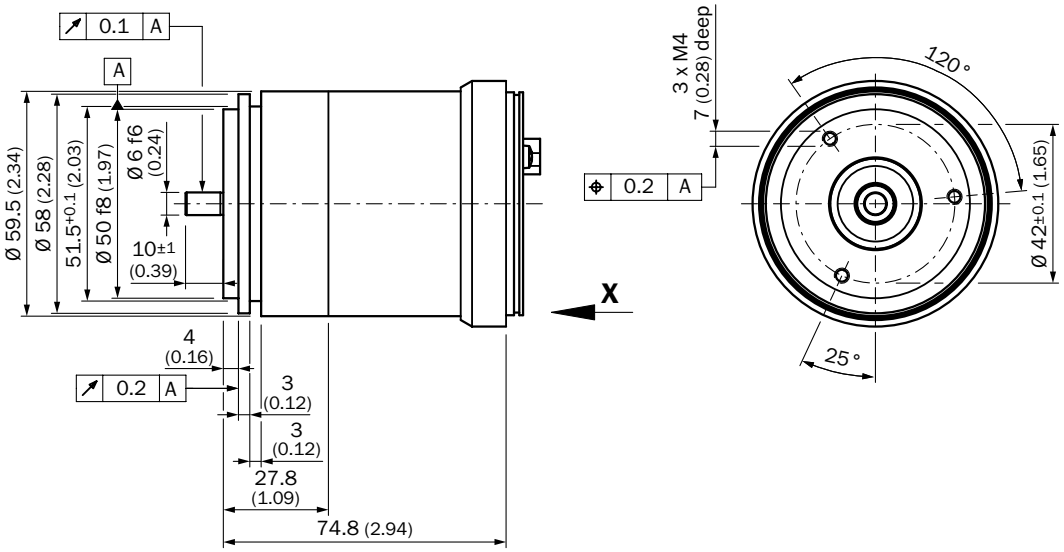
Dimensional drawings (dimensions in mm)

Face mount flange



General tolerances according to DIN ISO 2768-mk

Servo flange



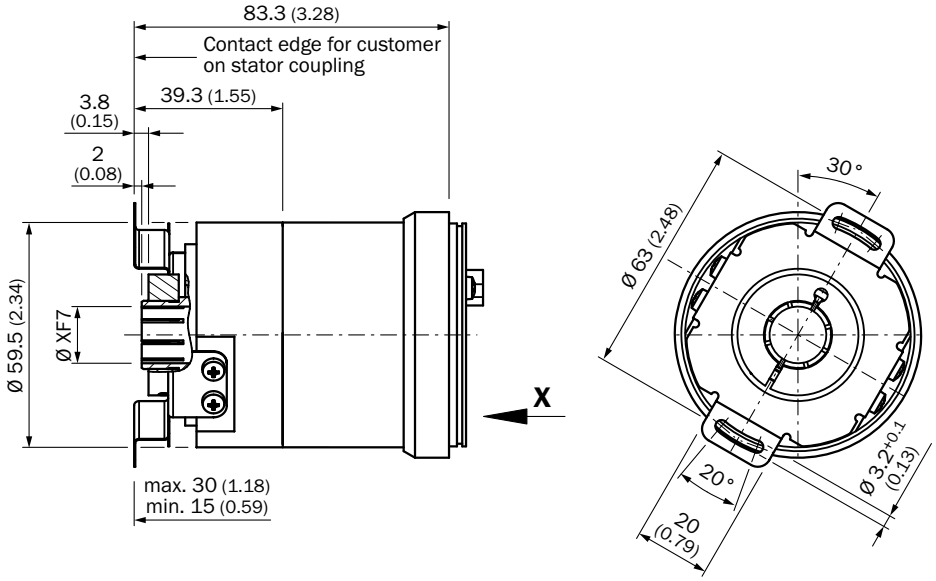
General tolerances according to DIN ISO 2768-mk

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Blind hollow shaft

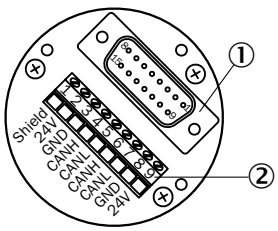


General tolerances according to DIN ISO 2768-mk

PIN assignment

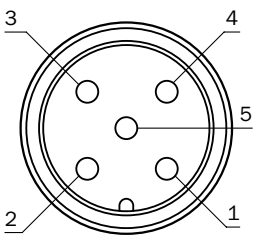
Terminal strip	Male device connector	Signal	Explanation
1	1	Shield	Screen
2	2	U_S (24 V)	Operating voltage 10 ... 32 V
3	3	GND (COM)	0 V (Gnd)
4	4	CAN_H	CAN bus signal high
5	5	CAN_L	CAN bus signal low
6	–	CAN_H	CAN bus signal high
7	–	CAN_L	CAN bus signal low
8	–	GND (COM)	0 V (Gnd)
9	–	U_S (24 V)	Operating voltage 10 - 32 V

Connection adapter

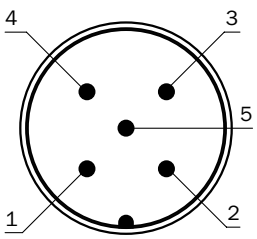


A = Internal plug connector to the encoder
B = External connections to the bus

M12 male device connector (connection adapter)



OUT/US (female contact)



N/US (male contact)

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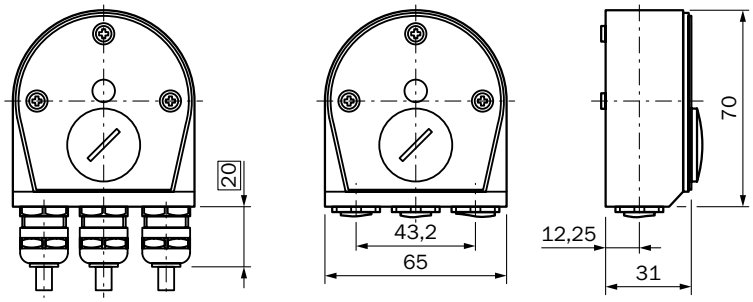
Mandatory accessories

Adapters and distributors

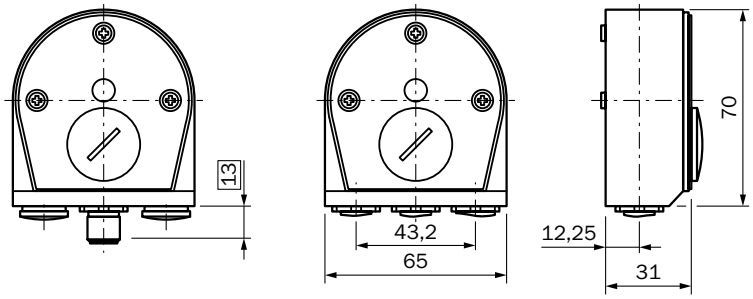
Bus adapters

Figure	Brief description	Type	Part no.
	CANopen connection adapter KR1, 1 x PG	AD-ATM60-KR1CO	2029230
	CANopen connection adapter KR2, 2 x PG	AD-ATM60-KR2CO	2029231
	CANopen connection adapter KR3, 3 x PG	AD-ATM60-KR3CO	2029232
	CANopen connection adapter SR1, 1 x M12, 5-pin	AD-ATM60-SR1CO	2031686
	CANopen connection adapter SR2, 2 x M12, 5-pin	AD-ATM60-SR2CO	2020935

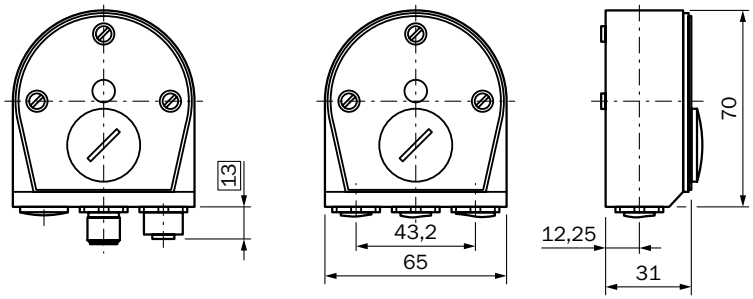
AD-ATM60-KRxCO



AD-ATM60-SR1CO



AD-ATM60-SR2CO



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Shaft adaptation

Collets and clamping rings

Figure	Brief description	Type	Part no.
	Collet for blind hollow shaft, shaft diameter 6 mm, external diameter 15 mm	SPZ-006-AD-A	2029174
	Collet for blind hollow shaft, shaft diameter 8 mm, external diameter 15 mm	SPZ-008-AD-A	2029176
	Collet for blind hollow shaft, shaft diameter 10 mm, external diameter 15 mm	SPZ-010-AD-A	2029178
	Collet for blind hollow shaft, shaft diameter 12 mm, external diameter 15 mm	SPZ-012-AD-A	2029179
	Collet for blind hollow shaft, shaft diameter 14 mm, external diameter 15 mm	SPZ-014-AD-A	2048863
	Collet for blind hollow shaft, shaft diameter 1/2" (12.7 mm), external diameter 15 mm	SPZ-1E2-AD-A	2029180
	Collet for blind hollow shaft, shaft diameter 1/4" (6.35 mm), external diameter 15 mm	SPZ-1E4-AD-A	2029175
	Collet for blind hollow shaft, shaft diameter 3/8" (9.525 mm), external diameter 15 mm	SPZ-3E8-AD-A	2029177

Dimensional drawings ➜ page K-725

Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 36 mm, including mounting kit for face mount flange	BEF-WF-36	2029164

Dimensional drawings ➜ page K-725

Flanges

Flange plate

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	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 10	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	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	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	BEF-FA-036-100	2029161

Dimensional drawings ➜ page K-725

Other mounting accessories

Measuring wheels and measuring wheel systems

Figure	Brief description	Type	Part no.
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278

Dimensional drawings ➜ page K-725

Mounting bell

Figure	Brief description	Type	Part no.
	Mounting bell for encoders with a servo flange, centering hub 50 mm, including mounting kit	BEF-MG-50	5312987

Dimensional drawings ➜ page K-725

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	BEF-WK-SF	2029166

Dimensional drawings ➜ page K-725

Miscellaneous

Figure	Brief description	Type	Part no.
	Mounting kit for servo flange encoder on the bearing block, 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
	Bearing block for hollow shaft encoder, including fixing screws	BEF-FA-B12-010	2042728
	Bearing block for servo and face mount flange encoder	BEF-FA-LB1210	2044591

Dimensional drawings ➜ page K-725

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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° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
	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 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	Bellows coupling, shaft diameter 10 mm/10 mm; maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular ± 4°; max. revolutions 10,000 rpm, -30° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	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. revolutions 10,000 rpm, -30° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	KUP-1012-B	5312984
	Bar coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle ± 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, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0608-S	5314179
	Bar coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 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 8 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0810-S	5314178
	Bar coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-1010-S	2056408
	Double-loop coupling, shaft diameter 6 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-0610-D	5326697
	Double-loop coupling, shaft diameter 8 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-0810-D	5326704
	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
	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, fiber-glass reinforced polyamide membrane and tempered steel coupling pin	KUP-0610-F	5312985
	Spring washer coupling, shaft diameter 10 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-1010-F	5312986

Dimensional drawings ➜ page K-725

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Connectivity

Plug connectors and cables

Female connector (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 5-pin, straight, shielded, for cable diameter 4.5 mm ... 7 mm Head B: -	DOS-1205-GA	6027534

Dimensional drawings ➜ page K-725

Cables (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, shielded, 2 x 0.34 mm² + 2 x 0.25 mm² Wire shielding: AL-PT foil, total shield, tin-plated C shield	By the meter	LTG-2804-MW

Male connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: male connector, M12, 5-pin, straight, A encoded, shielded, for cable diameter 4 mm ... 8 mm Head B: -	STE-1205-GA	6027533

Dimensional drawings ➜ page K-725

Connection cables with female and male connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 5-pin, straight Head B: male connector, M12, 5-pin, straight Cable: drop cable, PUR, halogen-free, unshielded, 2 x 0.34 mm², Ø 6.9 mm	6 m	DSL-1205-G06MK	6028327

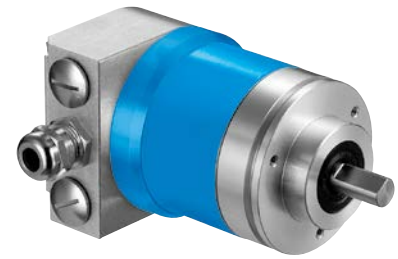
Dimensional drawings ➜ page K-725

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

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RELIABLE, ESTABLISHED, AND MODULAR



Product description

The ATM60 DeviceNet absolute multiturn encoder from SICK provides reliable positional and speed information even in harsh ambient conditions, with a resolution of up to 26 bits. This product family, which is proven in its field, is based on the principle of magnetic measurement. The 13 bit singleturn range is scanned by a sensor using permanent magnetic elements. The 13 bit multiturn range consists of a magnetic reduction gear.

Equipped with a zero set pushbutton, the encoder can be easily set to zero or to any other user-programmed value on site. The connection adapter, which can be removed from the device, enables simple user maintenance and mounting. With its magnetic scanning, rugged IP 67-rated housing and high level of resistance to shock and vibration, the ATM60 is optimally suited for use in harsh conditions.

At a glance

- Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits
- Mechanical interface: face mount, servo flange, blind hollow shaft, and adapter accessories
- Zero-set and preset functions via hardware/software
- Electrical interface:CAN/DeviceNet specification 2.0B, electrically isolated; device profile: Generic [0]
- Electronically adjustable, configurable resolution
- Network status info via duo LED
- Magnetic scanning

Your benefits

- Fewer variants are required since one freely programmable encoder offers all singleturn and multiturn resolutions
- Easy setup due to various connectivity options (1 to 2x PG, 1 to 2x M12)
- Maintenance-free encoder, long service life
- Application flexibility due to easily interchangeable collets for the blind hollow shaft
- Quick commissioning using the zero set/preset function either at the press of the button on the device or via software
- Increased productivity due to highly reliable shock and vibration resistance
- Worldwide availability and service ensure quick and reliable customer service

More information

Fields of application G-425
Detailed technical data. G-425
Type code. G-427
Ordering information. G-427
Dimensional drawings G-428
PIN assignment. G-429
Mandatory accessories. G-430
Recommended accessories G-431

→ www.mysick.com/en/ATM60_DeviceNet

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Measurement of absolute position in various machines and system such as wind power and solar plants, material transport equipment, textile machines, packaging systems, rollers, harbor facilities, printing machines

Detailed technical data

Performance

Max. number of steps per revolution	≤ 8,192
Max. number of revolutions	≤ 8,192
Resolution	13 bit x 13 bit
Error limits	± 0.25 °
Repeatability	0.1 °
Measurement step	0.043 °
Initialization time	1,250 ms [1]

[1] Valid positional data can be read once this time has elapsed.

Interfaces

Electrical interface	DeviceNet
Bus interface	DeviceNet ISO-DIN 11898, electrically isolated [1] 2)
Set (electronic adjustment)	Via PRESET pushbutton or protocol
Data protocol	DeviceNet Specification Release 2.0
Address setting	0 ... 63, DIP switch or protocol
Data transmission rate (baud rate)	125, 250, 500 kBaud DIP switch or protocol
Status information	Network status LED, 2-colors
Bus termination	DIP switch [3]

[1] CAN High Speed.

[2] CAN specification 2.0 B.

[3] Should only be connected in the final device.

Electrical data

Connection type	Bus adapter with cable screw fixings or round connectors [1]
Operating voltage range	10 V ... 32 V
Max. power consumption without load	≤ 2 W
Reverse polarity protection	✔
MTTFd: mean time to dangerous failure	150 years (EN ISO 13849-1) [2]

[1] Please order the DeviceNet adapter separately.

[2] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of devices, average ambient temperature 40 °C, frequency of use 8,760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Mechanical data

Shaft diameter	
Face mount flange	10 x 19 mm
Servo flange	6 x 10 mm
Blind hollow shaft [1]	6, 8, 10, 12, 14, 15 mm and 1/4", 3/8", 1/2"
Shaft material	Stainless steel
Flange material	Aluminum
Housing material	Aluminum
Mass [2]	
Face mount flange, servo flange	0.59 kg
Blind hollow shaft	0.59 kg
Start up torque at 20 °C	
Face mount flange, servo flange	2.5 Ncm with shaft seal
Face mount flange, servo flange	0.5 Ncm without shaft seal
Blind hollow shaft	1.2 Ncm with shaft seal
Operating torque at 20 °C	
Face mount flange, servo flange	1.8 Ncm with shaft seal
Face mount flange, servo flange	0.3 Ncm without shaft seal
Blind hollow shaft	0.8 Ncm with shaft seal
Permissible shaft loading	
Face mount flange, servo flange	300 N radial 50 N axial
Permissible shaft movement of the drive element, static/dynamic	
Blind hollow shaft	± 0.3/ ± 0.1 mm radial ± 0.5/ ± 0.2 mm axial
Max. angular acceleration	≤ 500,000 rad/s²
Operating speed [3]	
Face mount flange, servo flange	6,000 rpm
Blind hollow shaft	3,000 rpm
Rotor moment of inertia	
Face mount flange, servo flange	35 gcm²
Blind hollow shaft	55 gcm²
Bearing lifetime	3.6 x 10^9 revolutions

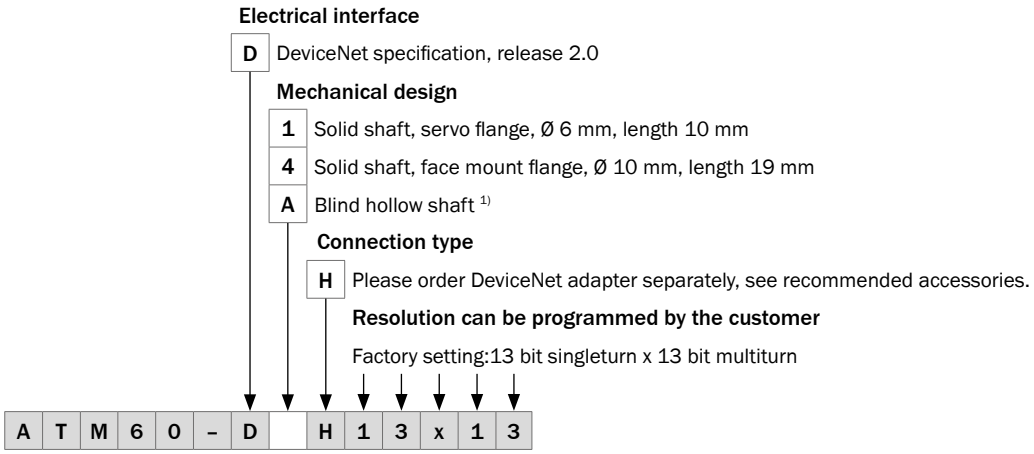
[1] Order collets for 6, 8, 10, 12 and 14 mm or 1/4", 3/8" and 1/2" as separate extra accessories. No collets are necessary for 15 mm shaft diameter.

[2] If the shaft seal has been removed by the customer.

Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-3
Enclosure rating (as per IEC 60529)	IP 67, with shaft seal IP 43, without shaft seal, not sealed on encoder flange IP 66, without shaft seal, not sealed on encoder flange
Permissible relative humidity	98%
Operating temperature range	–20 °C ... +85 °C
Storage temperature range	–40 °C ... +100 °C, without packaging
Resistance to shocks	100 g/6 ms (according to EN 60068-2-27)
Resistance to vibrations	20 g / 10 Hz - 2,000 Hz (according to EN 60068-2-6)

Type code



1) Order collet for 6, 8, 10, 12 and 14 mm or 1/4", 3/8" and 1/2" as separate extra accessories (see recommended accessories). No collets are necessary for 15 mm shaft diameter.

Ordering information

Solid shaft, servo flange

Shaft diameter	Electrical interface	Connection type	Number of steps	Resolution	Type	Part no.
Ø 10 mm, length 19 mm	10 V ... 32 V, DeviceNet	Bus adapter with cable screw fixings or round connectors	≤ 8,192	8,192 x 8,192	ATM60-D1H13X13	1030018

Solid shaft, face mount flange

Shaft diameter	Electrical interface	Connection type	Number of steps	Resolution	Type	Part no.
Ø 10 mm, length 19 mm	10 V ... 32 V, DeviceNet	Bus adapter with cable screw fixings or round connectors	≤ 8,192	8,192 x 8,192	ATM60-D4H13X13	1030017

Blind hollow shaft

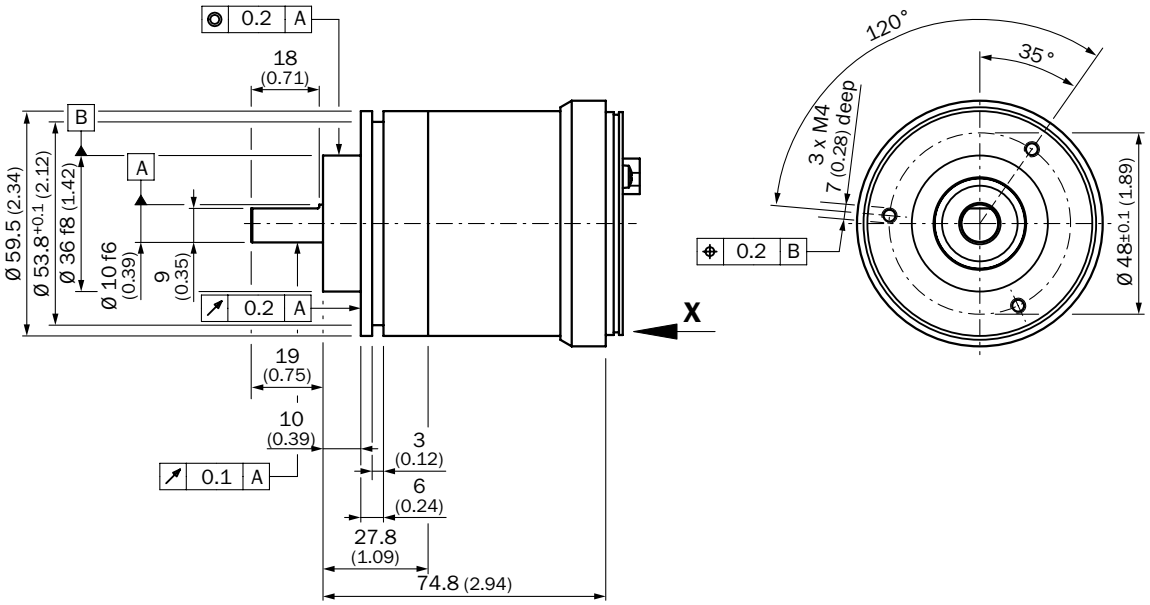
Shaft diameter	Electrical interface	Connection type	Number of steps	Resolution	Type	Part no.
6 mm, 8 mm, 10 mm, 12 mm, 14 mm, 15 mm, 1/4", 3/8", 1/2" 1)	10 V ... 32 V, DeviceNet	Bus adapter with cable screw fixings or round connectors	≤ 8,192	8,192 x 8,192	ATM60-DAH13X13	1030019

1) Order collets for 6, 8, 10, 12 and 14 mm or 1/4", 3/8" and 1/2" as separate extra accessories. No collets are necessary for 15 mm shaft diameter.

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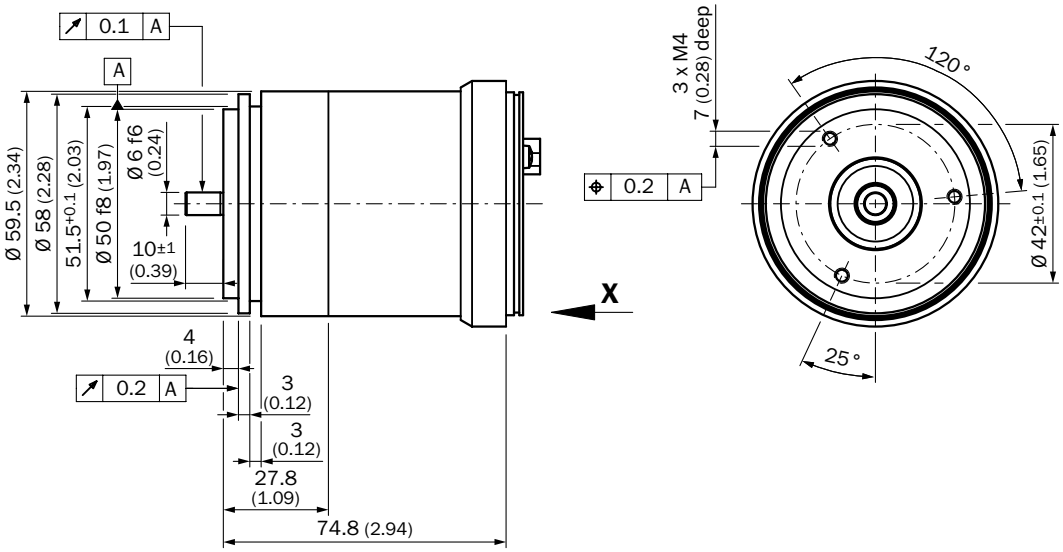
Dimensional drawings (dimensions in mm)

Face mount flange



General tolerances according to DIN ISO 2768-mk

Servo flange



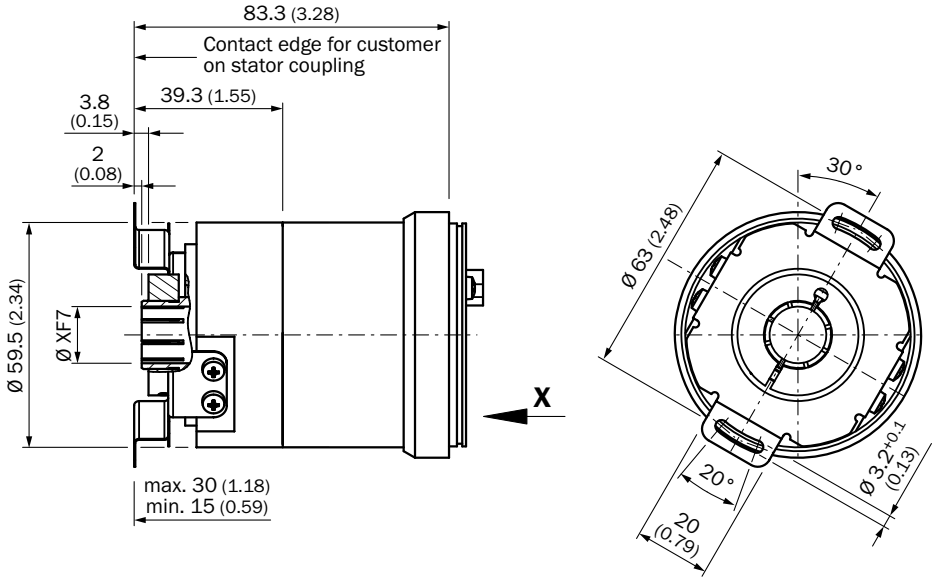
General tolerances according to DIN ISO 2768-mk

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Servo flange

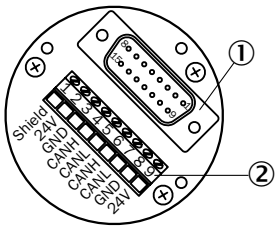


General tolerances according to DIN ISO 2768-mk

PIN assignment

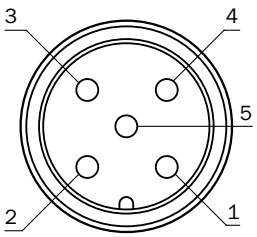
Terminal strip	Male device connector	Signal	Explanation
1	1	Shield	Screen
2	2	U_S (24 V)	Operating voltage 10 - 32 V
3	3	GND (COM)	0 V (Gnd)
4	4	CAN_H	CAN bus signal high
5	5	CAN_L	CAN bus signal low
6	–	CAN_H	CAN bus signal high
7	–	CAN_L	CAN bus signal low
8	–	GND (COM)	0 V (Gnd)
9	–	U_S (24 V)	Operating voltage 10 ... 32 V

Connection adapter

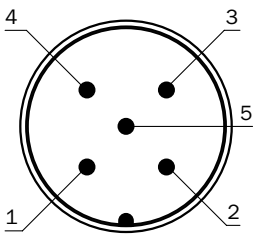


① = Internal plug connector to the encoder
② = External connections to the bus

M12 male device connector (connection adapter)



OUT/US (female contact)



N/US (male contact)

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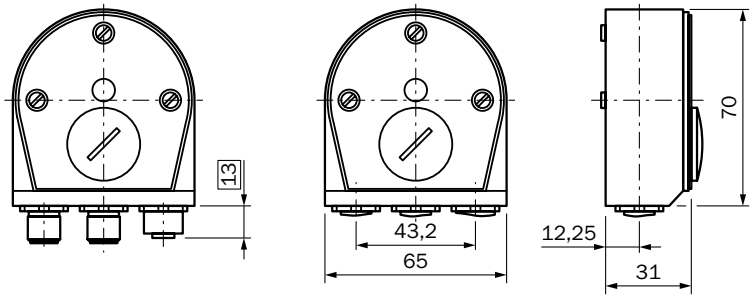
Mandatory accessories

Adapters and distributors

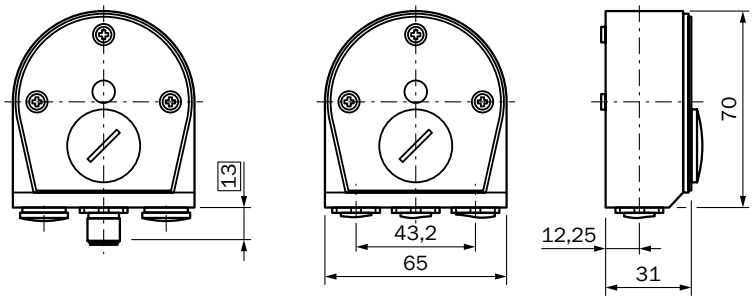
Bus adapters

Figure	Brief description	Type	Part no.
	DeviceNet connection adapter KR1, 1 x PG	AD-ATM60-KR1DN	2029228
	DeviceNet connection adapter KR2, 2 x PG	AD-ATM60-KR2DN	2029229
	DeviceNet connection adapter SR1, 1 x M12, 5-pin	AD-ATM60-SR1DN	2029226
	DeviceNet connection adapter SR2, 2 x M12, 5-pin	AD-ATM60-SR2DN	2029227

AD-ATM60-KRxDN



AD-ATM60-SRxDN



Shaft adaptation

Collets and clamping rings

Figure	Brief description	Type	Part no.
	Collet for blind hollow shaft, shaft diameter 6 mm, external diameter 15 mm	SPZ-006-AD-A	2029174
	Collet for blind hollow shaft, shaft diameter 8 mm, external diameter 15 mm	SPZ-008-AD-A	2029176
	Collet for blind hollow shaft, shaft diameter 10 mm, external diameter 15 mm	SPZ-010-AD-A	2029178
	Collet for blind hollow shaft, shaft diameter 12 mm, external diameter 15 mm	SPZ-012-AD-A	2029179
	Collet for blind hollow shaft, shaft diameter 14 mm, external diameter 15 mm	SPZ-014-AD-A	2048863
	Collet for blind hollow shaft, shaft diameter 1/2" (12.7 mm), external diameter 15 mm	SPZ-1E2-AD-A	2029180
	Collet for blind hollow shaft, shaft diameter 1/4" (6.35 mm), external diameter 15 mm	SPZ-1E4-AD-A	2029175
	Collet for blind hollow shaft, shaft diameter 3/8" (9.525 mm), external diameter 15 mm	SPZ-3E8-AD-A	2029177

Dimensional drawings ➜ page K-725

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Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 36 mm, including mounting kit for face mount flange	BEF-WF-36	2029164

Dimensional drawings ➜ page K-725

Flanges

Flange plate

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	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 10	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	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	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	BEF-FA-036-100	2029161

Dimensional drawings ➜ page K-725

Other mounting accessories

Measuring wheels and measuring wheel systems

Figure	Brief description	Type	Part no.
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278

Dimensional drawings ➜ page K-725

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Mounting bell

Figure	Brief description	Type	Part no.
	Mounting bell for encoders with a servo flange, centering hub 50 mm, including mounting kit	BEF-MG-50	5312987

Dimensional drawings ➜ page K-725

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	BEF-WK-SF	2029166

Dimensional drawings ➜ page K-725

Miscellaneous

Figure	Brief description	Type	Part no.
	Mounting kit for servo flange encoder on the bearing block, 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
	Bearing block for hollow shaft encoder, including fixing screws	BEF-FA-B12-010	2042728
	Bearing block for servo and face mount flange encoder	BEF-FA-LB1210	2044591

Dimensional drawings ➜ page K-725

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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° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
	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 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	Bellows coupling, shaft diameter 10 mm/10 mm; maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular ± 4°; max. revolutions 10,000 rpm, -30° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	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. revolutions 10,000 rpm, -30° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	KUP-1012-B	5312984
	Bar coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle ± 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, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°, max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0608-S	5314179
	Bar coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 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 8 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0810-S	5314178
	Bar coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-1010-S	2056408
	Double-loop coupling, shaft diameter 6 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-0610-D	5326697
	Double-loop coupling, shaft diameter 8 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-0810-D	5326704
	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
	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, fiber-glass reinforced polyamide membrane and tempered steel coupling pin	KUP-0610-F	5312985
	Spring washer coupling, shaft diameter 10 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-1010-F	5312986

Dimensional drawings ➜ page K-725

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Connectivity

Plug connectors and cables

Female connector (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 5-pin, straight, shielded, for cable diameter 4.5 mm ... 7 mm Head B: -	DOS-1205-GA	6027534

Dimensional drawings ➜ page K-725

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, shielded, 2 x 0.34 mm² + 2 x 0.25 mm² Wire shielding: AL-PT foil, total shield, tin-plated C shield	By the meter	LTG-2804-MW	6028328

Male connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: male connector, M12, 5-pin, straight, A encoded, shielded, for cable diameter 4 mm ... 8 mm Head B: -	STE-1205-GA	6027533

Dimensional drawings ➜ page K-725

Connection cables with female and male connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 5-pin, straight Head B: male connector, M12, 5-pin, straight Cable: drop cable, PUR, halogen-free, unshielded, 2 x 0.34 mm², Ø 6.9 mm	6 m	DSL-1205-G06MK	6028327

Dimensional drawings ➜ page K-725

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

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RELIABLE, ESTABLISHED, AND MODULAR



Product description

The ATM90 with SSI data interface complements the through hollow shaft variants in the ATM60 product family. The ATM90 operates reliably even under harsh ambient conditions. Its rugged mechanical design ensures maximum reliability and a long service life. Magnetic singleturn scanning allows a maximum resolution of up to 13 bits within one revolution. The number of revolutions, maximum of 13 bit, is output and recorded using a mechanical and almost completely wear-free transmission. This means that the ATM90 can be operated without a battery. A shallow installation depth of 60 mm combined with high shock and vibration resistance enable the ATM90 to be used in applications with high mechanical stress and distinct climate fluctuations

At a glance

- Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits
- Mechanical interface: through hollow shaft with shallow installation depth
- Zero-set and preset functions via hardware or software
- Electrical interface: SSI with gray or binary code type
- Electronically adjustable, configurable resolution
- Magnetic scanning

Your benefits

- Fewer variants are required since one freely programmable encoder offers all singleturn and multiturn resolutions
- Easy setup due to various electrical connection adapters (cable, M23)
- Maintenance-free encoder, long service life
- Quick commissioning using the zero set/preset function either at the press of the button on the device or via software
- Increased productivity due to highly reliable shock and vibration resistance
- Worldwide availability and service ensure quick and reliable customer service

More information

Fields of application G-437
Detailed technical data. G-437
Type code. G-438
Ordering information. G-439
Dimensional drawings G-440
PIN assignment. G-441
Recommended accessories. G-442

→ www.mysick.com/en/ATM90_SSI

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Measurement of absolute position in various machines and system such as wind power and solar plants, material transport equipment, textile machines, packaging systems, rollers, harbor facilities, printing machines

Detailed technical data

Performance

Max. number of steps per revolution	≤ 8,192
Max. number of revolutions	≤ 8,192
Resolution	13 x 12 or 12 x 13 bit
Error limits	± 0.25 °
Repeatability	0.1 °
Measurement step	0.043 °
Initialization time	1,050 ms [1]

[1] Valid positional data can be read once this time has elapsed.

Interfaces

Electrical interface	SSI
Signal wire	Potential-free with a 12-pin M23 male connector for the housing or a 12-wire cable
Interface signals	Clock +, Clock -, Data +, Data- [1] Programming interface: RS-422
Clock frequency	1 MHz [2]
Set (electronic adjustment)	H active (L = 0 - 4.7 V, H = 10 - Us V)
CW/CCW (counting sequence when turning)	L active (L = 0 - 1.5 V, H = 2.0 - Us V)
Configuration data	Number of steps per revolution Number of revolutions Code type Electronic adjustment

[1] For higher clock frequencies, choose synchronous SSI.

[2] Min. LOW level (Clock +): 500 ns.

Electrical data

Operating voltage range	10 V ... 32 V
Max. power consumption without load	≤ 0.8 W
Code type	Gray, binary
Code sequence	CW/CCW
Reverse polarity protection	✔
MTTFd: mean time to dangerous failure	150 years (EN ISO 13849-1) [1]

[1] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of devices, average ambient temperature 40 °C, frequency of use 8,760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Mechanical data

Shaft diameter Through hollow shaft	12, 16 mm and 1/2"
Shaft material	Stainless steel
Flange material	Aluminum
Housing material	Aluminum
Mass [1]	0.8 kg
Start up torque at 20 °C	0.5 Ncm
Operating torque at 20 °C	0.4 Ncm
Max. angular acceleration	≤ 600,000 rad/s²
Max. operating speed [2]	2,000 rpm
Rotor moment of inertia	152.77 gcm²
Bearing lifetime	3.6 x 10^9 revolutions

[1] Relates to devices with cable outlet.

[2] Take into account self-warming of 3.3 K per 1,000 rpm when designing operating temperature range

Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-3
Enclosure rating	IP 65 with shaft seal (acc. to IEC 60529) [1]
Permissible relative humidity	98%
Operating temperature range	–20 °C ... +70 °C
Storage temperature range	–40 °C ... +100 °C, without packaging
Resistance to shocks	100 g/6 ms (according to EN 60068-2-27)
Resistance to vibrations	20 g / 10 Hz - 2,000 Hz (according to EN 60068-2-6)

[1] When mating connector is inserted.

Type code

G

Electrical interface

A 10 V...32 V, SSI/RS422

Mechanical design

T Through hollow shaft, Ø 12 mm

U Through hollow shaft Ø 1/2"

X Through hollow shaft, Ø 16 mm

Connection type

A Male connector M23, 12-pin, radial outlet

K Cable, 12-wire, radial outlet, 1.5 m

L Cable, 12-wire, radial outlet, 3.0 m

M Cable, 12-wire, radial outlet, 5.0 m

Resolution can be programmed by the customer using the programming tool PGT 01 [1),2)]

Factory setting:12 bit singleturn x 12 bit multiturn

A	T	M	9	0	–	A			1	2	x	1	2

[1] Ex-works configuration: 4,096 steps x 4,096 revolutions, Gray-Code, Set = 0. Other configurations on request.

[2] Maximum permissible resolution: 25 bit (12 bit singleturn x 13 bit multiturn or 13 bit singleturn x 12 bit multiturn).

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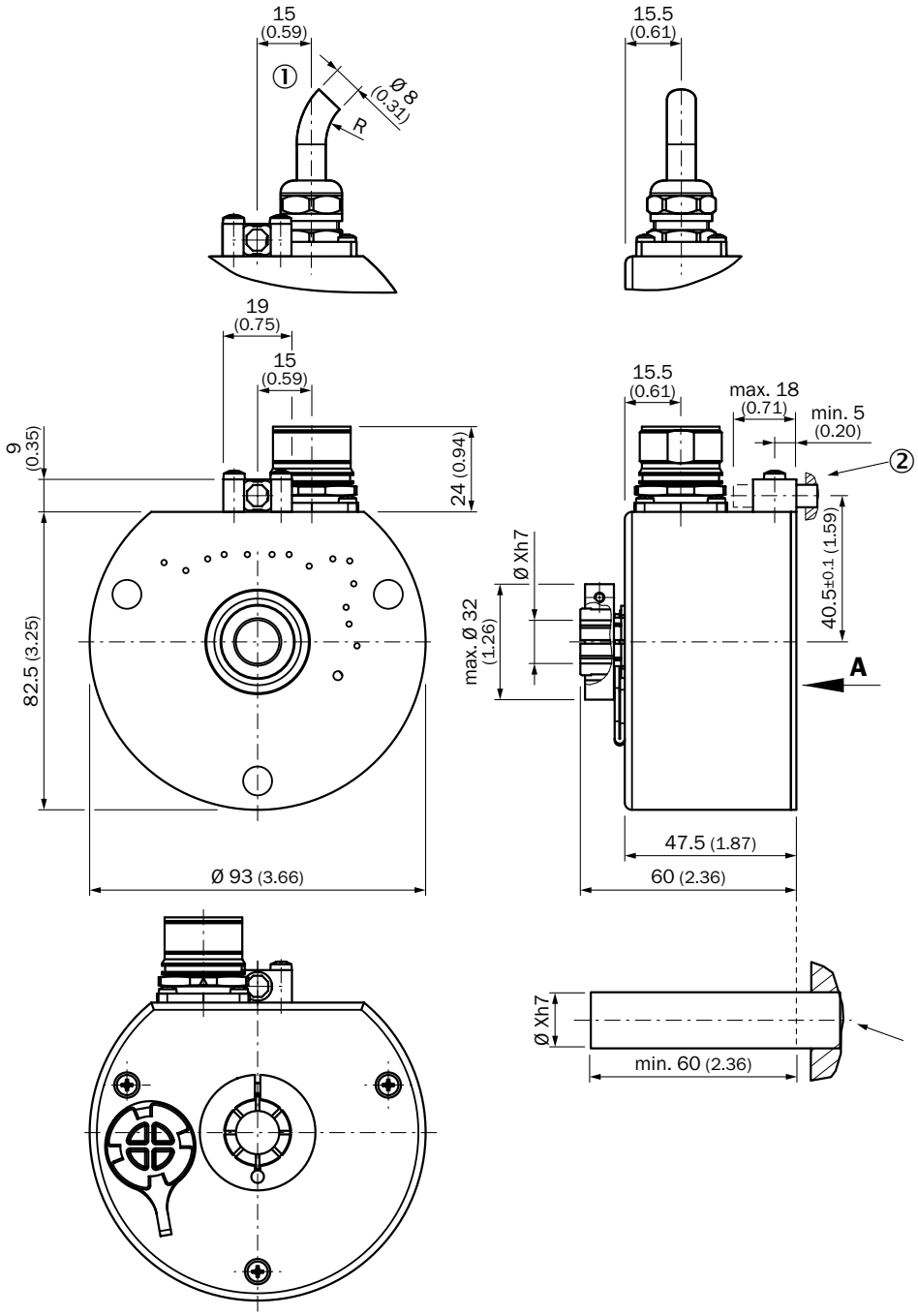
Ordering information

Through hollow shaft

- **Electrical interface:** 10 V ... 32 V, SSI
- **Number of steps:** ≤ 4,096
- **Resolution:** 4,096 x 4,096
- **Programmable:** ✔

Shaft diameter	Connection type	Type	Part no.
1/2"	Cable, 12-wire, radial, 1.5 m	ATM90-AUK12X12	1030035
	Cable, 12-wire, radial, 3 m	ATM90-AUL12X12	1030036
	Cable, 12-wire, radial, 5 m	ATM90-AUM12X12	1030037
	M23 male connector, 12-pin, radial	ATM90-AUA12X12	1030034
12 mm	Cable, 12-wire, radial, 1.5 m	ATM90-ATK12X12	1030031
	Cable, 12-wire, radial, 3 m	ATM90-ATL12X12	1030032
	Cable, 12-wire, radial, 5 m	ATM90-ATM12X12	1030033
	M23 male connector, 12-pin, radial	ATM90-ATA12X12	1030030
16 mm	Cable, 12-wire, radial, 1.5 m	ATM90-AXK12X12	1030039
	Cable, 12-wire, radial, 3 m	ATM90-AXL12X12	1030040
	Cable, 12-wire, radial, 5 m	ATM90-AXM12X12	1030041
	M23 male connector, 12-pin, radial	ATM90-AXA12X12	1030038

Dimensional drawings (dimensions in mm)



General tolerances according to DIN ISO 2768-mk

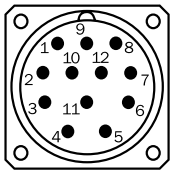
① Min. bend radius 40 mm

② Encoder stator coupling through customer's Ø 6 mm cylindrical pin, DIN EN 28734

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PIN assignment

PIN	Signal	Wire colors (cable outlet)	Explanation
1	GND	Blue	Ground connection
2	Data +	White	Interface signals
3	Clock +	Yellow	Interface signals
4	R x D +	Gray	RS-422 programming cable
5	R x D –	Green	RS-422 programming cable
6	T x D +	Pink	RS-422 programming cable
7	T x D –	Black	RS-422 programming cable
8	U_S	Red	Operating voltage
9	SET	Orange	Electronic adjustment
10	Data –	Brown	Interface signals
11	Clock –	Violet	Interface signals
12	V/$\overline{R}$	Orange/black	Sequence in direction of rotation
	Screen		Housing potential



View of M23 male device connector on encoder

V/$\overline{R}$ This input programs the counting direction for the encoder. When it is not connected, this input is set to HIGH. If the encoder shaft is rotated clockwise (to the right) as viewed when facing the shaft, it counts in ascending order. If it should count in ascending order when the shaft is rotated counterclockwise (to the left), then this connection must be permanently set to LOW level (GND).

SET This input is for electronic zeroing. If the SET cable is set to U_S for more than 100 ms, the mechanical position corresponds to the 0 value, i.e., the predetermined SET value.

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Recommended accessories

Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm	1.5 m	DOL-2312-G1M5MA1	2029200
		3 m	DOL-2312-G03MMA1	2029201
		5 m	DOL-2312-G05MMA1	2029202
		10 m	DOL-2312-G10MMA1	2029203
		20 m	DOL-2312-G20MMA1	2029204
		30 m	DOL-2312-G30MMA1	2029205

Dimensional drawings ➜ page K-725

Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: –20 °C ... +130 °C	DOS-2312-G	6027538
	Head A: female connector, M23, 12-pin, 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: female connector, M23, 12-pin, angled, shielded, for cable diameter 4.2 mm ... 6.6 mm Head B: - Operating temperature: –20 °C ... +130 °C	DOS-2312-W01	2072580
	Head A: female connector, M23, 21-pin, straight, shielded, for cable diameter 5.5 mm ... 12 mm Head B: -	DOS-2321-G	6027539

Dimensional drawings ➜ page K-725

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	By the meter	LTG-2308-MWENC	6027529
	Head A: cable Head B: cable Cable: PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.5 mm	By the meter	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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm	By the meter	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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm	By the meter	LTG-2612-MW	6028516

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Male connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	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 ➜ page K-725

Other accessories

Programming and configuration tools

Figure	Brief description	Type	Part no.
	Programming tool for ATM60, ATM90 and KH53 SSI	PGT-01-S	1030111

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

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RELIABLE, ESTABLISHED, AND MODULAR



Product description

The ATM90 PROFIBUS complements the through hollow shaft variants in the ATM60 product family. The ATM90 operates reliably even under harsh ambient conditions. Its rugged mechanical design ensures maximum reliability and a long service life. Magnetic singleturn scanning allows a maximum resolution of up to 13 bits within one revolution. The number of revolutions, maximum of 13 bit, is output and recorded using a mechanical and almost completely wear-free transmission. This means that the ATM90 can be operated without a battery. A shallow installation depth of 60 mm combined with high shock and vibration resistance enable the ATM90 to be used in applications with high mechanical stress and distinct climate fluctuations

At a glance

- Extremely rugged, tried-and-tested absolute multiturn encoder with a resolution of up to 26 bits
- Mechanical interface: through hollow shaft with shallow installation depth
- Zero-set and preset functions via hardware or software
- Electrical interface: PROFIBUS DP as per IEC61158 / RS-485 , electrically isolated
- Electronically adjustable, configurable resolution
- Magnetic scanning

Your benefits

- Fewer variants are required since one freely programmable encoder offers all singleturn and multiturn resolutions
- Easy setup due to various electrical connection adapters (cable, M23)
- Maintenance-free encoder, long service life
- Quick commissioning using the zero set/preset function either at the press of the button on the device or via software
- Increased productivity due to highly reliable shock and vibration resistance
- Worldwide availability and service ensure quick and reliable customer service

More information

Fields of application G-445
Detailed technical data. G-445
Type code. G-446
Ordering information. G-447
Dimensional drawings G-447
PIN assignment. G-449
Recommended accessories. G-451

→ www.mysick.com/en/ATM90_PROFIBUS

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Measurement of absolute position in various machines and system such as wind power and solar plants, material transport equipment, textile machines, packaging systems, rollers, harbor facilities, printing machines

Detailed technical data

Performance

Max. number of steps per revolution	≤ 8,192
Max. number of revolutions	8,192
Resolution	13 bit x 13 bit
Error limits	± 0.25 °
Repeatability	0.1 °
Measurement step	0.043 °
Initialization time	1,250 ms [1]

[1] Valid positional data can be read once this time has elapsed.

Interfaces

Electrical interface	PROFIBUS
Bus interface	PROFIBUS DP, RS–485 [1] [2] [3]
Set (electronic adjustment)	Via PRESET pushbutton or protocol
Data protocol	Profile for encoder (07hex) – Class 2
Address setting	0 ... 127, DIP switch or protocol
Data transmission rate (baud rate)	9.6 kBaud to 12 Mbaud, autodetect
Status information	LED green (running), LED red (bus activity)
Bus termination	DIP switch [4]

[1] EN 50 170-2.

[2] DIN 19245 Part 1-3.

[3] Electrically isolated through optocoupler.

[4] Should only be connected in the final device.

Electrical data

Connection type	Bus adapter with 3 x M14 screw fixings Bus adapter with 3 cable screw fixings
Operating voltage range	10 V ... 32 V
Max. power consumption without load	≤ 2 W
Reverse polarity protection	✔
MTTFd: mean time to dangerous failure	150 years (EN ISO 13849-1) [1]

[1] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of devices, average ambient temperature 40 °C, frequency of use 8,760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Mechanical data

Shaft diameter	
Through hollow shaft	12, 16 mm and 1/2"
Shaft material	Stainless steel
Flange material	Aluminum
Housing material	Aluminum
Mass [1]	
Connector outlet	0.6 kg
Cable outlet	0.8 kg
Start up torque at 20 °C	0.5 Ncm
Operating torque at 20 °C	0.4 Ncm
Max. angular acceleration	≤ 600,000 rad/s²
Max. operating speed [2]	3,000 rpm
Rotor moment of inertia	153 gcm²
Bearing lifetime	3,6 x 10^9 revolutions

[1] Relates to devices with cable outlet.

[2] Take into account self-warming of 3.3 K per 1,000 rpm when designing operating temperature range

Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-3
Enclosure rating	IP 65 with shaft seal (acc. to IEC 60529)
Permissible relative humidity	98%
Operating temperature range	–20 °C ... +80 °C
Storage temperature range	–40 °C ... +100 °C, without packaging
Resistance to shocks	6 g/20 ms (according to EN 60068-2-27)
Resistance to vibrations	20 g/ 10 Hz ... 2,000 Hz

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Type code

Electrical interface

P PROFIBUS DP

Mechanical design

T Through hollow shaft, Ø 12 mm

U Through hollow shaft Ø 1/2"

X Through hollow shaft, Ø 16 mm

Connection type

F 3 x M14 male connectors, 7-pin, radial outlet

G 3x screw fixings for cable connection, metric M16 x 1.5, SW17

Resolution can be programmed by the customer

Factory setting:12 bit singleturn x 12 bit multiturn

A	T	M	9	0	–	P					x		

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Ordering information

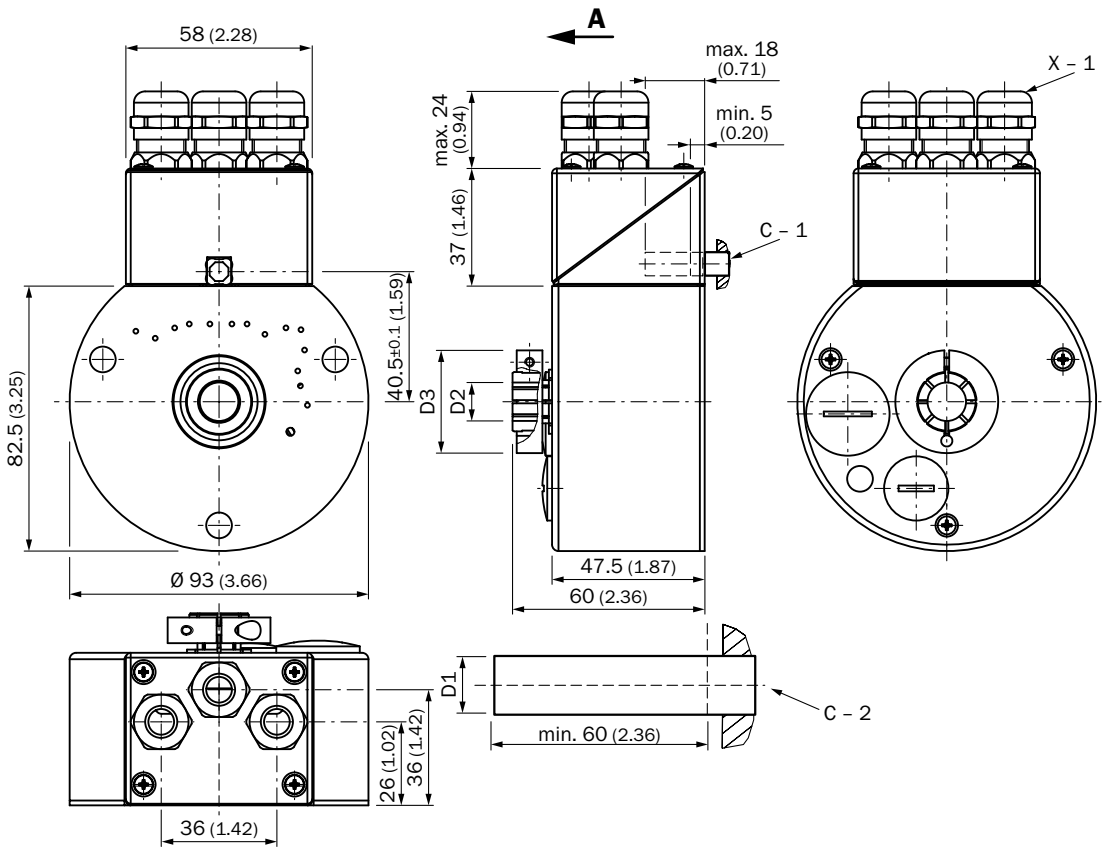
Through hollow shaft

- **Electrical interface:** 10 V ... 32 V, PROFIBUS
- **Number of steps:** ≤ 8,192
- **Resolution:** 8,192 x 8,192

Shaft diameter	Connection type	Type	Part no.
1/2"	Bus adapter with 3 cable screw fixings	ATM90-PUG13X13	1030046
	Bus adapter with 3 x M14 screw fixings	ATM90-PUF13X13	1030043
12 mm	Bus adapter with 3 cable screw fixings	ATM90-PTG13X13	1030045
	Bus adapter with 3 x M14 screw fixings	ATM90-PTF13X13	1030042
16 mm	Bus adapter with 3 cable screw fixings	ATM90-PXG13X13	1030047
	Bus adapter with 3 x M14 screw fixings	ATM90-PXF13X13	1030044

Dimensional drawings (dimensions in mm)

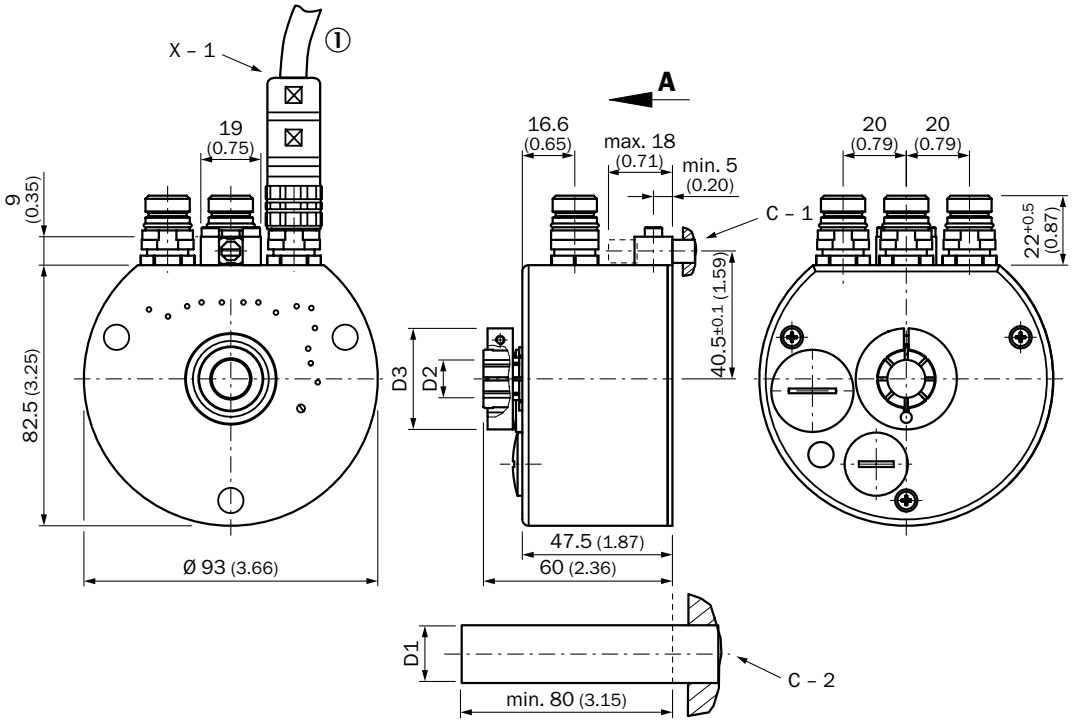
Cable outlet



General tolerances according to DIN ISO 2768-mk

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Connector outlet



General tolerances according to DIN ISO 2768-mk

① Minimum bend radius 40 mm

Hollow shaft	D1	D2	D3
12 mm	12.0^{h7}	12.0^{F7}	29.5
1/2"	12.7^{h7}	12.7^{F7}	29.5
16 mm	16.0^{h7}	16.0^{F7}	32.0

C - 1	Stator coupling via cylindrical pin, (customer), Ø 6_{m6} as per DIN EN ISO 8734
C - 2	Drive shaft (customer)
X - 1	3x screw fixings for cable connection, metric M16 x 1.5, SW 17
A	When looking at the base plate (is used to define the direction of rotation)

PIN assignment

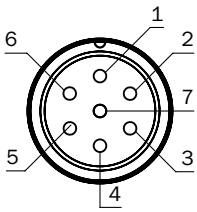
PROFIBUS DP (in/out)

PIN	Signal	Explanation
1	RTS	Request To Send 1)
2	A	A cable PROFIBUS DP
3	N. C.	Not connected
4	B	B cable PROFIBUS DP
5	2M	0 V (potential free) [2]
6	2P5	+ 5 V (potential free) [2]
7	N. C.	Not connected

[1] Use for external bus terminations or to supply the sender/receiver with a optical fiber transmission.

[2] Signal is optional, serves to detect the direction of an optical fiber connection.

N. C. = Not connected.

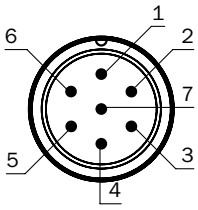


U_S

PIN	Signal	Explanation
1	U_S (24 V)	Operating voltage
2	N. C.	Not connected
3	GND (0 V)	0 V (Gnd)
4	N. C.	Not connected
5	RTS	Request To Send [1]
6	N. C.	Not connected
7	N. C.	Not connected

[1] Signal is optional, serves to detect the direction of an optical fiber connection.

N. C. = Not connected.



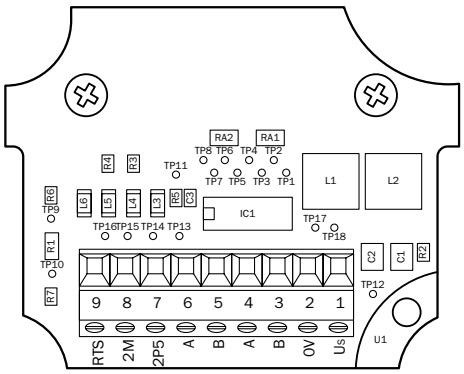
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Connection adapter

PIN	Signal	Explanation
1	U_S (24 V)	Operating voltage
2	GND (0 V)	0 V (Gnd)
3	B	B cable PROFIBUS DP (out)
4	A	A cable PROFIBUS DP (out)
5	B	B cable PROFIBUS DP (in)
6	A	A cable PROFIBUS DP (in)
7	2P5	+ 5 V (potential free) [1]
8	2M	0 V (potential free) [1]
9	RTS	Request To Send [2]

[1] Use for external bus terminations or to supply the sender/receiver with a optical fiber transmission.

[2] Signal is optional, serves to detect the direction of an optical fiber connection.



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Recommended accessories

Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 2 x 0.34 mm², Ø 8.0 mm	5 m	DOL-1205-G05MQ	6026006
		10 m	DOL-1205-G10MQ	6026008
		12 m	DOL-1205-G12MQ	6032636
		15 m	DOL-1205-G15MQ	6032637
		20 m	DOL-1205-G20MQ	6032638
		30 m	DOL-1205-G30MQ	6032639
		50 m	DOL-1205-G50MQ	6032861

Dimensional drawings ➜ page K-725

Connecting cables with male connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: male connector, M12, 5-pin, straight, B-coded Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 2 x 0.34 mm², Ø 8.0 mm Wire shielding: AL-PT foil, total shield, tin-plated C shield	5 m	STL-1205-G05MQ	6026005
		10 m	STL-1205-G10MQ	6026007
		12 m	STL-1205-G12MQ	6032635

Dimensional drawings ➜ page K-725

Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 4-pin, straight, unshielded, for power supply, for cable diameter 4 mm ... 6 mm Head B: -	DOS-1204-G	6007302
	Head A: female connector, M12, 5-pin, straight, B-coded, shielded, for cable diameter 4 mm ... 9 mm Head B: -	DOS-1205-GQ	6021353
	Head A: female connector, M14, 7-pin, straight, shielded, for cable diameter 4 mm ... 8 mm Head B: -	DOS-1507-G	6027536

Dimensional drawings ➜ page K-725

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, shielded, 2 x 0.25 mm², Ø 8.0 mm	By the meter	LTG-2102-MW	6021355

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Other plug connectors and cables

Figure	Brief description	Type	Part no.
	Sales kit consisting of: 2 M14 male cable connectors, 7-pin (6027535) 1 M14 female cable connector, 7-pin (6027535)	DSC-1507-G	2029199

Male connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: male connector, M12, 5-pin, straight, B-coded, shielded, for cable diameter 4 mm ... 9 mm Head B: -	STE-1205-GQ	6021354
	Head A: male connector, M14, 7-pin, straight, shielded, for cable diameter 4 mm ... 8 mm Head B: -	STE-1507-G	6027535

Dimensional drawings ➜ page K-725

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

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RELIABLE AND ESTABLISHED





PARALLEL

More information

Fields of application G-455
Detailed technical data. G-455
Ordering information. G-457
Dimensional drawings G-461
PIN assignment. G-464
Signal outputs G-466
Recommended accessories. G-468

Product description

The modular setup of its CoreTech technology enables the compact ARS60 absolute singleturn encoder to provide a customized solution for all applications. All common mechanical variants are available with any number of steps between 2 and 32,768 and are either equipped with an SSI or parallel output, making the ARS60 a universal solution for nearly any application requirements

At a glance

- Absolute singleturn encoder
- Resolution: up to 15 bit (32,768 steps)
- Electrical interface: SSI with gray or gray capped code type
- Electrical interface: Parallel with gray, gray capped, binary, BCD code type
- Zero-set function
- Mechanical interfaces: face mount flange, servo flange, blind and through hollow shaft
- Enclosure rating: Up to IP66

Your benefits

- Programmable resolution (up to 15 bit)
- Simple zero point adjustment directly on the encoder at the touch of a button or on a connecting wire (cable version)
- Suitable for all mounting methods thanks individual mechanical interfaces
- Application flexibility due to easily interchangeable collets for the blind hollow shaft and through hollow shaft

→ www.mysick.com/en/ARS60_SSI_Parallel

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Electronics and solar industry
- Textile machinery
- Packaging industry
- High-bay warehouses
- Woodworking machines
- Mechanical engineering
- Automotive industry
- Material handling

Detailed technical data

Performance

Number of steps per revolution	00002 ... 32,768 (see ordering information)
Max. number of revolutions	1
Error limits	
Binary number of steps	0.035°
Non-binary number of steps	0.046°
Repeatability	0.005°
Measurement step deviation	
Binary number of steps	0.005°
Non-binary number of steps	0.016°
Measurement step	360° / Number of lines per revolution
Initialization time	80 ms [1]

[1] Valid positional data can be read once this time has elapsed.

Electrical data

Electrical interface	SSI or parallel
Control input switching level	Logic H = 0.7 x U_S Logic L = 0 V... 0.3 V x U_S
Operation of SET button [1]	100 ms
Operating voltage range	10 V DC ... 32 V DC
Operating current	
SSI	Typ. 60 mA
Parallel	Typ. 90 mA
Code sequence	CW, increasing, when viewing the clockwise rotating shaft
Reverse polarity protection	✔
MTTFd: mean time to dangerous failure	300 years (EN ISO 13849-1) [1]

[1] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of devices, average ambient temperature 40 °C, frequency of use 8,760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

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Mechanical data

Shaft diameter	
Face mount flange	10 x 19 mm
Servo flange	6 x 10 mm
Blind hollow shaft [1]	6, 8, 10, 12, 14, 15 mm and 1/4", 3/8", 1/2"
Through hollow shaft [1]	6, 8, 10, 12 mm and 1/4", 3/8", 1/2"
Shaft material	Stainless steel
Flange material	Aluminum
Housing material	Aluminum
Mass [2]	0.3 kg
Start up torque at 20 °C	
Face mount flange	0.4 Ncm
Servo flange	0.25 Ncm
Blind hollow shaft	0.6 Ncm
Through hollow shaft	2.2 Ncm
Operating torque at 20 °C	
Face mount flange	0.3 Ncm
Servo flange	0.2 Ncm
Blind hollow shaft	0.4 Ncm
Through hollow shaft	1.6 Ncm
Permissible shaft loading	
Face mount flange, servo flange	10 N radial 50 N axial
Permissible shaft movement of the drive element, static/dynamic	
Blind hollow shaft, through hollow shaft	± 0.3/ ± 0.1 mm radial ± 0.5/ ± 0.2 mm axial
Max. angular acceleration	≤ 500,000 rad/s²
Operating speed [3]	
Face mount flange, servo flange	6,000 rpm with shaft seal 10,000 rpm without shaft seal, if the shaft seal has been removed by the customer
Blind hollow shaft, through hollow shaft	3,000 rpm
Rotor moment of inertia	
Face mount flange	54 gcm²
Servo flange	48 gcm²
Blind hollow shaft, through hollow shaft	See Figure 1 below.
Bearing lifetime	3,6 x 10^9 revolutions

[1] Order collets for 6, 8, 10, 12 and 14 mm or 1/4", 3/8" and 1/2" as separate extra accessories. No collets are necessary for 15 mm shaft diameter.

[2] Relates to devices with cable outlet.

[3] Take into account self-warming of 3.3 K per 1,000 rpm when designing operating temperature range

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Ambient data

EMC	(according to EN 61000-6-2 and EN 61000-6-3) [1]
Enclosure rating (as per IEC 60529)[2]	
Face mount flange, servo flange, blind hollow shaft: male connector outlet	IP 65
Face mount flange, servo flange, blind hollow shaft: cable outlet	IP 66
Through hollow shaft: male connector outlet	IP 64
Through hollow shaft: cable outlet	IP 64
Permissible relative humidity	90% (condensation of optical surfaces not permitted)
Operating temperature range	–20 °C ... +85 °C
Storage temperature range	–40 °C ... +100 °C
Resistance to shocks	50 g/ 11 ms (as per EN 60068-2-27)
Resistance to vibrations	20 g / 10 Hz - 2,000 Hz (according to EN 60068-2-6)

[1] The EMC according to the standards quoted is achieved if shielded cables are used.

[2] When mating connector is inserted.

Ordering information

Type code: ARS60 SSI, through hollow shaft

Electrical interface

- **A** 10 ... 32 V, SSI/Gray
- **B** 10 ... 32 V, SSI/Gray, capped

Mechanical design

- **D** Through hollow shaft [1]

Connection type

- **A** Male connector M23, 12-pin, radial outlet
- **K** Cable, 11-wire, radial outlet, 1.5 m
- **L** Cable, 11-wire, radial outlet, 3.0 m
- **M** Cable, 11-wire, radial outlet, 5.0 m

Resolution

Any number of steps from 00002 to 32768 possible. Always 5 characters in clear text.

A	R	S	6	0	–		D						

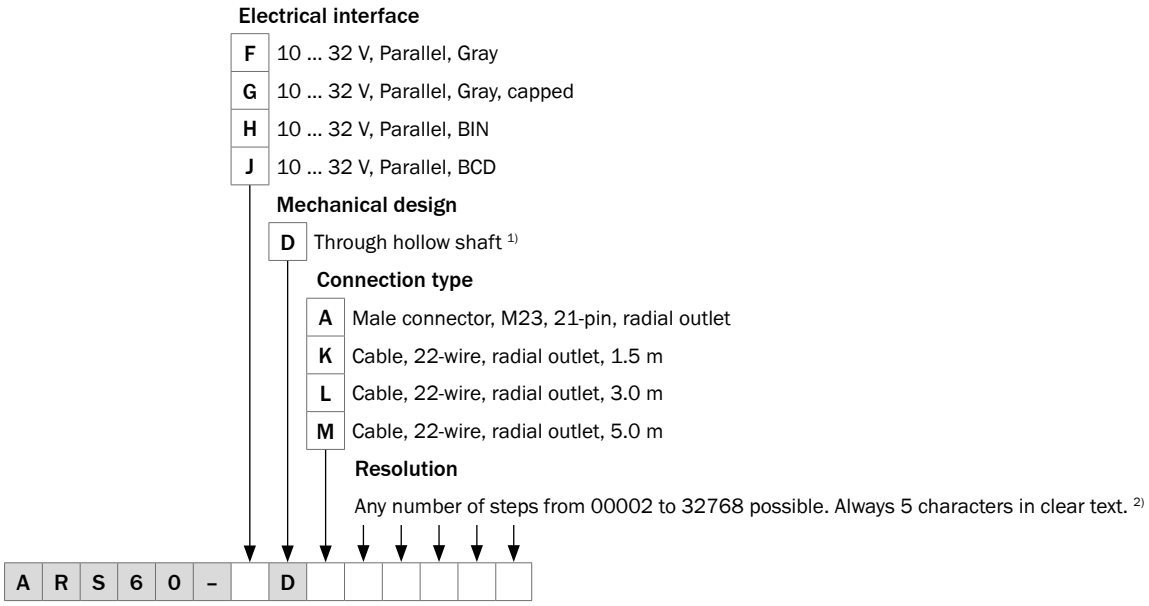
[1] Order collet for 6, 8, 10 and 12 mm or 1/4", 3/8" and 1/2" as separate extra accessories (see recommended accessories).

Example orders

- Through hollow shaft

Through hollow shaft design	Type
10 ... 32 Volt, SSI, Gray, M23 male connector, 12-pin, radial, number of steps 8,192	ARS60-ADA08192

Type code: ARS60 parallel, through hollow shaft



1) Order collet for 6, 8, 10 and 12 mm or 1/4", 3/8" and 1/2" as separate extra accessories (see recommended accessories).

2) For the following interfaces: 10 ... 32 V Parallel Gray; 10 ... 32 V Parallel Gray capped; 10 ... 32 V Parallel BIN.
00002 to 07999 steps possible for the electrical interface: 10 ... 32 V, Parallel BCD. Always 5 characters in clear text.

Example orders

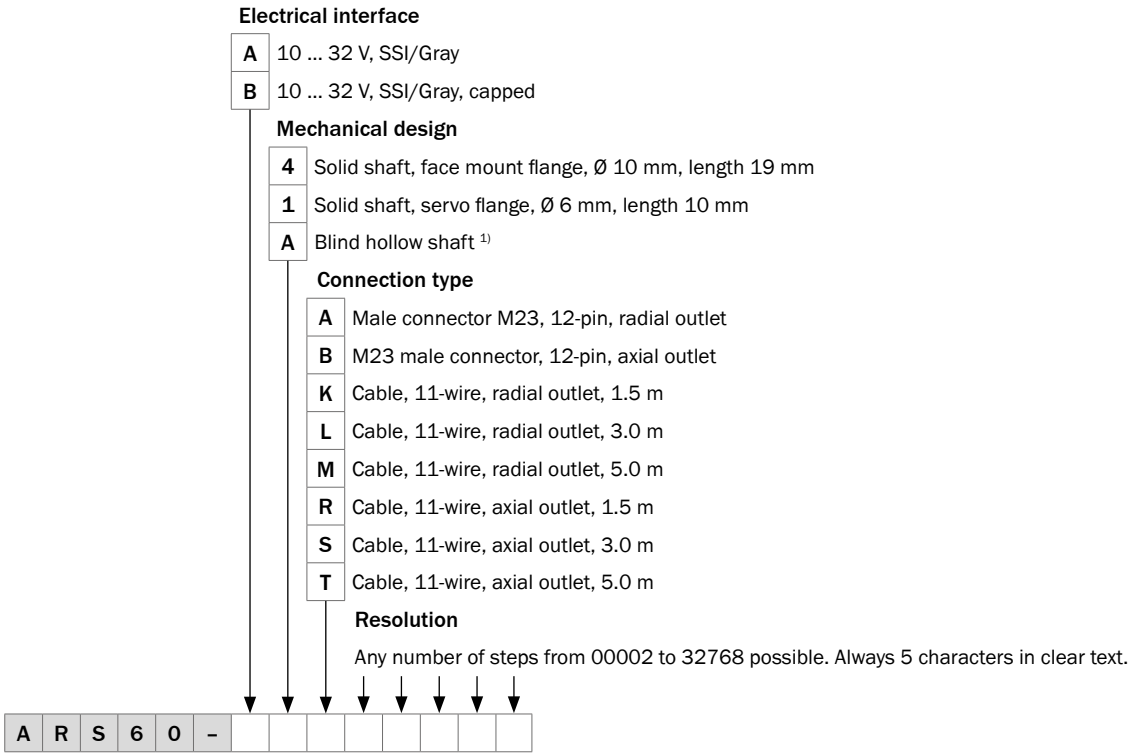
- Through hollow shaft

Through hollow shaft design	Type
10 ... 32 Volt, Parallel, Gray, M23 male connector, 21-pin, radial, number of steps 8,192	ARS60-FDA08192

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Type code: ARS60 SSI



1) Order collet for 6, 8, 10, 12 and 14 mm or 1/4", 3/8" and 1/2" as separate extra accessories (see recommended accessories). No collets are necessary for 15 mm shaft diameter.

Example orders

- Face mount flange

Face mount flange design	Type
10 ... 32 Volt, SSI, Gray, M23 male connector, 12-pin, radial, number of steps 8,192	ARS60-A4A08192

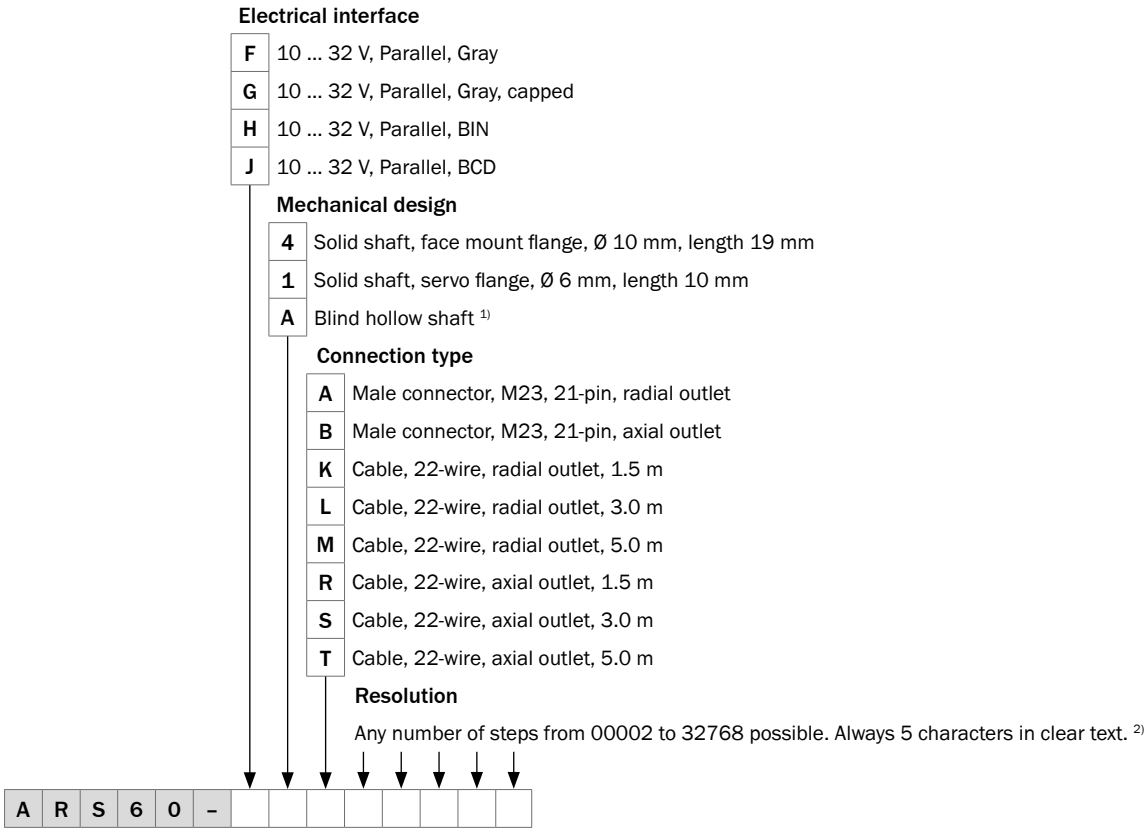
- Servo flange

Servo flange design	Type
10 ... 32 Volt, SSI, Gray, M23 male connector, 12-pin, radial, number of steps 8,192	ARS60-A1A08192

- Blind hollow shaft

Blind hollow shaft design	Type
10 ... 32 Volt, SSI, Gray, M23 male connector, 12-pin, radial, number of steps 8,192	ARS60-AAA08192

Type code: ARS60 parallel



1) Order collet for 6, 8, 10, 12 and 14 mm or 1/4", 3/8" and 1/2" as separate extra accessories (see recommended accessories). No collets are necessary for 15 mm shaft diameter.

2) For the following interfaces: 10 ... 32 V Parallel Gray; 10 ... 32 V Parallel Gray capped; 10 ... 32 V Parallel BIN.
00002 to 07999 steps possible for the electrical interface: 10 ... 32 V, Parallel BCD. Always 5 characters in clear text.

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Example orders

- Servo flange

Servo flange design	Type
10 ... 32 Volt, Parallel, Gray, M23 male connector, 21-pin, radial, number of steps 8,192	ARS60-F1A08192

- Face mount flange

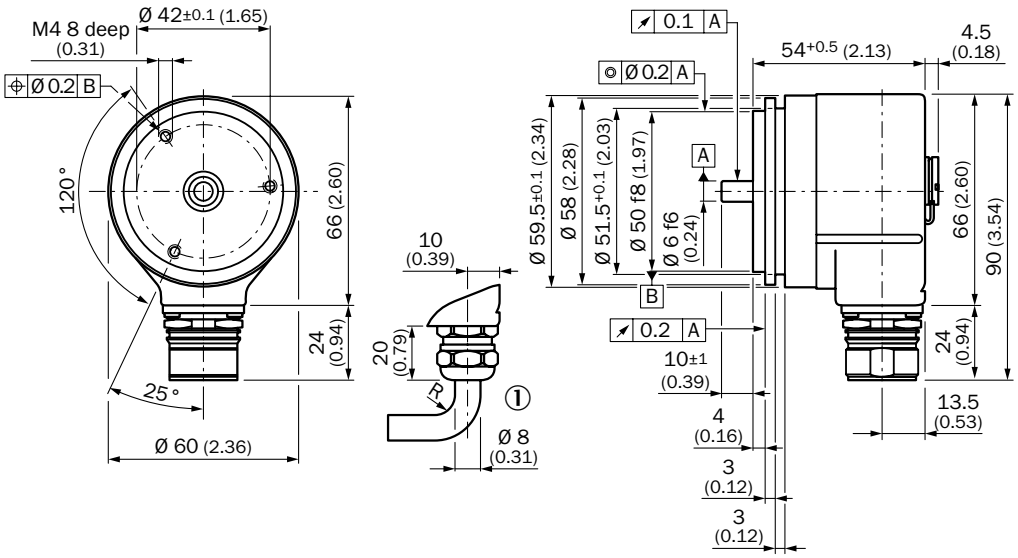
Face mount flange design	Type
10 ... 32 Volt, Parallel, Gray, M23 male connector, 21-pin, radial, number of steps 8,192	ARS60-F4A08192

- Blind hollow shaft

Blind hollow shaft design	Type
10 ... 32 Volt, Parallel, Gray, M23 male connector, 21-pin, radial, number of steps 8,192	ARS60-FAA08192

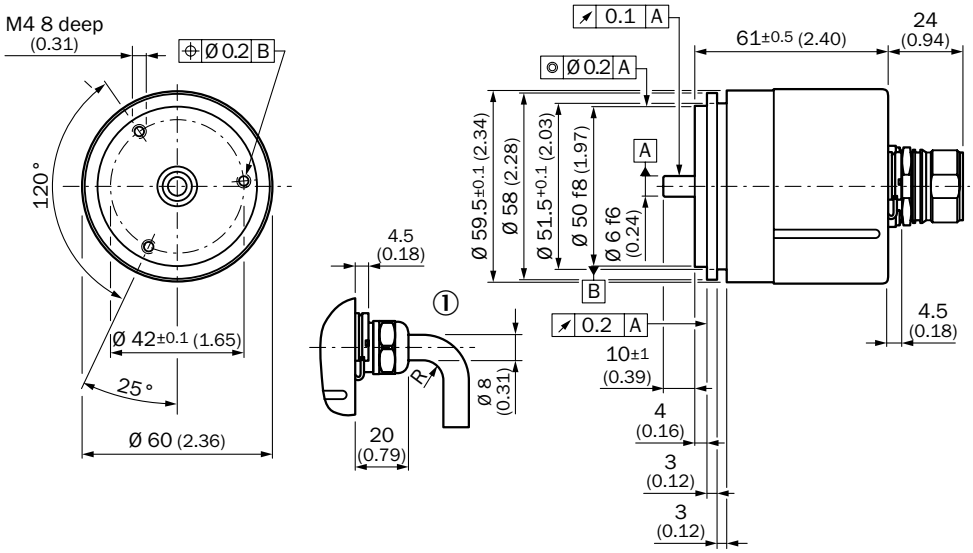
Dimensional drawings (dimensions in mm)

Servo flange, radial



General tolerances according to ISO 2768-mk
① R = min. bend radius 40 mm

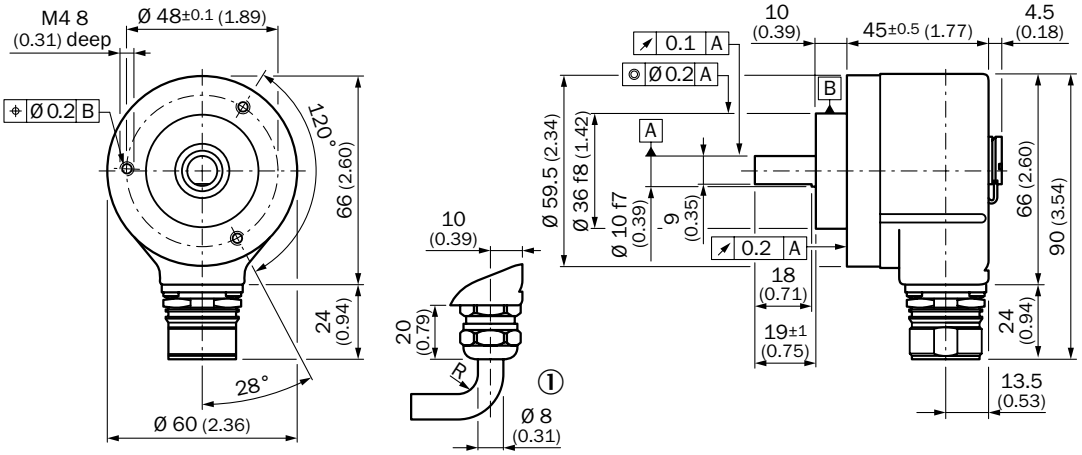
Servo flange, axial



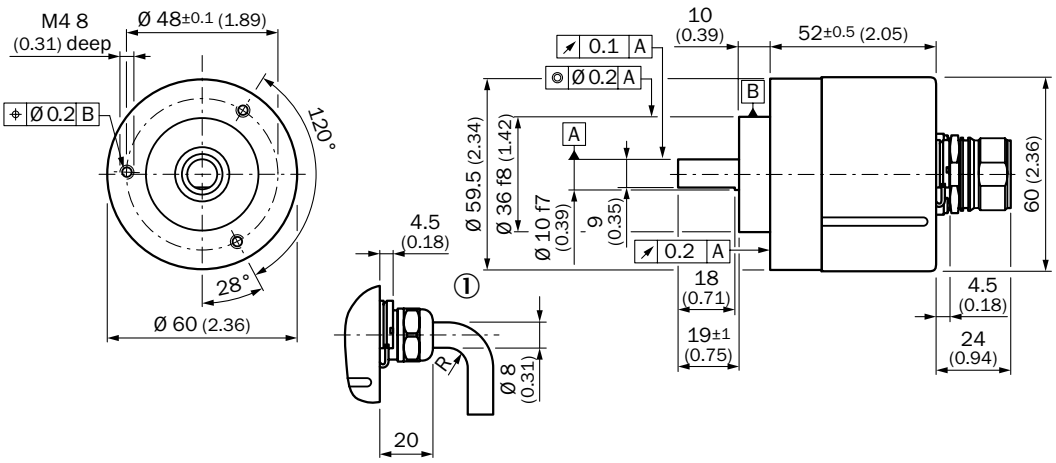
General tolerances according to ISO 2768-mk
① R = min. bend radius 40 mm

G

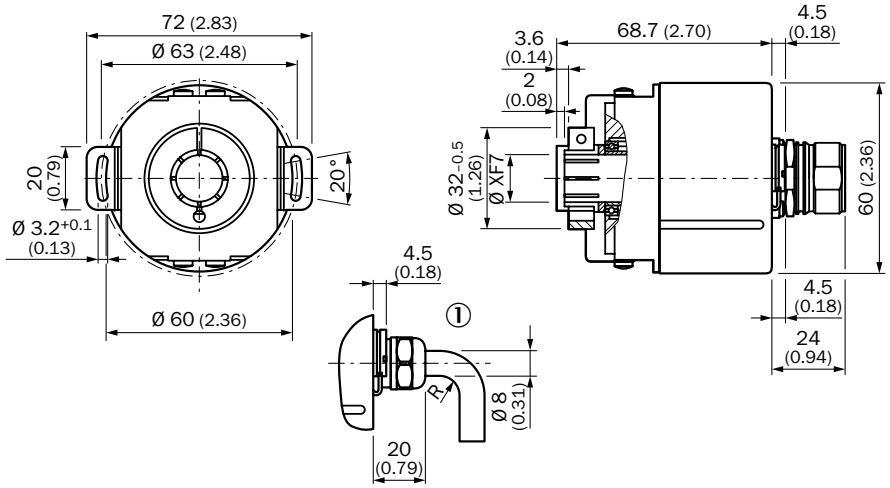
Face mount flange, radial



General tolerances according to ISO 2768-mk
① R = min. bend radius 40 mm

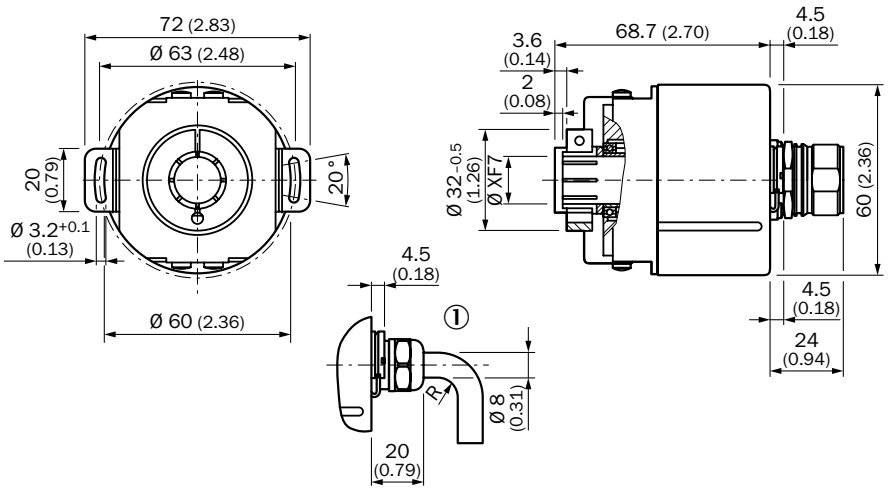


Blind hollow shaft, axial

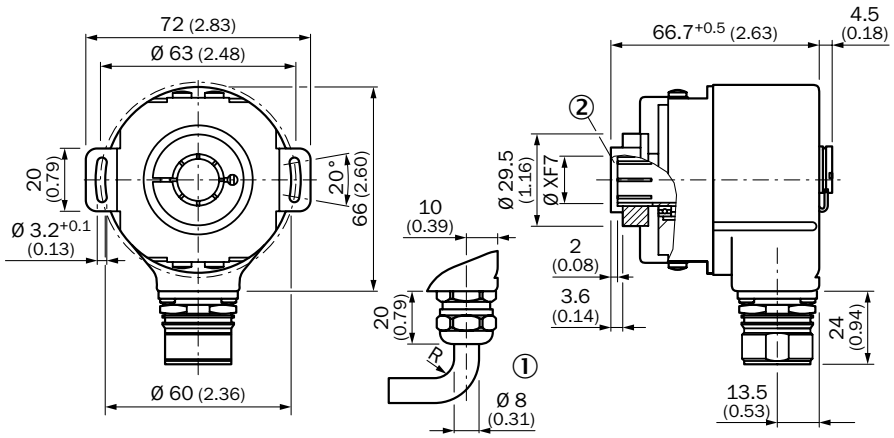


General tolerances according to ISO 2768-mk
① R = min. bend radius 40 mm

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Through hollow shaft, radial



General tolerances according to ISO 2768-mk

① R = min. bend radius 40 mm

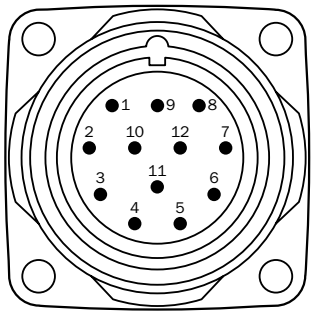
② Min. shaft insertion depth 15 mm

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PIN assignment

Pin assignment for design with 12-pin male connector; SSI interface

Signal	12-pin male device connector	11-wire cable outlet
GND	1	Blue
Data (+)	2	White
Clock (+)	3	Yellow
N. C.	4	–
V/$\overline{R}$	5	Pink
N. C.	6	–
N. C.	7	–
U_S	8	Red
SET	9	Orange
Data (–)	10	Brown
Clock (–)	11	Violet
N. C.	12	–



View of 12-pin M23 device connector on SSI encoder

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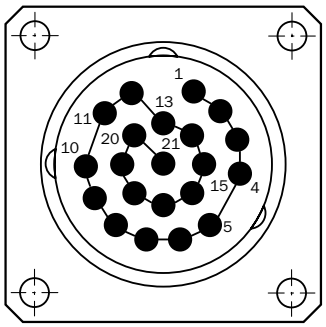
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Pin assignment for design with 21-pin male connector, single; parallel interface

PIN	Wire colors at cable outlet	Binary	Gray	BCD	Explanation
1	Violet	2^0	G_0	2^0 v.10^0	Data cables Outputs
2	White/brown	2^1	G_1	2^1 v.10^0	
3	White/green	2^2	G_2	2^2 v.10^0	
4	White/yellow	2^3	G_3	2^3 v.10^0	
5	White/gray	2^4	G_4	2^0 v.10^1	
6	White/pink	2^5	G_5	2^1 v.10^1	
7	White/blue	2^6	G_6	2^2 v.10^1	
8	White/red	2^7	G_7	2^3 v.10^1	
9	White/black	2^8	G_8	2^0 v.10^2	
10	Brown/green	2^9	G_9	2^1 v.10^2	
11	Brown/yellow	2^{10}	G_{10}	2^2 v.10^2	
12	Brown/gray	2^{11}	G_{11}	2^3 v.10^2	
13	Brown/pink	2^{12}	G_{12}	2^0 v.10^3	
14	Brown/blue	2^{13}	G_{13}	2^1 v.10^3	
15	Brown/red	2^{14}	G_{14}	2^2 v.10^3	
16	Green	Parity	Parity	Parity	
17	Pink	Store_	Store_	Store_	
18	Yellow	Enable_	Enable_	Enable_	
19	Brown	V/R_	V/R_	V/R_	
1)	Gray	SET	SET	SET	
20	Blue	GND	GND	GND	
21	Red	U_S	U_S	U_S	
Housing		Screen	Screen	Screen	

[1] Set cable only possible at cable outlet.

U_S	Encoder's supply voltage (always observe the encoder's type label prior to commissioning).
GND	Encoder ground connection; electrically isolated from the housing. The voltage relating to GND is U_S.
V/R_	Forwards/Reverse: This input programs the counting direction for the encoder. When it is not connected, this input is set to HIGH. If the encoder shaft is rotated clockwise (to the right) as viewed when facing the drive shaft, it counts in ascending order. If it should count in ascending order when the shaft is rotated counterclockwise (to the left), then this connection must be permanently set to LOW level (GND).
Enable_	This input activates the data output driver if a LOW level is connected. When it is not connected, this input is set to LOW. The outputs are in tri-state mode when the level is HIGH.
Store_	This input stores the encoder data in gray code when connecting a LOW level. This helps to prevent read errors if the output data is requested in binary code. If this input is set to LOW, the data at the encoder output is stable, regardless of whether the input shaft is rotating. When it is not connected, this input is set to HIGH.
Parity	This output supplies a HIGH level when the checksum is even.
SET	This input is for electronic zeroing. If the SET cable is set to U_S for more than 100 ms, the mechanical position corresponds to the value 0.



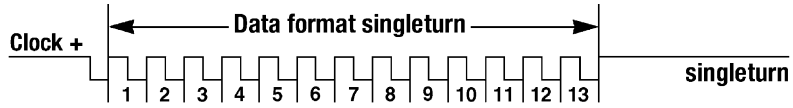
View of 21-pin M23 device connector on parallel encoder

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Signal outputs

SSI data format for resolutions ≤ 8,192 (1–13 bit)

In order to ensure compatibility with the data formats available on the market, the ARS60 distinguishes between two data formats:
The first data format is for encoders with resolutions up to 13 bit.
This is the standard data format for the singleturn absolute encoder.

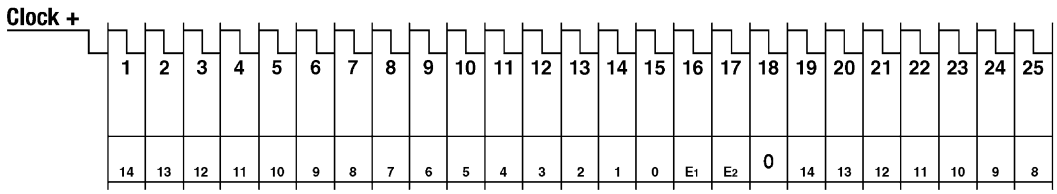


A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-8	A-9	A-10	A-11	A-12	A-13	tm-T/2		2^A	A
x	x	x	x	x	x	x	x	x	x	x	x	x	0	1	8192	13
x	x	x	x	x	x	x	x	x	x	x	x	0	0	1	4096	12
x	x	x	x	x	x	x	x	x	x	x	0	0	0	1	2048	11
x	x	x	x	x	x	x	x	x	x	0	0	0	0	1	1024	10

Code disc for 1 revolution
resolution per revolution

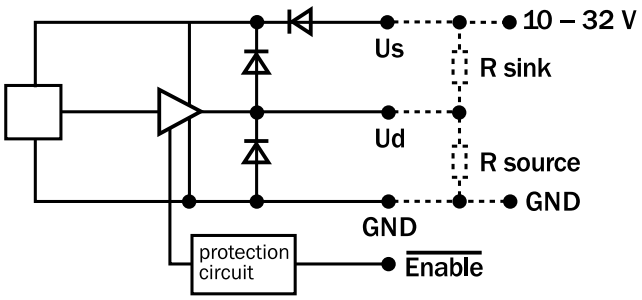
SSI data format for resolutions > 8,192 (14 and 15 bit)

All data is transmitted MSB-justified. Two errorbits follow the 15 data bits.
Error 1 (E1) = Position error
An error has occurred during the position detection process since the last SSI transmission. This errorbit is deleted during the next SSI transmission.
Error 2 (E2) = Sender monitoring



Parallel interface (output driver 7272 push pull)

- Tri-state-compatible
- Short-circuit protected
- Reverse polarity protection
- Integrated transient protection diodes



Technical data for parallel interface

Id_H max. at +85 C ,8 nF load 6,000 rpm	30 mA
Id_L max. at +85 C ,8 nF load 6,000 rpm	30 mA
Output saturation level (H level)	
At Id_H	10 mA 2.8 V
U_S-Ud_H	30 mA 3.0 V
Output saturation level (L level)	
At Id_L	10 mA 0.4 V
Ud_L	30 mA 2.0 V
Position repeatability (depending on encoder resolution and output code)	
Parallel gray code	60 µs
Parallel BIN code	60 µs
Parallel BCD code	200 µs

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Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for encoder with centering hub 36 mm, including mounting kit for face mount flange	BEF-WF-36	2029164

Dimensional drawings ➜ page K-725

Flanges

Flange plate

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	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 10	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	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	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	BEF-FA-036-100	2029161

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Dimensional drawings ➜ page K-725

Other mounting accessories

Measuring wheels and measuring wheel systems

Figure	Brief description	Type	Part no.
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988
	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678
	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222
	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634
	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278

Dimensional drawings ➜ page K-725

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Mounting bell

Figure	Brief description	Type	Part no.
	Mounting bell for encoders with a servo flange, centering hub 50 mm, including mounting kit	BEF-MG-50	5312987

Dimensional drawings ➜ page K-725

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	BEF-WK-SF	2029166

Dimensional drawings ➜ page K-725

Miscellaneous

Figure	Brief description	Type	Part no.
	Mounting kit for servo flange encoder on the bearing block, 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
	Bearing block for hollow shaft encoder, including fixing screws	BEF-FA-B12-010	2042728
	Bearing block for servo and face mount flange encoder	BEF-FA-LB1210	2044591

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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° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
	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 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	Bellows coupling, shaft diameter 10 mm/10 mm; maximum shaft offset: radial ± 0.25 mm, axial ± 0.4 mm, angular ± 4°; max. revolutions 10,000 rpm, -30° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	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. revolutions 10,000 rpm, -30° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	KUP-1012-B	5312984
	Bar coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle ± 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, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°, max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0608-S	5314179
	Bar coupling, shaft diameter 6 mm/10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 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 8 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0810-S	5314178
	Bar coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-1010-S	2056408
	Double-loop coupling, shaft diameter 6 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-0610-D	5326697
	Double-loop coupling, shaft diameter 8 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-0810-D	5326704
	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
	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, fiber-glass reinforced polyamide membrane and tempered steel coupling pin	KUP-0610-F	5312985
	Spring washer coupling, shaft diameter 10 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-1010-F	5312986

Dimensional drawings ➜ page K-725

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Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm [1]	1.5 m	DOL-2312-G1M5MA2	2029206
		3 m	DOL-2312-G03MMA2	2029207
		5 m	DOL-2312-G05MMA2	2029208
		10 m	DOL-2312-G10MMA2	2029209
		20 m	DOL-2312-G20MMA2	2029210
		30 m	DOL-2312-G30MMA2	2029211
	Head A: female connector, M23, 21-pin, straight Head B: cable Cable: PUR, halogen-free, shielded, 20 x 0.14 mm², 2 x 0.25 mm², Ø 7.8 mm [2]	1.5 m	DOL-2321-G1M5PA4	2029218
		3 m	DOL-2321-G03MPA4	2029219
		5 m	DOL-2321-G05MPA4	2029220
		10 m	DOL-2321-G10MPA4	2029221
		20 m	DOL-2321-G20MPA4	2029222

[1] For ARS60 SSI.

[2] For ARS60 Parallel.

Dimensional drawings ➜ page K-725

Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: –20 °C ... +130 °C	DOS-2312-G	6027538
	Head A: female connector, M23, 12-pin, 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: female connector, M23, 12-pin, angled, shielded, for cable diameter 4.2 mm ... 6.6 mm Head B: - Operating temperature: –20 °C ... +130 °C	DOS-2312-W01	2072580
	Head A: female connector, M23, 21-pin, straight, shielded, for cable diameter 5.5 mm ... 12 mm Head B: -	DOS-2321-G	6027539
	Head A: female connector, D-Sub, 37-pin, straight, shielded Head B: -	DOS-0D37-G	2029224

Dimensional drawings ➜ page K-725

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Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	By the meter	LTG-2308-MWENC	6027529
	Head A: cable Head B: cable Cable: PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.5 mm	By the meter	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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm	By the meter	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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm	By the meter	LTG-2612-MW	6028516
	Head A: cable Head B: cable Cable: PUR, halogen-free, shielded, 20 x 0.14 mm², 2 x 0.25 mm², Ø 7.8 mm	By the meter	LTG-2622-MW	6027532

Male connectors (ready to assemble)

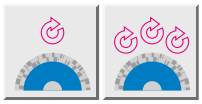
Figure	Brief description	Type	Part no.
	Head A: male connector, D-Sub, 15-pin, straight, shielded Head B: -	STE-0D15-G	2029223
	Head A: male connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: –20 °C ... +130 °C	STE-2312-G	6027537
	Head A: 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

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Dimensional drawings ➜ page K-725

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

COMPACT, UNIVERSAL, INTUITIVE





Product description

The ACS36 (singleturn) and ACM36 (multiturn) encoder families have an analog interface with a maximum resolution of up to 3,723 steps (for singleturn and multiturn). Using the teach-in function on the membrane keyboard, the measuring range can be intuitively programmed directly on the device in just a few clicks. A current signal of 4–20 mA or a voltage signal of 0–10 V is output depending on the device version.

At a glance

- Compact 36 mm absolute encoder with up to 3,723 steps (for singleturn and multiturn)
- Servo flange
- Radial cable outlet
- Analog interface 4 to 20 mA or 0 to 10 V
- Programming via keypad on the encoder
- IP 65 protection class
- Operating temperature: –30 °C ... +80 °C

Your benefits

- Intuitive configuration of the measuring range directly on the device using membrane keyboard (teach-in function) saves time and requires no special expertise.
- The compact size (36-mm format) allows the encoder to be used in confined spaces and thus provides greater freedom for development and machine design.
- The analog interfaces (current/voltage) offer a low-cost solution for detecting the position and path, and thereby help to reduce overall system costs.

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CE

Additional Information

Fields of application G-475
Detailed technical data. G-475
Type code. G-476
Ordering information. G-477
Dimensional drawings G-477
PIN assignment. G-477
Electrical wiring. G-477
Resolution diagram. G-478
Recommended accessories. G-479

→ www.mysick.com/en/ACS_ACM36

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

Measurement of the absolute position in a variety of industries, machines and equipment, for example:

- Automatically guided vehicle systems (AGS)
- Industrial trucks
- Commercial vehicles
- Packaging
- Logistics applications
- Mechanical engineering
- Medical technology

Detailed technical data

Performance

	ACS36-K1K0-K01	ACS36-L1K0-K01	ACM36-K1K0-K01	ACM36-L1K0-K01
Max. number of revolutions	1		16	
Resolution per measuring step	5.4 ... 40.2 µA [1]	2.7 ... 25.1 mV [1]	5.2 µA [1]	2.7 mV [1]
Measuring range	0° ... 360°, programmable		0° ... 5,760°, programmable	
Minimum measuring range	35°		336°	
Accuracy	± 0.2 %, based on the programmed angle			

[1] See measuring step diagram/calculation formula for details.

Interfaces

	ACS36-K1K0-K01	ACS36-L1K0-K01	ACM36-K1K0-K01	ACM36-L1K0-K01
Electrical interface	Analog, 4 mA ... 20 mA	Analog, 0 V ... 10 V	Analog, 4 mA ... 20 mA	Analog, 0 V ... 10 V

Mechanical data

	ACS36-K1K0-K01	ACS36-L1K0-K01	ACM36-K1K0-K01	ACM36-L1K0-K01
Length of the shaft	12.4 mm			
Mass	0.1 kg			
Shaft material	Stainless steel 1,4305			
Flange material	AlMgSi			
Housing design	36 mm			
Housing material	AlMgSi			
Cable material	PVC			
Start up torque	0.5 Ncm (+20 °C)			
Operating torque	0.2 Ncm (+20 °C)			
Permissible shaft loading	20 N (axial) 40 N (radial)			
Maximum operating speed	3,000 rpm		10,000 rpm	
Rotor moment of inertia	10 gcm²			
Bearing lifetime	1 x 10^6 revolutions			
Max. angular acceleration	≤ 500,000 rad/s²			

Electrical data

	ACS36-K1K0-K01	ACS36-L1K0-K01	ACM36-K1K0-K01	ACM36-L1K0-K01
Connection type	Cable, radial, 1.5 m			
Operating voltage range	19 V DC ... 33 V DC			
Current consumption	< 80 mA			
Min. load resistance	–	≥ 10 kΩ	–	≥ 10 kΩ
Max. load resistance	≤ 600 Ω	–	≤ 600 Ω	–

[1] Factory setting is CW – CCW can be programmed on the encoder

	ACS36-K1K0-K01	ACS36-L1K0-K01	ACM36-K1K0-K01	ACM36-L1K0-K01
Code sequence	CW [1]			
Reverse polarity protection	✔			
Electrical wiring	3-wire			

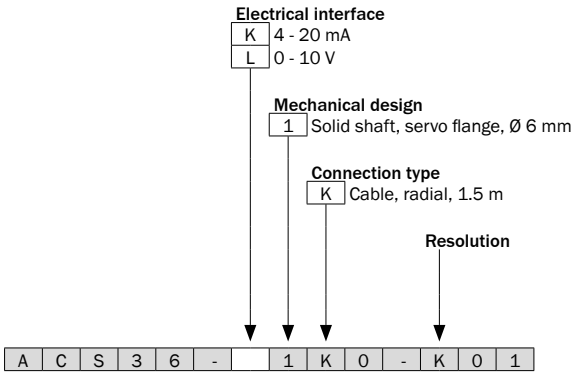
[1] Factory setting is CW – CCW can be programmed on the encoder

Ambient data

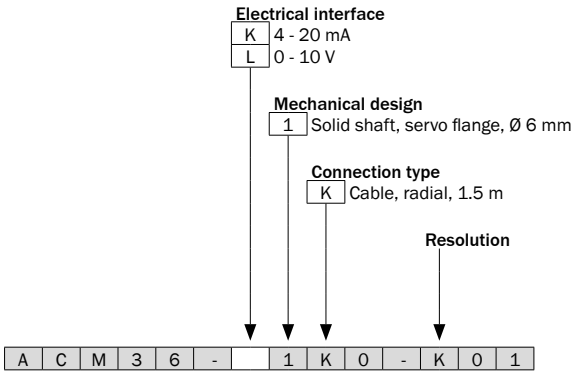
EMC	EN 61000-6-2, EN 61000-6-4
Enclosure rating	IP 65
Permissible relative humidity	90%
Operating temperature range	–30 °C ... +80 °C
Storage temperature range	–40 °C ... +100 °C, without packaging
Resistance to shocks	25 g, 11 ms (EN 60068-2-27)
Resistance to vibrations	4 g, 5 Hz ... 100 Hz (EN 60068-2-6)

Type code

Singleturn



Multiturn



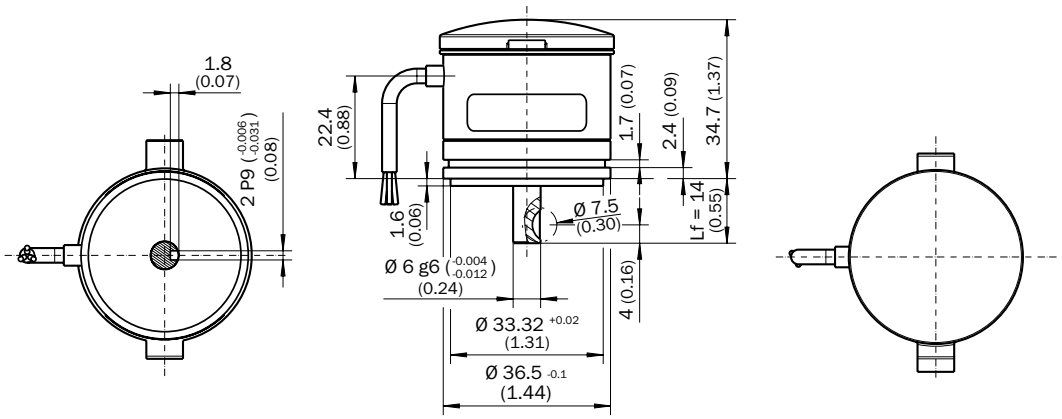
Ordering information

- **Shaft diameter:** 6 mm, 12.4 mm
- **Connection type:** cable, radial, 1.5 m

Electrical interface	Number of steps	Resolution	Type	Part no.
Analog, 4 mA ... 20 mA	2,979	0.09° ... 0.12° [1]	ACS36-K1K0-K01	6053311
Analog, 0 V ... 10 V	3,723	0.09° ... 0.10° [1]	ACS36-L1K0-K01	6052345
Analog, 4 mA ... 20 mA	2,979	0.11° ... 1.93° [1]	ACM36-K1K0-K01	6039751
Analog, 0 V ... 10 V	3,723	0.09° ... 1.55° [1]	ACM36-L1K0-K01	6039752

[1] See resolution diagram.

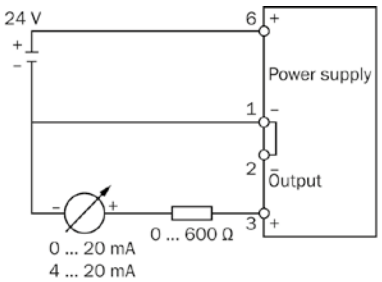
Dimensional drawings (dimensions in mm)



PIN assignment

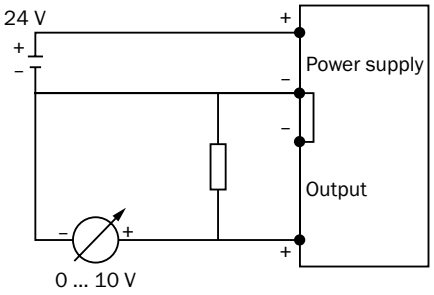
gn	+24 V
ws	Output
br	0 V

Electrical wiring



3 wire technique
power output

At a supply voltage of 18 V, the internal resistance of the measuring device must not exceed 600 Ohm.



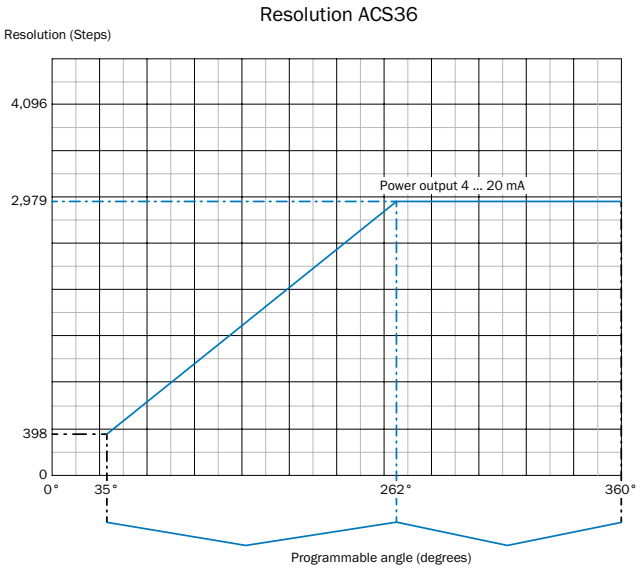
Voltage output

For an accurate measurement, the internal resistance of the measuring device must be equal to 10 kOhm.

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Resolution diagram

Singleturn, power output



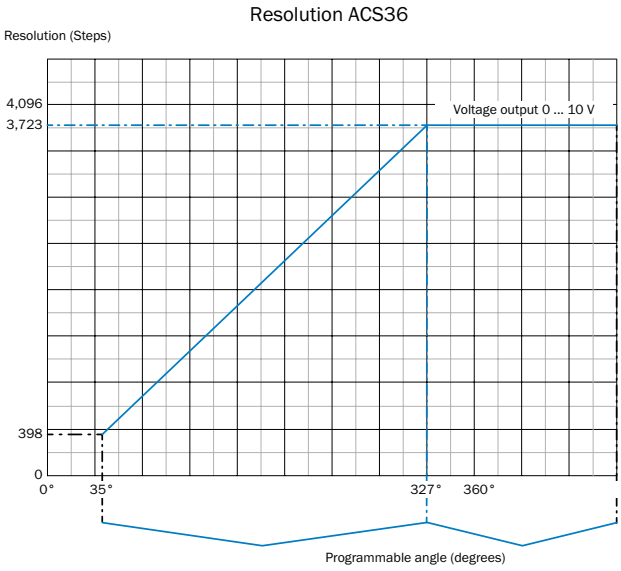
Calculation formula for number of steps in angle range

$Steps = \frac{Angle \times 4096}{360°}$

Number of steps in angle range

Steps (4 ... 20 mA) = 2979

Singleturn, voltage output



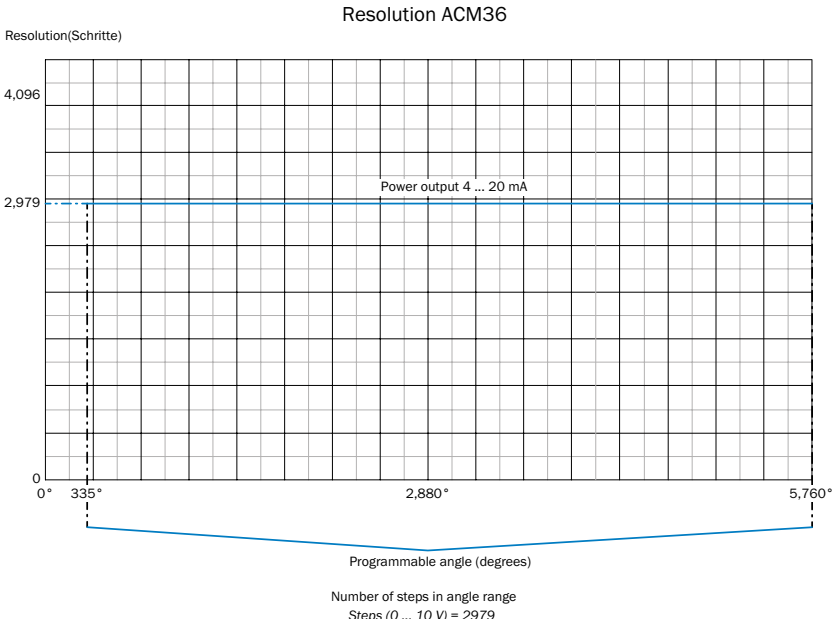
Calculation formula for number of steps in angle range

$Steps = \frac{Angle \times 1024}{360°}$

Number of steps in angle range

Steps (0 ... 10 V) = 3723

Multiturn, power output

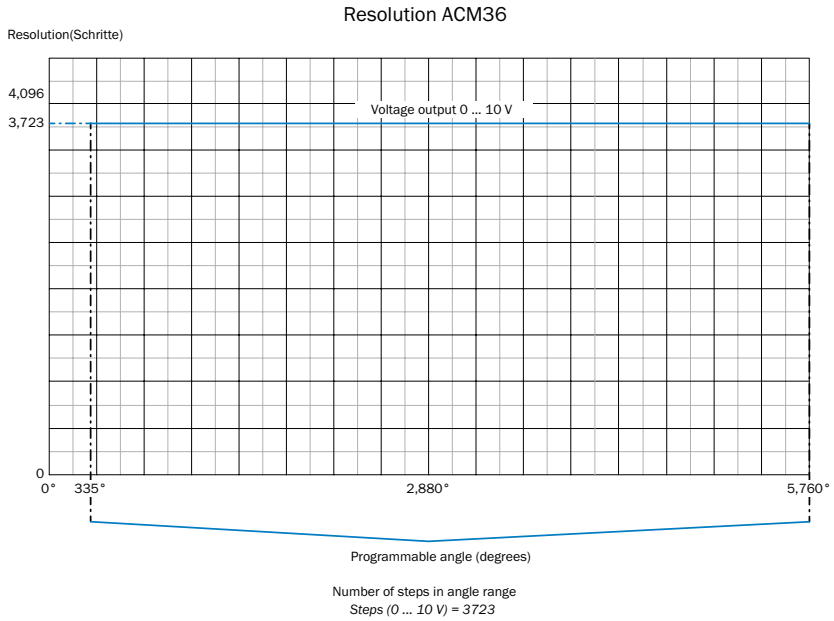


Number of steps in angle range

Steps (0 ... 10 V) = 2979

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Multiturn, voltage output



Recommended accessories

Mounting systems

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° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
	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 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	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, fiber-glass reinforced polyamide membrane and tempered steel coupling pin	KUP-0610-F	5312985

Dimensional drawings ➜ page K-725

Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 5-pin, straight, A-coded Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 5 x 0.34 mm², Ø 5.9 mm	1.5 m	DOL-1205-G1M5ACS-C0	6049451
		3 m	DOL-1205-G03MACS-C0	6049452
		5 m	DOL-1205-G05MACS-C0	6049453
		10 m	DOL-1205-G10MACS-C0	6049454

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Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 5-pin, angled, A-coded Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 5 x 0.34 mm², Ø 5.9 mm	1.5 m	DOL-1205-W1M5ACSCO	6049455
		3 m	DOL-1205-W03MACSCO	6049456
		5 m	DOL-1205-W05MACSCO	6049457
		10 m	DOL-1205-W10MACSCO	6049458

Dimensional drawings ➜ page K-725

Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 5-pin, straight, unshielded, for cable diameter 4 mm ... 6 mm Head B: -	DOS-1205-G	6009719

Dimensional drawings ➜ page K-725

Male connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: male connector, M12, 5-pin, straight, unshielded, for cable diameter 4 mm ... 6 mm Head B: -	STE-1205-G	6022083

Dimensional drawings ➜ page K-725

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

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COMPACT, UNIVERSAL, INTUITIVE



Product description

The ACM60 (multiturn) encoder family has an analog interface with a maximum overall resolution of up to 13,107 steps. Using the teach-in function on the membrane keyboard, the measuring range can be intuitively programmed directly on the device with just a few clicks. A current signal of 4–20 mA or a voltage signal of 0–10 V is output depending on the device version.

At a glance

- Compact 60 mm absolute encoder with up to 13,107 steps
- Servo flange
- Radial connector outlet
- Analog interface 4 to 20 mA or 0 to 10 V
- Programming via keypad on the encoder
- IP 68 protection class
- Operating temperature: –30 °C ... +80 °C

Your benefits

- Intuitive configuration of the measuring range directly on the device using membrane keyboard (teach-in function) saves time and requires no special expertise.
- The compact size (including M12 connection technology) allows the encoder to be used in confined spaces and thus provides greater freedom for development and machine design.
- The analog interfaces (current/voltage) offer a low-cost solution for detecting the position and path, and thereby help to reduce overall system costs.

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Additional Information

Fields of application G-483
Detailed technical data. G-483
Type code. G-484
Ordering information. G-484
Dimensional drawings G-485
PIN assignment. G-485
Electrical wiring. G-485
Resolution diagram. G-486
Recommended accessories. G-487

→ www.mysick.com/en/ACM60

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

Measurement of the absolute position in a variety of industries, machines and equipment, for example:

- Automatically guided vehicle systems (AGS)
- Industrial trucks
- Commercial vehicles
- Packaging
- Logistics applications
- Mechanical engineering
- Medical technology

Detailed technical data

Performance

	ACM60B-S1KE13x06	ACM60B-S1LE13x06
Number of revolutions	64	
Resolution per measuring step	1.5 ... 8.8 µA [1]	0.8 ...5.5 mV [1]
Measuring range	0° ... 23,040°, programmable	
Minimum measuring range	640°	
Accuracy	± 0.1%, based on the programmed angle	

[1] See measuring step diagram/calculation formula for details.

Interfaces

	ACM60B-S1KE13x06	ACM60B-S1LE13x06
Electrical interface	Analog, 4 mA ... 20 mA	Analog, 0 V ... 10 V

Mechanical data

Length of the shaft	10 mm
Mass	0.4 kg
Shaft material	Stainless steel
Flange material	Aluminum
Housing design	60 mm
Housing material	Aluminum die cast
Start up torque	0.05 Ncm (+20 °C)
Operating torque	0.3 Ncm (+20 °C)
Permissible shaft loading	30 N (axial) 60 N (radial)
Maximum operating speed	10,000 rpm
Rotor moment of inertia	30 gcm²
Bearing lifetime	2 x 10^9 revolutions
Max. angular acceleration	≤ 500,000 rad/s²

Electrical data

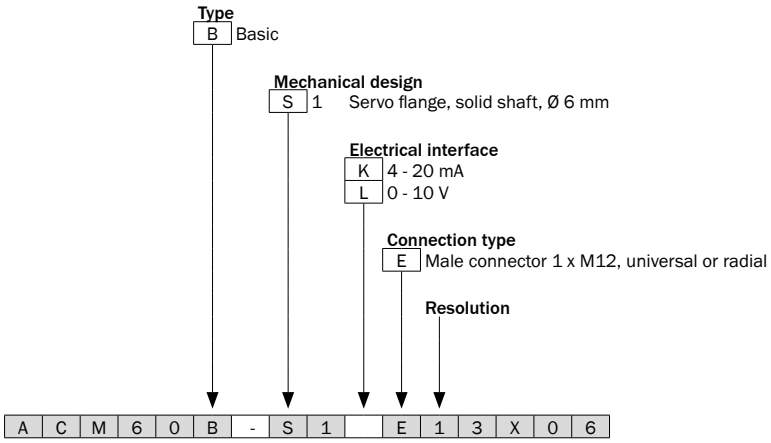
	ACM60B-S1KE13x06	ACM60B-S1LE13x06
Connection type	M12 male connector, 5-pin, radial	
Operating voltage range	18 V DC ... 33 V DC	
Current consumption	< 80 mA	
Min. load resistance	–	≥ 10 kΩ
Max. load resistance	≤ 600 Ω	–
Code sequence	CW [1]	
Reverse polarity protection	✔	
Electrical wiring	3- or 4-wire, see figure	4-wire, see figure

[1] Factory setting is CW – CCW can be programmed on the encoder

Ambient data

EMC	EN 61000-6-2, EN 61000-6-4
Enclosure rating	IP 68
Permissible relative humidity	90%
Operating temperature range	–30 °C ... +80 °C
Storage temperature range	–40 °C ... +100 °C, without packaging
Resistance to shocks	25 g, 11 ms (EN 60068-2-27)
Resistance to vibrations	4 g, 5 Hz ... 100 Hz (EN 60068-2-6)

Type code



Ordering information

- **Shaft diameter:** 6 mm, 10 mm
- **Connection type:** M12 male connector, 5-pin, radial

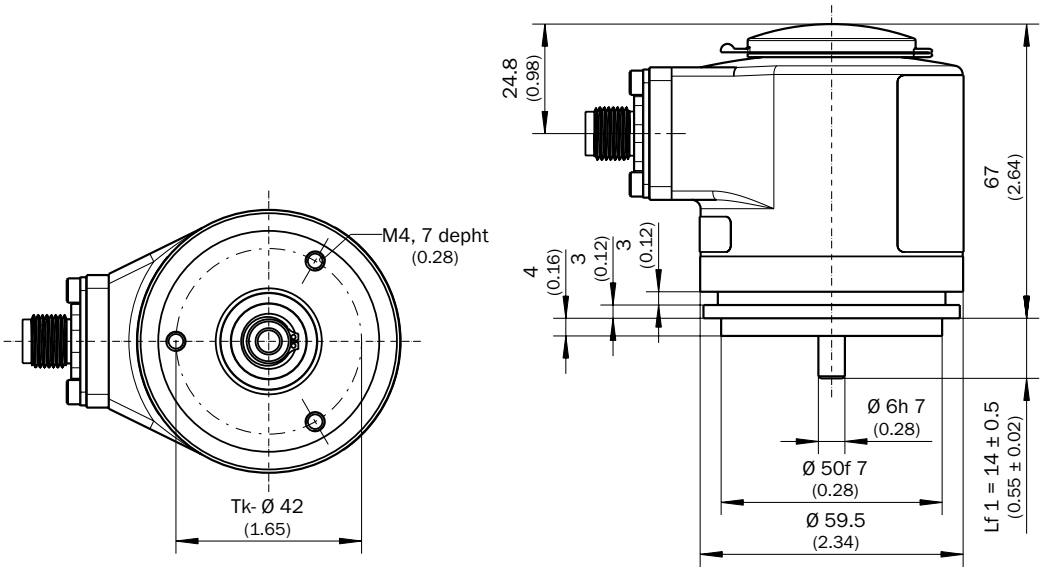
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Electrical interface	Number of steps	Resolution	Type	Part no.
Analog, 4 mA ... 20 mA	≤ 10,486	0.35° ... 2.20° [1]	ACM60B-S1KE13x06	6045312
Analog, 0 V ... 10 V	≤ 13,107	0.35° ... 1.76° [1]	ACM60B-S1LE13x06	6045313

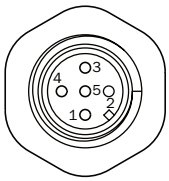
[1] See resolution diagram.

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Dimensional drawings (dimensions in mm)



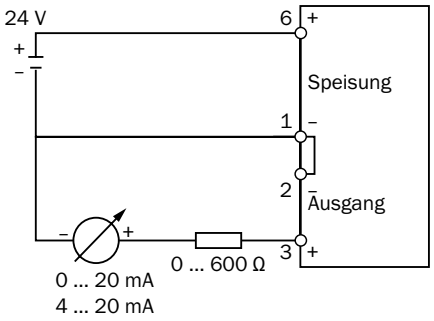
PIN assignment



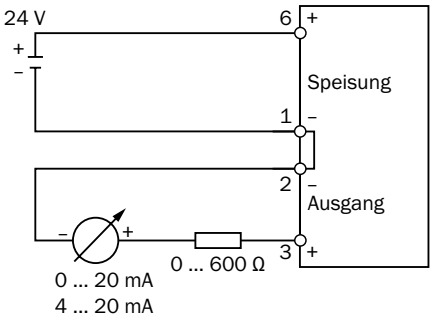
1	GND
2	24 V
3	Output GND
4	Output 4 ... 20 mA
5	n.c.

Electrical wiring

Power output



3 Leitertechnik
Stromausgang

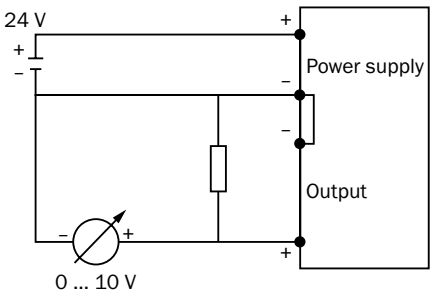


4 Leitertechnik
Stromausgang

At a supply voltage of 18 V, the internal resistance of the measuring device must not exceed 600 ohm.

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Voltage output

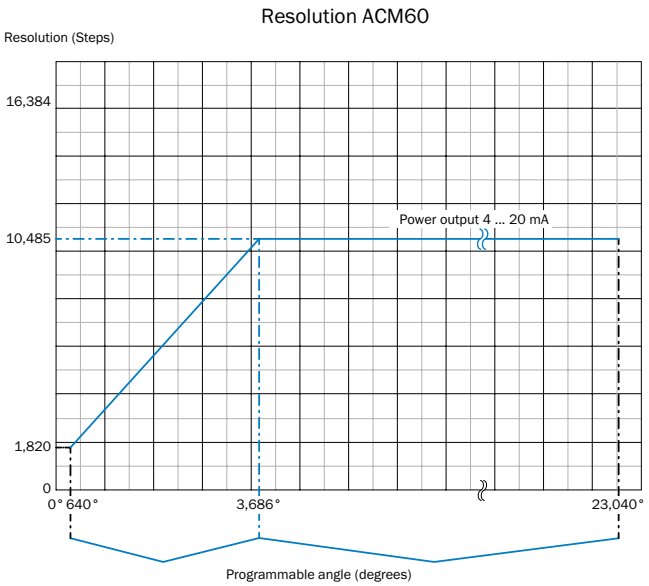


Voltage output

For an accurate measurement, the internal resistance of the measuring device must be equal to 10 kOhm.

Resolution diagram

Power output



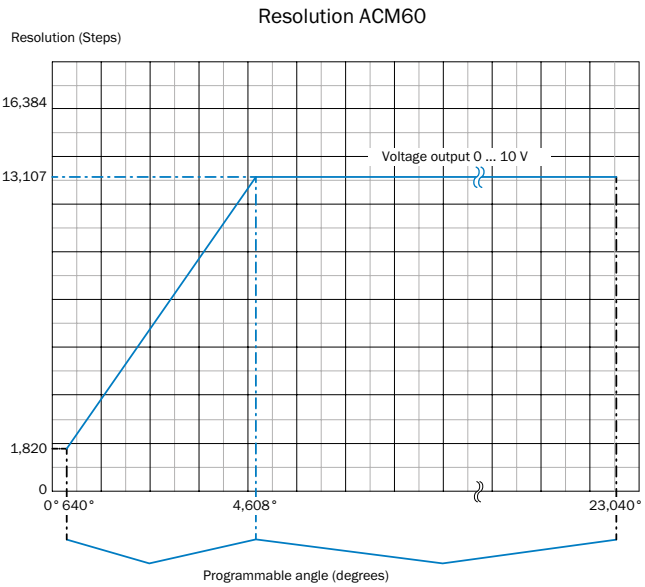
Calculation formula for number of steps in angle range

$Steps = \frac{Angle \times 1024}{360°}$

Number of steps in angle range

Steps (0 ... 10 V) = 10485

Voltage output



Calculation formula for number of steps in angle range

$Steps = \frac{Angle \times 1024}{360°}$

Number of steps in angle range

Steps (0 ... 10 V) = 13107

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Recommended accessories

Mounting systems

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° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0606-B	5312981
	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 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982
	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, fiber-glass reinforced polyamide membrane and tempered steel coupling pin	KUP-0610-F	5312985

Dimensional drawings ➜ page K-725

Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 5-pin, straight, A-coded Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 5 x 0.34 mm², Ø 5.9 mm	1.5 m	DOL-1205-G1M5ACSCO	6049451
		3 m	DOL-1205-G03MACSCO	6049452
		5 m	DOL-1205-G05MACSCO	6049453
		10 m	DOL-1205-G10MACSCO	6049454
	Head A: female connector, M12, 5-pin, angled, A-coded Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 5 x 0.34 mm², Ø 5.9 mm	1.5 m	DOL-1205-W1M5ACSCO	6049455
		3 m	DOL-1205-W03MACSCO	6049456
		5 m	DOL-1205-W05MACSCO	6049457
		10 m	DOL-1205-W10MACSCO	6049458

Dimensional drawings ➜ page K-725

Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 5-pin, straight, unshielded, for cable diameter 4 mm ... 6 mm Head B: -	DOS-1205-G	6009719

Dimensional drawings ➜ page K-725

Male connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: male connector, M12, 5-pin, straight, unshielded, for cable diameter 4 mm ... 6 mm Head B: -	STE-1205-G	6022083

Dimensional drawings ➜ page K-725

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

G



SAFETY ENCODERS

Safety in motion – functional safety encoders

SICK's reliable encoders assist in the implementation of safety functions, facilitating safe and efficient machine operation. This is backed up by SICK's many years of safety expertise, an international service and training network, and a range of optimized system solutions. Functional safety encoders generate information about position, angle, and revolution counts, with a particular emphasis on mechanical and electrical safety. By offering these encoders along with reliable control solutions, SICK can offer all of the various components required for the implementation of comprehensive safety solutions under one roof.

Your benefits

- Optimal protection for persons, machinery, and systems
- Certified safety products for compliance with legal requirements
- Enhanced efficiency and productivity thanks to reliable drive monitoring
- Increased machine availability afforded by a rugged, fail-safe design
- Perfect adaptation to application-specific requirements due to wide range of variants
- Intelligent system layout thanks to compact design
- Time and cost savings due to simple and efficient device implementation

8015560/2015-09-01
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Applications H-492
Product family overview H-495



DFS60S Pro H-496
Safe, easy, flexible: Encoders for functional safety

H

PRODUCT FAMILY OVERVIEW



DFS60S Pro

Safe, easy, flexible: Encoders for functional safety

Technical data overview	
Safety integrity level	SIL2 (IEC 61508), SILCL2 (IEC 62061)
Performance level	PL d (EN ISO 13849)
Category	3 (EN ISO 13849)
Encoder interface	4.5 V ... 32 V, SinCos 1.0 V_{SS} (differential)
Mechanical design	Solid shaft, flattened, servo flange Solid shaft, flattened, face mount flange Solid shaft with feather key, servo flange Solid shaft with feather key, face mount flange Blind hollow shaft with feather key groove Through hollow shaft with feather key groove
Connection type	M23 male connector, 12-pin M12 male connector, 8-pin Cable, 8-wire (depends on type)
Operating temperature range	–30 °C ... +95 °C (depends on type)
Enclosure rating	IP 65 (as per IEC 60529)

At a glance

- Encoders for functional safety technology: SIL2 (IEC 61508), SILCL2 (EN 62061), PL d (EN ISO 13849)
- Electrical interface: 4.5 V ... 32 V; sin/cos 1 V_{SS}; 1,024 periods
- Face mount flange or servo flange, blind hollow shaft or through hollow shaft (assembly options with feather key)
- Universal cable outlet, M23 or M12 male connector, axial or radial
- Enclosure rating: IP 65
- Operating temperature: –30 °C ... +95 °C (depends on type)

Detailed information → H-496

SAFE, EASY, FLEXIBLE: ENCODERS FOR FUNCTIONAL SAFETY



Product description

Safe electrical and mechanical design, easy system implementation, and flexible application possibilities. The DFS60S Pro is an incremental encoder for functional safety. It supports safety functions that conform to IEC 61800-5-2. The high enclosure rating, wide temperature range, and wide-set ball bearings are the key to enhanced durability. They make the DFS60S Pro the universal motion control sensor for stationary and mobile safety applications.

At a glance

- Encoders for functional safety technology: SIL2 (IEC 61508), SILCL2 (EN 62061), PL d (EN ISO 13849)
- Electrical interface: 4.5 V ... 32 V; sin/cos 1 V_{PP}; 1,024 periods
- Face mount flange or servo flange, blind hollow shaft or through hollow shaft (assembly options with feather key)
- Universal cable outlet, M23 or M12 male connector, axial or radial
- Enclosure rating: IP 65
- Operating temperature range: –30 °C ... +95 °C

Your benefits

- Certified safety solution that ensures the best possible protection for persons, machinery, and systems
- Easy and practical implementation of safety functions using an all-in-one solution, safety functions with the Flexi Soft Drive monitor by SICK: safe stop 1 (SS1), safe stop 2 (SS2), safe operating stop (SOS), safe speed monitoring (SSM), safely limited speed (SLS), safe direction (SDI), safe brake control (SBC)
- Positive and non-positive connections for mechanical reliability
- Certified safety products reduce the scope of safety engineering
- Versatile connection options for high levels of flexibility and straightforward implementation
- Compact size for compatibility with applications in which installation space is limited

Additional information

Detailed technical data. H-497
Type code. H-499
Ordering information. H-500
Dimensional drawings H-502
Interface signals H-512
PIN and wire allocation. H-513
Recommended accessories. H-514

→ www.mysick.com/en/DFS60S_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.

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Detailed technical data

Performance

Number of sine/cosine periods per revolution	1,024
Measurement increment	0.3 angular seconds for interpolation of the sine/cosine signals with e.g. 12 bit[1)]
Typ. integral non-linearity	Typ. ± 45 angular seconds (with slackened stator coupling)
Differential non-linearity	± 7 angular seconds
Reference signal, number	1
Reference signal, position	90°, electric, logically gated with sine and cosine

[1)] Not safety-related.

Mechanical data

	Solid shaft, servo flange	Solid shaft, face mount flange	Blind hollow shaft	Through hollow shaft
Mechanical design	Solid shaft, flattened / solid shaft with feather key groove (depending on type)		Blind hollow shaft with feather key groove	Through hollow shaft with feather key groove
Shaft diameter	6 mm	10 mm	6 mm 8 mm 3/8" 10 mm 12 mm 1/2" 14 mm 15 mm 5/8" (depending on type)	
Length of the shaft	10 mm	19 mm	–	
Shaft material	Stainless steel			
Flange material	Aluminum		Zinc die cast	
Housing material	Aluminum die cast			
Mass	Approx. 0.3 kg [1)]		Approx. 0.25 kg [1)]	
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)	
Permissible shaft loading	80 N (radial) 40 N (axial)		–	
Permissible shaft movement, static	–		± 0.3 mm (radial) ± 0.5 mm (axial)	
Permissible shaft movement, dynamic	–		± 0.05 mm (radial) ± 0.1 mm (axial)	
Max. angular acceleration	≤ 500,000 rad/s²			
Maximum operating speed	9,000 rpm [2)]		6,000 rpm [2)]	
Rotor moment of inertia	8 gcm²		56 gcm²	
Bearing lifetime	3.6 x 10^9 revolutions [3)]			

[1)] Relates to encoder with connector outlet.

[2)] Take into account self-heating of 3.0 K per 1,000 revolutions/min at the operating temperature measuring point when designing the operating temperature range.

[3)] At maximum speed and temperature.

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Electrical data

	Solid shaft, servo flange	Solid shaft, face mount flange	Blind hollow shaft	Through hollow shaft
Electrical interface	4.5 V ... 32 V, SinCos 1.0 V_{SS} (differential)			
Connection type	M23 male connector, 12-pin, radial M23 male connector, 12-pin, axial M12 male connector, 8-pin, radial M12 male connector, 8-pin, axial Cable, 8-wire, universal, 0.5 m [1] Cable, 8-wire, universal, 1.5 m [1] Cable, 8-wire, universal, 3 m [1] Cable, 8-wire, universal, 5 m [1] Cable, 8-wire, universal, 10 m [1] (depending on type)		M23 male connector, 12-pin, radial M12 male connector, 8-pin, radial Cable, 8-wire, universal, 0.5 m [1] Cable, 8-wire, universal, 1.5 m [1] Cable, 8-wire, universal, 3 m [1] Cable, 8-wire, universal, 5 m [1] Cable, 8-wire, universal, 10 m [1] (depending on type)	
Initialization time	50 ms [2]			
Maximum output frequency	≤ 153.6 kHz			
Load resistance	≥ 120 Ω			
Max. power consumption without load	≤ 0.7 W			
Reverse polarity protection	✔			
Protection class	III (according to DIN EN 61140)			
Contamination rating	2			
Short-circuit protection of the outputs	✔ [3]			

[1] The universal cable outlet is positioned so that it is possible to lay it without bends in a radial or axial direction. UL approval not available.

[2] After this period valid signals can be read.

[3] Short-circuit to another channel or GND permitted for max. 30 sec. In the case of US ≤ 12 V additional short-circuit to US permitted for max. 30 sec.

Safety characteristics

Safety integrity level	SIL2 (IEC 61508), SILCL2 (IEC 62061) [1]
Category	3 (EN ISO 13849)
Test rate	Not required
Maximum demand rate	Continuous (analog signals)
Performance level	PL d (EN ISO 13849) [1]
PFHd: Probability of dangerous failure per hour	1.7×10^{-8} [2]
T_M (mission time)	20 years (EN ISO 13849)
Safety-related measuring increment	0.09°, quadrature analysis
Safety-related accuracy	± 0.09°

[1] For more detailed information on the exact configuration of your machine/system, please consult your local SICK subsidiary.

[2] The stated values apply to a diagnostic degree of coverage of 99%, which must be achieved by the external drive system, and an operating temperature of 95 °C.

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Ambient data

EMC	According to EN 61000-6-2, EN 61000-6-3, and IEC 61326-3-1
Enclosure rating	IP 65 (according to IEC 60529) [1]
Permissible relative humidity	90%, condensation not permitted
Operating temperature range	
M23 male connector, 12-pin	–30 °C ... +95 °C [2]
M12 male connector, 8-pin	–30 °C ... +95 °C [2]
Cable, 8-wire	–30 °C ... +85 °C [2]
Storage temperature range	–30 °C ... +85 °C, without packaging
Resistance to shocks	100 g, 6 ms (according to EN 60068-2-27) [3]
Resistance to vibrations	
M23 male connector, 12-pin	10 g, 10 Hz ... 1,000 Hz (EN 60068-2-6) [4]
M12 male connector, 8-pin	30 g, 10 Hz ... 1,000 Hz (EN 60068-2-6) [4]
Cable, 8-wire	30 g, 10 Hz ... 1,000 Hz (EN 60068-2-6) [3]

[1] At least IP 65 when male connector connection has mating connector inserted.

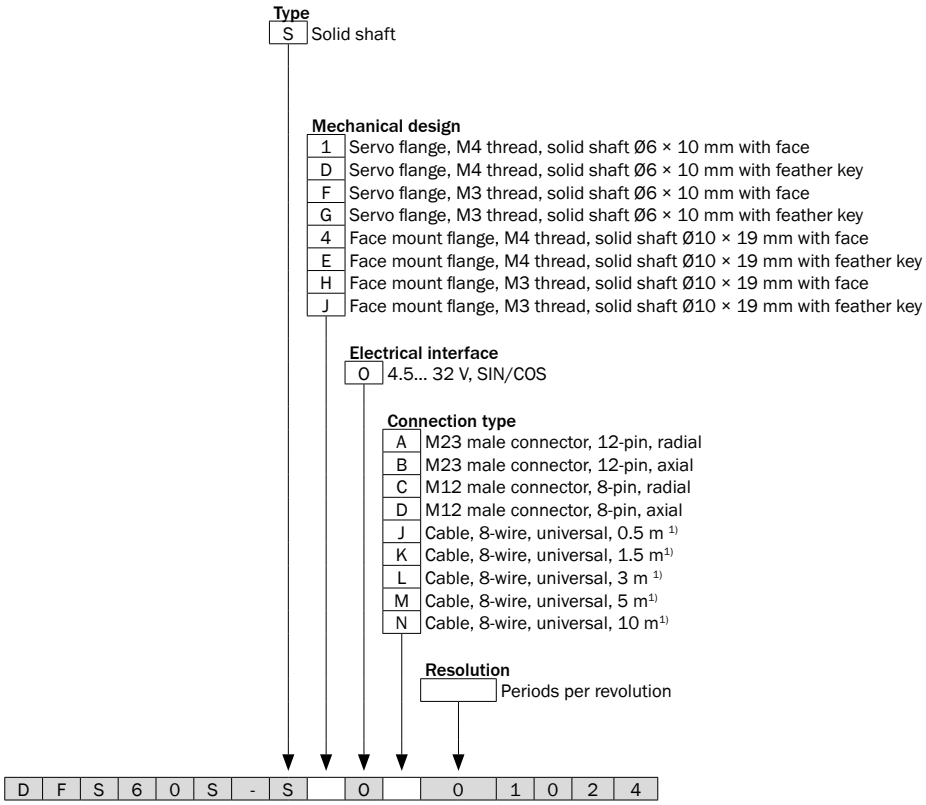
[2] Take into account self-heating of 3.0 K per 1,000 revolutions/min at the operating temperature measuring point when designing the operating temperature range.

[3] Checked during operation using vector length monitoring.

[4] Checked during operation using vector length monitoring. Includes mating connector.

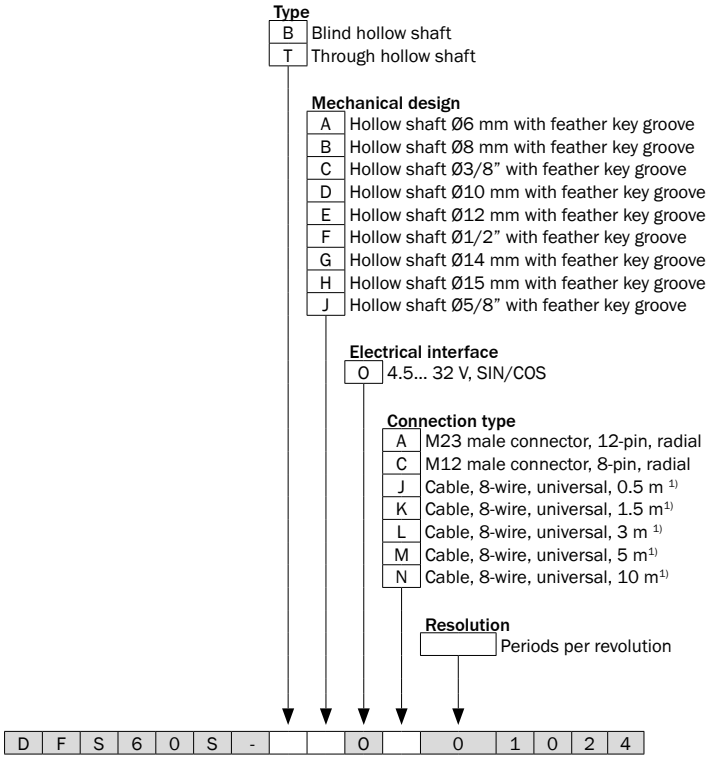
Type code

Solid shaft



[1] The universal cable outlet is positioned so that it is possible to lay it without bends in a radial or axial direction. UL approval not available.

Hollow shaft



1) The universal cable outlet is positioned so that it is possible to lay it without bends in a radial or axial direction. UL approval not available.

Ordering information

Other device versions available here ➜ www.mysick.com/en/DFS60S_Pro

Solid shaft, flattened, face mount flange

- **Shaft diameter:** 10 mm
- **Shaft length:** 19 mm
- **Shaft mounting:** M4 thread

Connection type	Type	Part no.
M23 male connector, 12-pin, radial	DFS60S-S4OA01024	1069518
M12 male connector, 8-pin, radial	DFS60S-S4OC01024	1069519
Cable, 8-wire, universal, 1.5 m	DFS60S-S4OK01024	1069520

Solid shaft with feather key, face mount flange

- **Shaft diameter:** 10 mm
- **Shaft length:** 19 mm
- **Shaft mounting:** M4 thread

Connection type	Type	Part no.
M23 male connector, 12-pin, radial	DFS60S-SEOA01024	1069521
M12 male connector, 8-pin, radial	DFS60S-SEOC01024	1067912
Cable, 8-wire, universal, 1.5 m	DFS60S-SEOK01024	1067913

Solid shaft, flattened, servo flange

- **Shaft diameter:** 6 mm
- **Shaft length:** 10 mm
- **Shaft mounting:** M4 thread

Connection type	Type	Part no.
M23 male connector, 12-pin, radial	DFS60S-S10A01024	1069522
M12 male connector, 8-pin, radial	DFS60S-S10C01024	1069517
Cable, 8-wire, universal, 1.5 m	DFS60S-S10K01024	1069523

Solid shaft with feather key, servo flange

- **Shaft diameter:** 6 mm
- **Shaft length:** 10 mm
- **Shaft mounting:** M4 thread

Connection type	Type	Part no.
M23 male connector, 12-pin, radial	DFS60S-SDOA01024	1067910
M12 male connector, 8-pin, radial	DFS60S-SDOC01024	1069524
Cable, 8-wire, universal, 1.5 m	DFS60S-SDOK01024	1069525

Blind hollow shaft with feather key groove

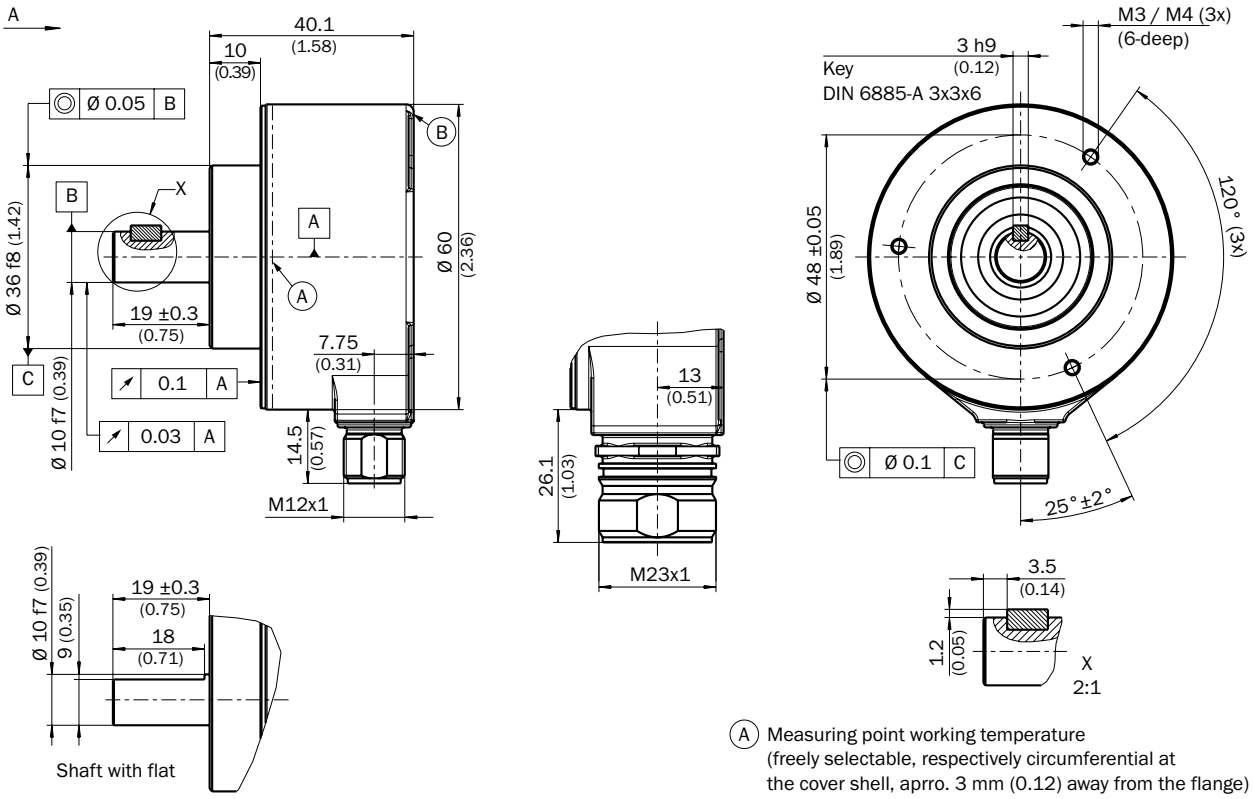
Shaft diameter	Connection type	Type	Part no.
10 mm	M23 male connector, 12-pin, radial	DFS60S-BDOA01024	1069535
	M12 male connector, 8-pin, radial	DFS60S-BDOC01024	1067915
	Cable, 8-wire, universal, 1.5 m	DFS60S-BDOK01024	1069536
12 mm	M23 male connector, 12-pin, radial	DFS60S-BEOA01024	1069537
	M12 male connector, 8-pin, radial	DFS60S-BEOC01024	1069538
	Cable, 8-wire, universal, 1.5 m	DFS60S-BEOK01024	1069539
14 mm	M23 male connector, 12-pin, radial	DFS60S-BGOA01024	1069540
	M12 male connector, 8-pin, radial	DFS60S-BGOC01024	1069541
	Cable, 8-wire, universal, 1.5 m	DFS60S-BGOK01024	1069542

Through hollow shaft with feather key groove

Shaft diameter	Connection type	Type	Part no.
6 mm	M23 male connector, 12-pin, radial	DFS60S-TAOA01024	1067914
10 mm	M23 male connector, 12-pin, radial	DFS60S-TDOA01024	1069526
	M12 male connector, 8-pin, radial	DFS60S-TDOC01024	1069527
	Cable, 8-wire, universal, 1.5 m	DFS60S-TDOK01024	1067916
12 mm	M23 male connector, 12-pin, radial	DFS60S-TEOA01024	1069528
	M12 male connector, 8-pin, radial	DFS60S-TEOC01024	1069529
	Cable, 8-wire, universal, 1.5 m	DFS60S-TEOK01024	1069530
14 mm	M23 male connector, 12-pin, radial	DFS60S-TGOA01024	1069531
	M12 male connector, 8-pin, radial	DFS60S-TGOC01024	1069532
	Cable, 8-wire, universal, 1.5 m	DFS60S-TGOK01024	1069534

Dimensional drawings (dimensions in mm)

Solid shaft, face mount flange, male connector connection, radial



(A) Measuring point working temperature
(freely selectable, respectively circumferential at the cover shell, aprro. 3 mm (0.12) away from the flange)

(B) Measuring point vibration
(respectively at the housing face, approx. 3 mm (0.12) away from the cover)

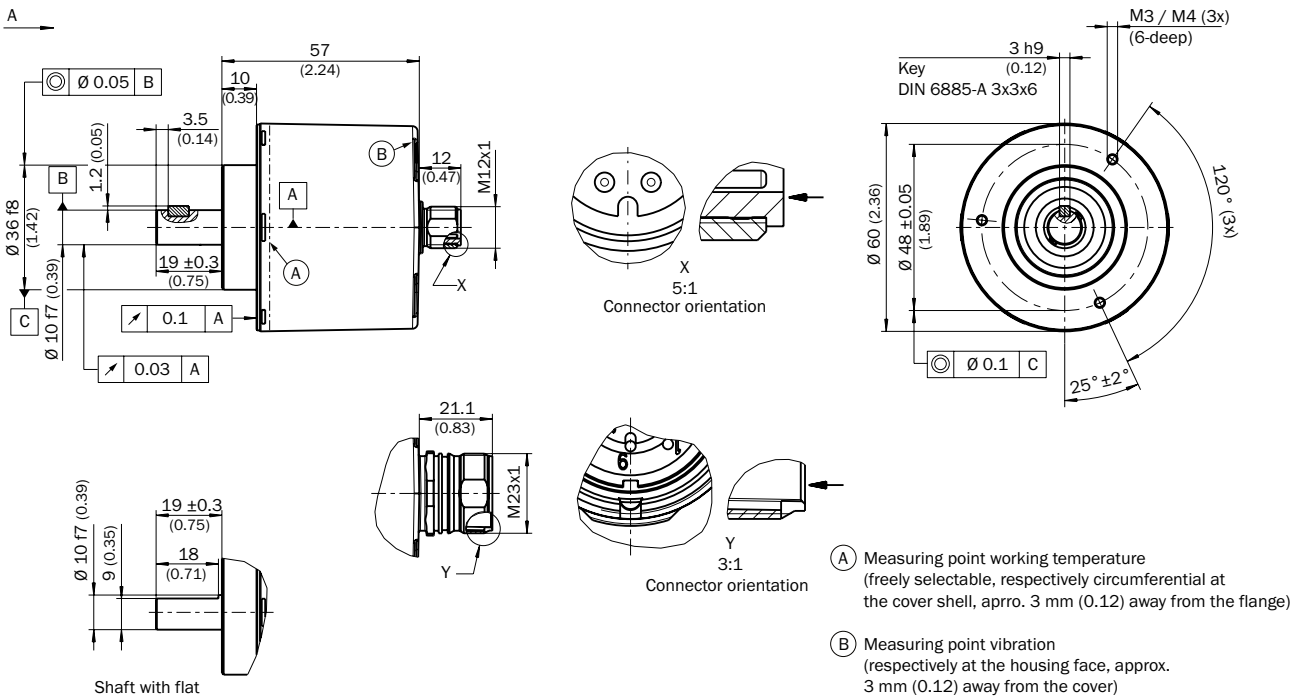
General tolerances as per DIN ISO 2768-mk

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Solid shaft, face mount flange, male connector connection, axial



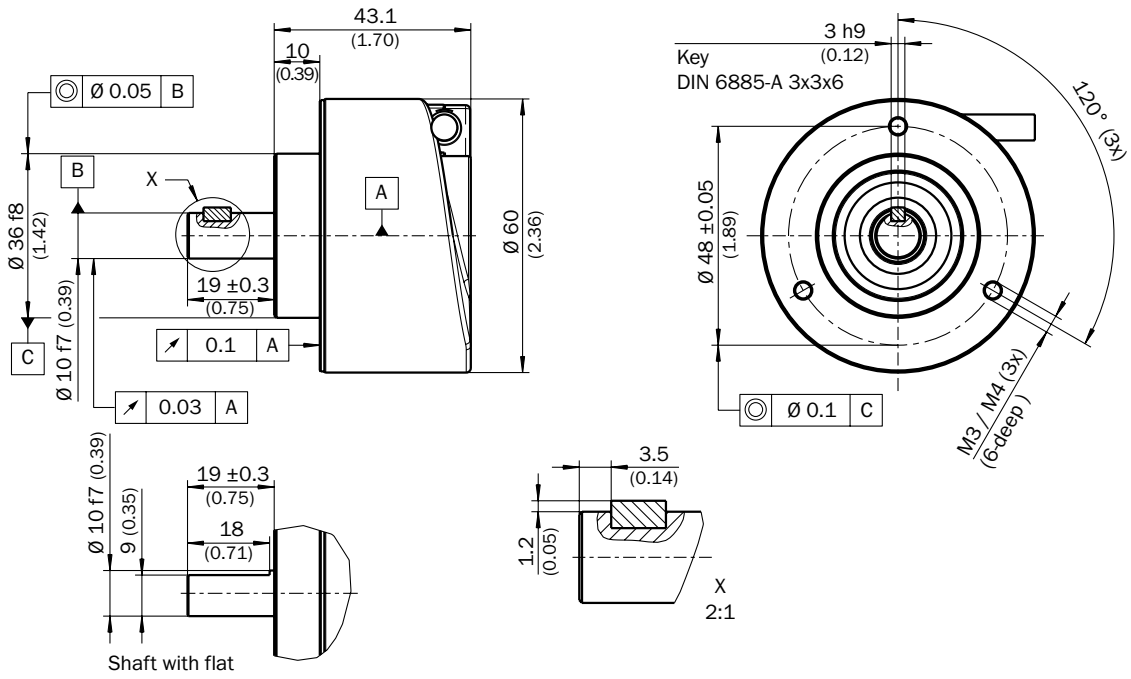
(A) Measuring point working temperature
(freely selectable, respectively circumferential at the cover shell, aprro. 3 mm (0.12) away from the flange)

(B) Measuring point vibration
(respectively at the housing face, approx. 3 mm (0.12) away from the cover)

General tolerances as per DIN ISO 2768-mk

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Solid shaft, face mount flange, cable connection

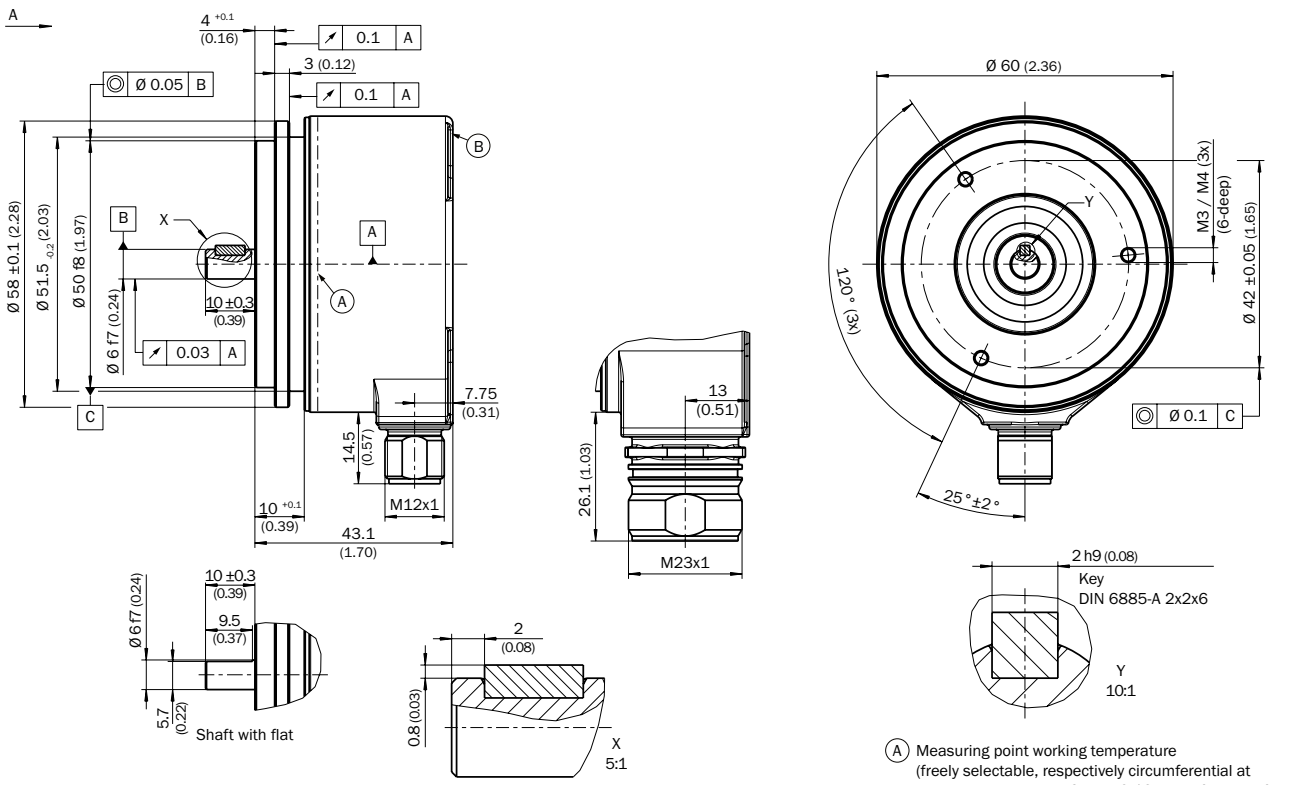


General tolerances according to DIN ISO 2768-mk

Cable diameter = 5.6 ± 0.2 mm; R bend radius = min. 7.5 x cable outer diameter

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Solid shaft, servo flange, male connector connection, radial



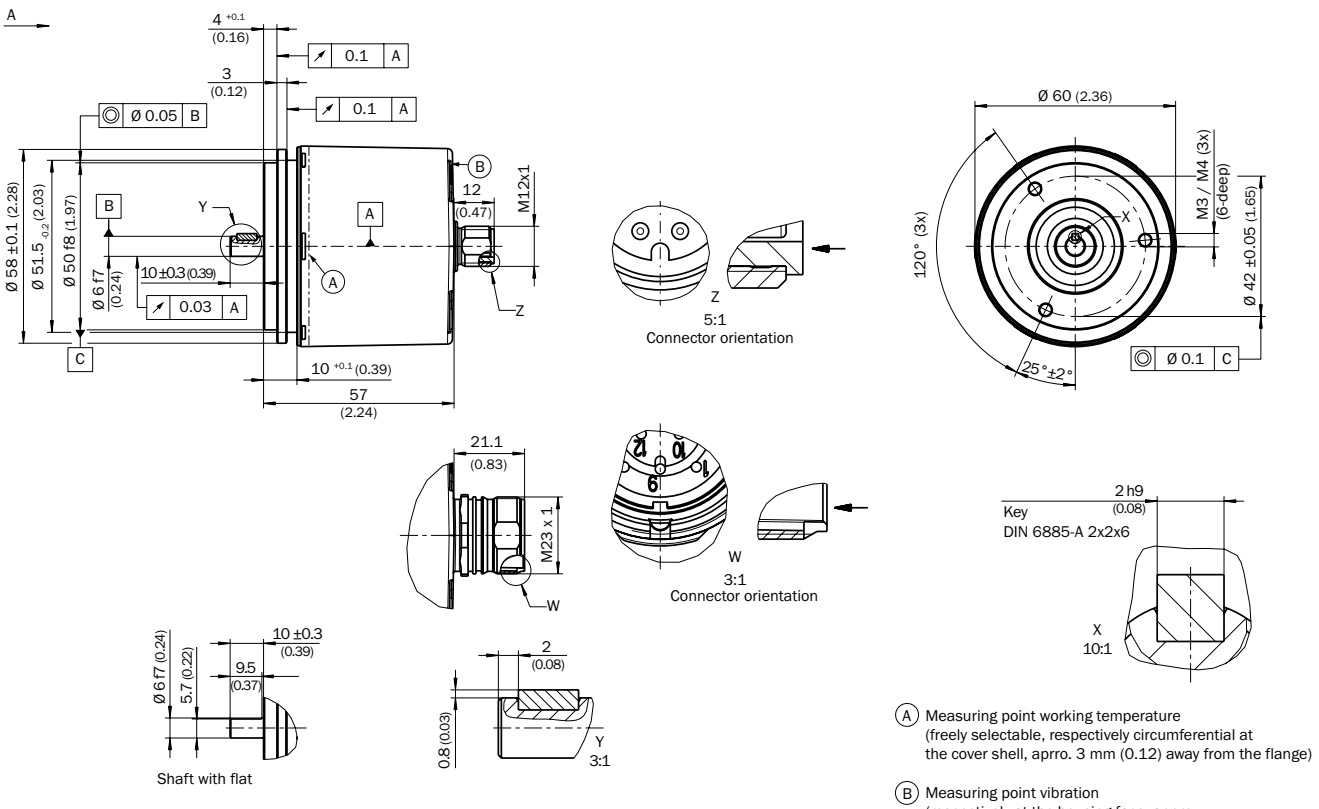
(A) Measuring point working temperature
(freely selectable, respectively circumferential at the cover shell, aprro. 3 mm (0.12) away from the flange)

(B) Measuring point vibration
(respectively at the housing face, approx. 3 mm (0.12) away from the cover)

General tolerances as per DIN ISO 2768-mk

H

Solid shaft, servo flange, male connector connection, axial



(A) Measuring point working temperature
(freely selectable, respectively circumferential at the cover shell, aprro. 3 mm (0.12) away from the flange)

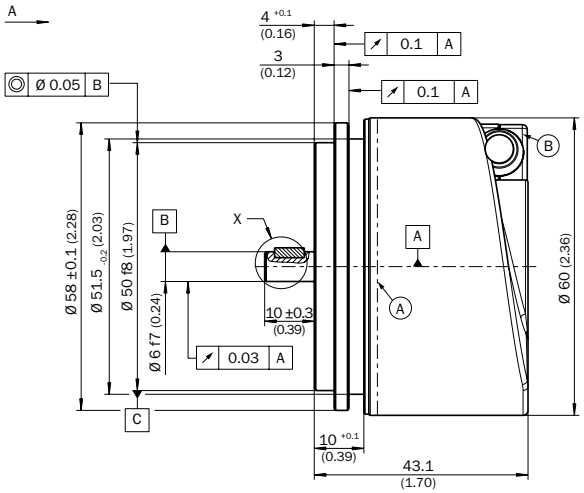
(B) Measuring point vibration
(respectively at the housing face, approx. 3 mm (0.12) away from the cover)

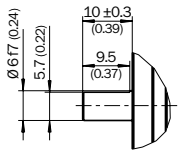
General tolerances as per DIN ISO 2768-mk

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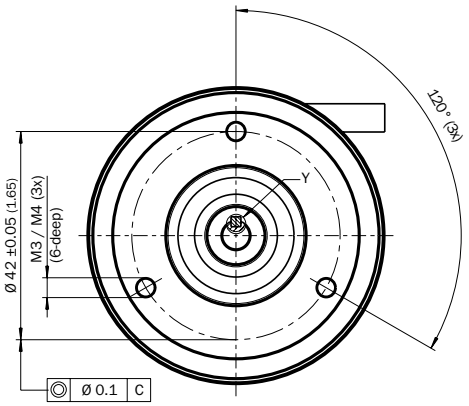
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Subject to change without notice

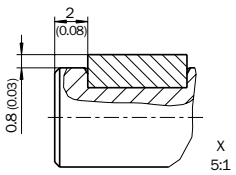
Solid shaft, servo flange, cable connection

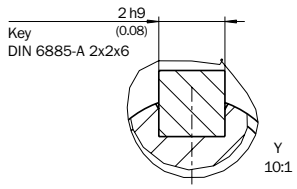




Shaft with flat





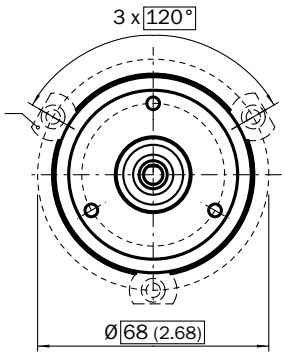


(A) Measuring point working temperature
(freely selectable, respectively circumferential at the cover shell, aprro. 3 mm (0.12) away from the flange)

(B) Measuring point vibration
(respectively at the housing face, approx. 3 mm (0.12) away from the cover)

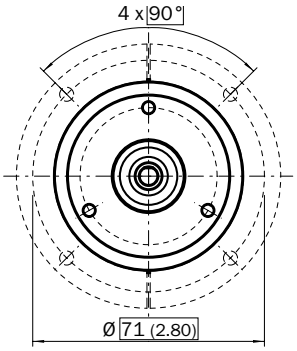
General tolerances as per DIN ISO 2768-mk
Cable diameter = 5.6 ± 0.2 mm; bend radius R = min. 7.5 x diameter cable

Mounting suggestion for small servo clamp (part number 2029166)



All dimensions in mm (inch)

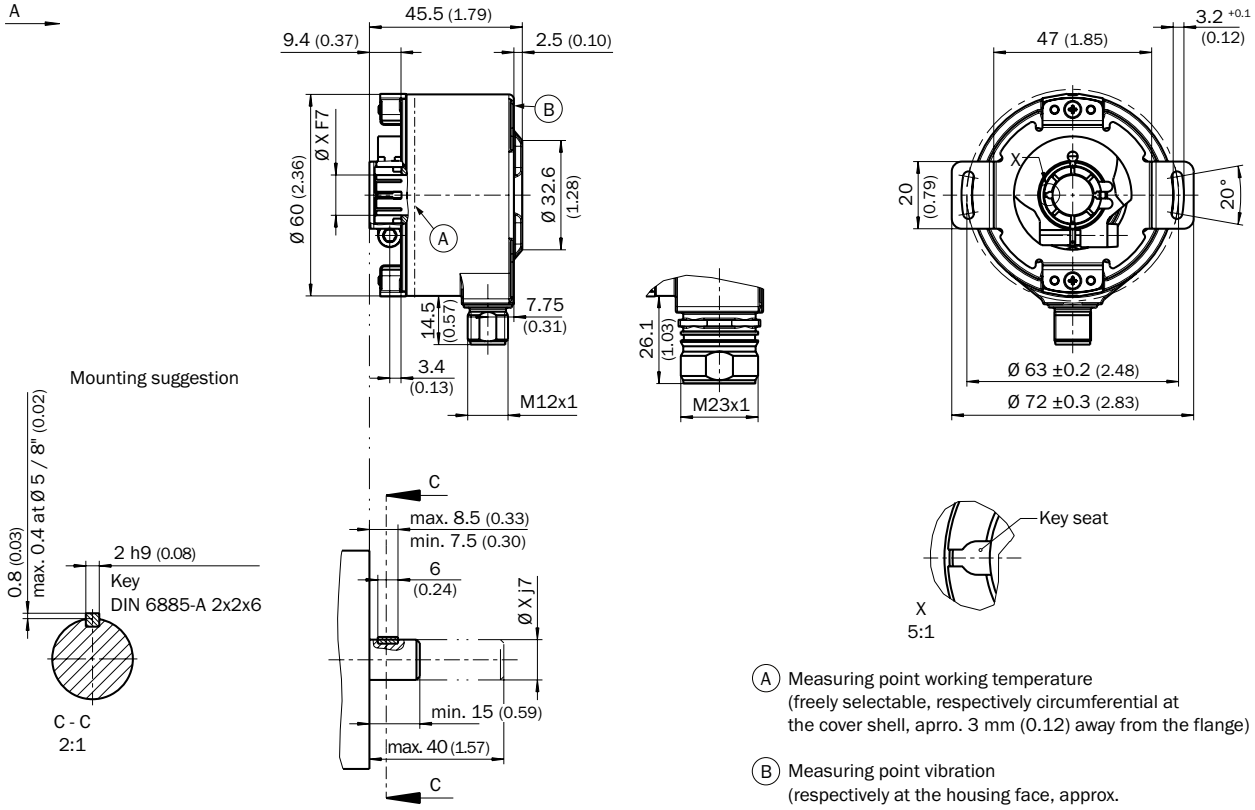
Mounting suggestion for half-shell servo clamp (part number 2029165)



All dimensions in mm (inch)

H

Blind hollow shaft, male connector connection



(A) Measuring point working temperature
(freely selectable, respectively circumferential at the cover shell, aprro. 3 mm (0.12) away from the flange)

(B) Measuring point vibration
(respectively at the housing face, approx. 3 mm (0.12) away from the cover)

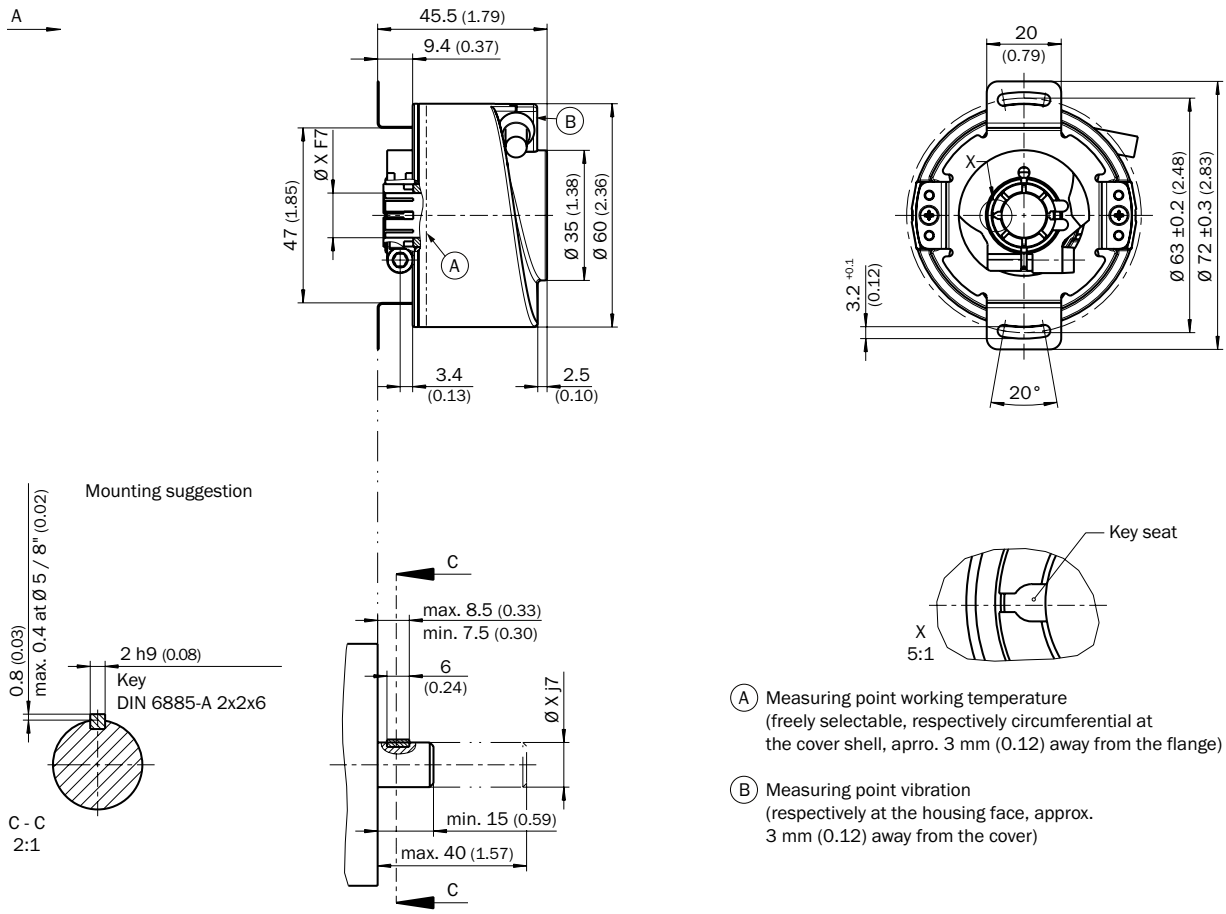
General tolerances as per DIN ISO 2768-mk

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

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Blind hollow shaft, cable connection



(A) Measuring point working temperature
(freely selectable, respectively circumferential at the cover shell, aprro. 3 mm (0.12) away from the flange)

(B) Measuring point vibration
(respectively at the housing face, approx. 3 mm (0.12) away from the cover)

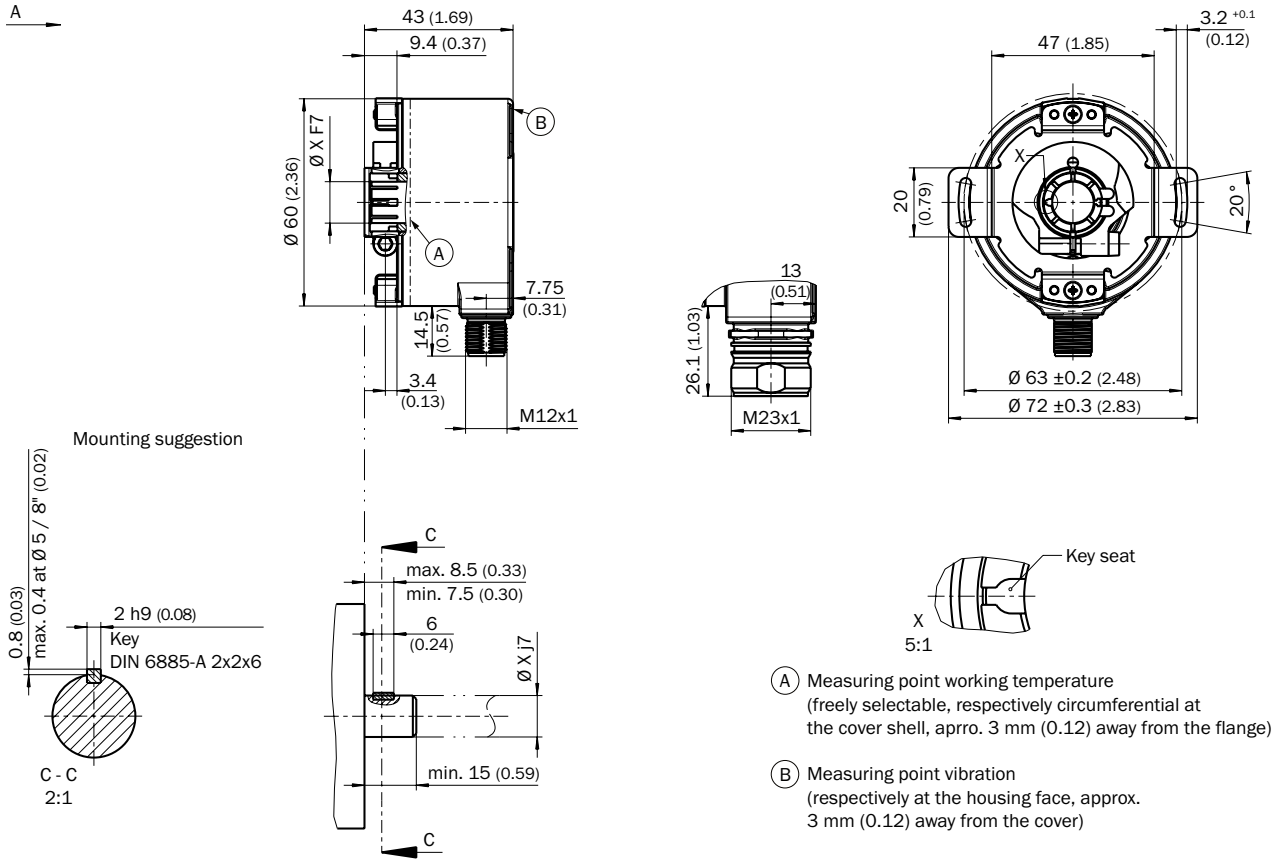
General tolerances as per DIN ISO 2768-mk

Cable diameter = 5.6 ± 0.2 mm; bend radius R = min. 7.5 x diameter cable

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

H

Through hollow shaft, male connector connection



(A) Measuring point working temperature
(freely selectable, respectively circumferential at the cover shell, aprro. 3 mm (0.12) away from the flange)

(B) Measuring point vibration
(respectively at the housing face, approx. 3 mm (0.12) away from the cover)

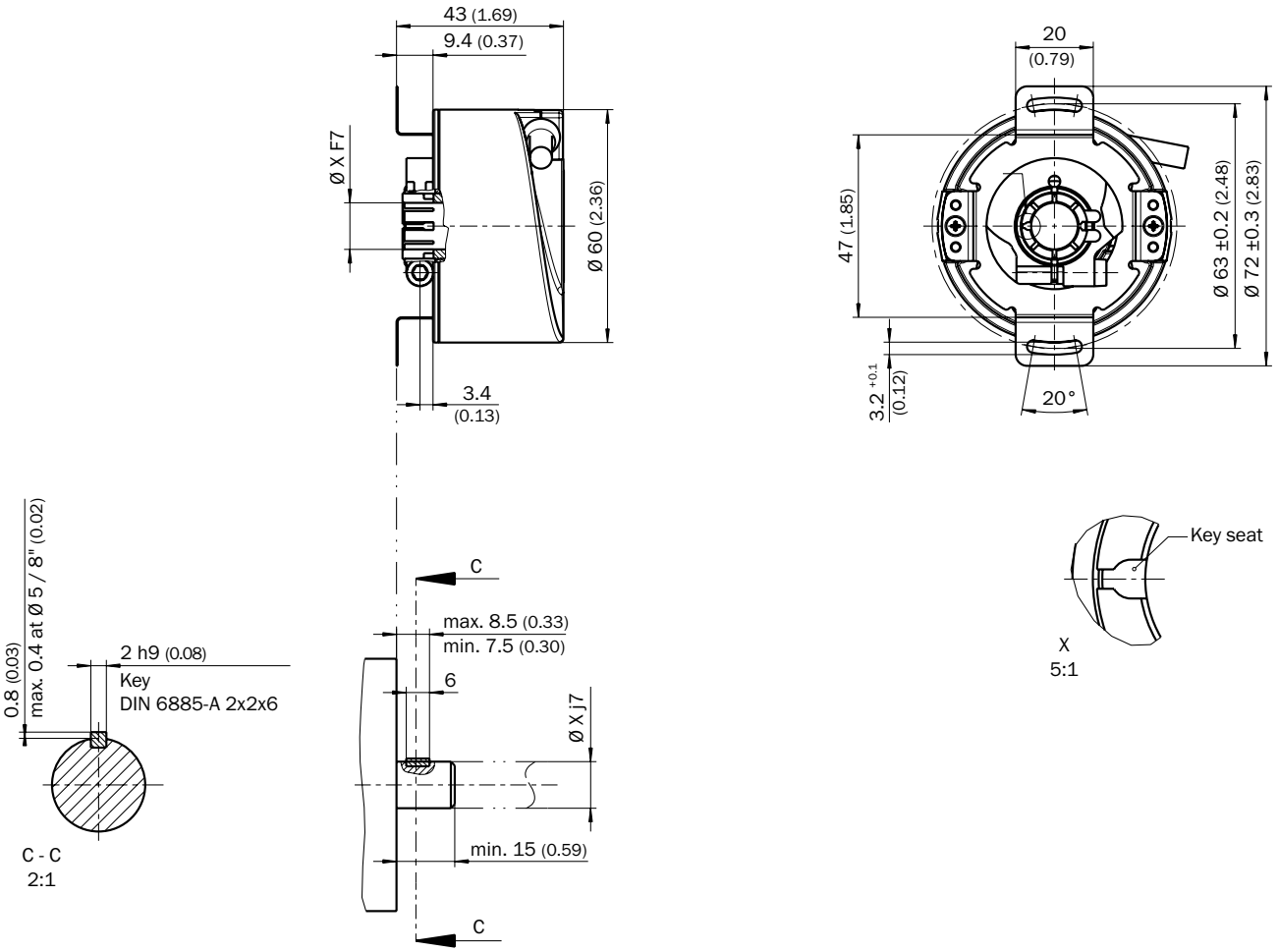
General tolerances as per DIN ISO 2768-mk

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

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Through hollow shaft, cable connection



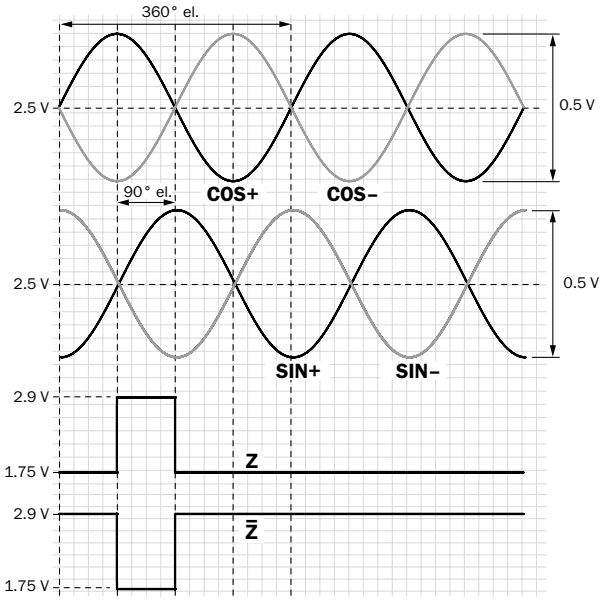
General tolerances according to DIN ISO 2768-mk
Cable diameter = 5.6 ± 0.2 mm; R bend radius = min. 7.5 x cable outer diameter

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

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Interface signals

SIN/COS interface signals before differential generation



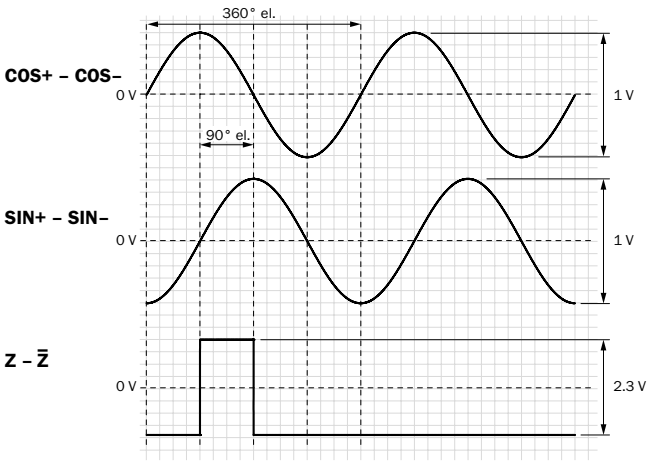
For clockwise shaft rotation, looking in direction “A” (see dimensional drawing)

Signal	Interface signals	Interface signals before differential generation With 120 Ω load	Signal offset	Supply voltage	Output
+ SIN - SIN + COS - COS	Analog, differential	0.5 V_{PP} ± 20%	2.5 V ± 10%	4.5 V ... 32 V	Sine 0.5 V_{PP}

Signal	Interface signals	Interface signals before differential generation With 120 Ω load
Z Z_	Digital, differential	Low: 1.75 V ± 15%, High: 2.90 V ± 15%

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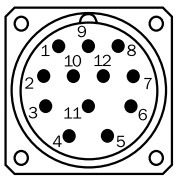
SIN/COS interface signals after differential generation



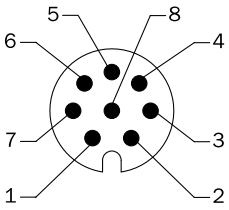
For clockwise shaft rotation, looking in direction “A” (see dimensional drawing)

PIN and wire allocation

View of the M23 male connector plug-in face



View of the M12 male connector plug-in face



PIN M12 male connector, 8-pin	PIN M23 male connector, 12-pin	Wire colors Cable connection	Signal	Explanation
1	6	Brown	COS -	Signal
2	5	White	COS +	Signal
3	1	Black	SIN -	Signal
4	8	Pink	SIN +	Signal
5	4	Yellow	Z_	Signal (do not use for safety-related operating modes)
6	3	Violet	Z	Signal (do not use for safety-related operating modes)
7	10	Blue	GND	Ground connection
8	12	Red	US	Supply voltage (volt-free to housing)
-	9	-	N. C.	Not connected
-	2	-	N. C.	Not connected
-	11	-	N. C.	Not connected
-	7	-	N. C.	Not connected
Shielding	Shielding	Shielding	Shielding	Shield connected with encoder housing Connected to ground on control side

Cable information

Permissible length of cable at maximum output frequency depending on the supply voltage:

Connection type	+ US	Max. length of cable[1]
M12	4.5 V...5.0 V	50 m
	5.0 V...7.0 V	100 m
M23	7.0 V...30 V	150 m
Cable outlet	4.5 V...5.0 V	50 m - (4 x length of encoder cable)
	5.0 V...7.0 V	100 m - (4 x length of encoder cable)
	7.0 V...30 V	150 m - (4 x length of encoder cable)

[1] Data cable 4 x 2 x 0.25 mm2+ 2 x 0.5 mm2 + 1 x 0.14 mm² with shielding (for US, GND 2 x 0.5 mm²), part. no. 6027530

Recommended 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.

Mounting systems

Flanges

Flange plate

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	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 10	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	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	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	BEF-FA-036-100	2029161
	Stator coupling, one-sided, 179 mm long with slot	On request	On request [1]

[1] For more detailed information, please consult your local SICK subsidiary. The stator coupling is mounted ex works. The customer is not permitted to replace the stator coupling

Other mounting accessories

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	BEF-WK-SF	2029166

Miscellaneous

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

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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 ... +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 / 10 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, aluminum hub, for use with feather key	KUP-0610-BP	2075375
	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 °C ... +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 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
	Bellows coupling, shaft diameter 6 mm / 10 mm, 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-0610-BS	2075377
	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° ... +120° C, max. torque 80 Ncm; material: stainless steel bellows, fixed with two setscrews each	KUP-1010-BS	2075376

Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm², 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 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1)]	2 m	DOL-2312-G02MLA3	2030682
		7 m	DOL-2312-G07MLA3	2030685
		10 m	DOL-2312-G10MLA3	2030688
		15 m	DOL-2312-G15MLA3	2030692
		20 m	DOL-2312-G20MLA3	2030695
		25 m	DOL-2312-G25MLA3	2030699
		30 m	DOL-2312-G30MLA3	2030702
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: incremental, suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1)]	1.5 m	DOL-2312-G1M5MA3	2029212
		3 m	DOL-2312-G03MMA3	2029213
		5 m	DOL-2312-G05MMA3	2029214
		10 m	DOL-2312-G10MMA3	2029215
		20 m	DOL-2312-G20MMA3	2029216
		30 m	DOL-2312-G30MMA3	2029217

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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, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: –40 °C ... +125 °C	DOS-2312-G02	2077057

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: SSI, suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	By the meter	LTG-2308-MWENC	6027529
	Head A: cable Head B: cable Cable: SSI, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.5 mm		LTG-2411-MW	6027530
	Head A: cable Head B: cable Cable: SSI, suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², 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 coded, incremental, 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, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: –40 °C ... +125 °C	STE-2312-G01	2077273

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

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WIRE DRAW ENCODERS

Wire draw encoders - made-to-measure solutions for your applications

Wire draw encoders consist of a wire draw mechanism and an encoder. The rotation of the drum is proportional to the length being measured and is recorded by an encoder, which then outputs the data. This allows for positioning on linear measuring sections. SICK's wire draw encoders provide a large selection of interfaces, which enable simple system integration in applications in demanding industrial environments.

Different performance classes make it possible to select a device that ideally suits the application at hand.

Your benefits

- From basic configuration to heavy-duty encoders, the wide range of SICK wire draw encoders is suitable for a very broad variety of applications
- SICK wire draw encoders offer the right interface for each application due to their modular design
- A large selection of measuring lengths – from 1.25 m to 50 m
- 3 different designs – EcoLine, Compact, HighLine – suitable for any application
- Unlike other linear measuring systems, wire draw encoders do not require precise linear guidance
- Resolutions of up to 0.001 mm enable very precise measurements
- Simple commissioning

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Applications I-520
Product family overview I-524
Selection guide I-526



EcoLine I-528
Modular wire draw encoders in smallest design



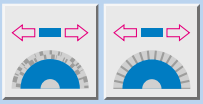
Compact I-576
Compact, rugged design - with integrated encoder



HighLine I-590
Rugged design measures distances up to 50 m - the heavy-duty wire draw encoder

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PRODUCT FAMILY OVERVIEW





EcoLine

Modular wire draw encoders in smallest design

Technical data overview		
Sub-product family	BCG	PFG
Measuring length	≤ 10 m	≤ 10 m
Resolution	Up to 0.001 mm	Up to 0.001 mm
Reproducibility	≤ 0.2 mm	≤ 0.2 mm
Electrical interface	4 mA ... 20 mA, analog 0 V ... 10 V analog SSI CANopen DeviceNet PROFIBUS EtherNet/IP PROFINET EtherCAT®	4.5 V ...5.5 V, TTL/RS422 HTL/Push Pull
Modularity (wire draw mechanism and encoder)	✔	✔

At a glance

- Measured lengths of 1.25 m ... 10 m
- Modular measuring system with a wide selection of interfaces/measuring lengths
- Very small, slim housing (55 mm ... 190 mm) with spring integrated in the measurement drum
- Light yet shock-proof and temperature-resistant plastic housing
- Analog interface with teach-in function available on the encoder

Detailed information ➜ I-528

		
	Compact	**HighLine**
	Compact, rugged design - with integrated encoder	Rugged design measures distances up to 50 m - the heavy-duty wire draw encoder
	BKS	XKS	PKS	BTF	PRF
	≤ 5 m	≤ 5 m	≤ 5 m	≤ 50 m	≤ 50 m
	Up to 0.295 µm	Up to 0.295 µm	Up to 0.295 µm	Up to 0.001 mm	Up to 0.001 mm
	0.15°	0.15°	0.15°	≤ 5 mm	≤ 5 mm
	SSI	7 V ... 12 V, HIPERFACE®	4.5 V ...5.5 V, TTL/RS422	4 mA ... 20 mA, analog 0 V ... 10 V analog SSI CANopen DeviceNet PROFIBUS EtherNet/IP PROFINET EtherCAT®	4.5 V ...5.5 V, TTL/RS422 10 V ... 32 V, HTL/Push Pull
	–	–	–	✔	✔
	• Measuring lengths from 2 m ... 5 m • Integrated measuring system • Compact housing (90 mm x 90 mm x 90 mm) • Incremental and absolute versions • High resolution			• Measuring lengths: 2 m ... 50 m • Modular measuring system with a wide selection of interfaces/measuring lengths • Very rugged system (dirt scraper, integrated brushes) • High-quality winding mechanism and wire input • High enclosure rating • High resistance to shock and vibrations • Extremely high resolution possible • Expandable using external accessories	
	➜ I-576			➜ I-590	

SELECTION GUIDE

	Measuring length [m]							
	1.25	2	3	5	10	20	30	50
EcoLine								
 BCG05	■							
 BCG08			■					
 BCG13				■				
 BCG19					■			
 PFG05	■							
 PFG08			■					
 PFG13				■				
 PFG19					■			
Compact								
 BKS		■		■				
 XKS		■		■				
 PKS		■		■				
HighLine								
 BTF08		■	■					
 BTF13				■	■	■	■	
 BTF19								■
 PRF08		■	■					
 PRF13				■	■	■	■	
 PRF19								■

[1] Optional, on request.

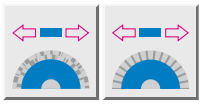
[2] Up to 20 m measuring length analog interface available.

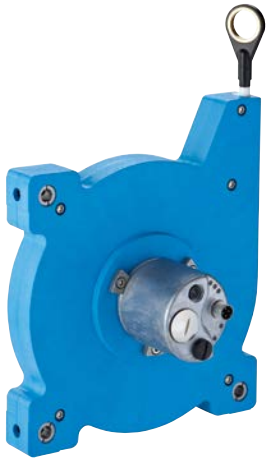
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Interfaces												Page
Analog		Absolute								Incremental		
0 V ... 10 V	4 mA ... 20 mA	SSI	PROFIBUS	DeviceNet	CANopen	EtherNet/IP	EtherCAT®	PROFINET	HIPERFACE®	HTL	TTL	
■	■	■			■							→ I-528
■	■	■	■	■	■	■	■	■	■ 1)			→ I-528
■	■	■	■	■	■	■	■	■	■ 1)			→ I-528
■	■	■	■	■	■	■	■	■	■ 1)			→ I-528
										■	■	→ I-528
										■	■	→ I-528
										■	■	→ I-528
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		■										→ I-576
									■			→ I-576
											■	→ I-576
■	■	■	■	■	■	■	■	■	■ 1)			→ I-590
■ 2)	■ 2)	■	■	■	■	■	■	■	■ 1)			→ I-590
		■	■	■	■	■	■	■	■ 1)			→ I-590
										■	■	→ I-590
										■	■	→ I-590
										■	■	→ I-590

MODULAR WIRE DRAW ENCODERS IN MINIATURE DESIGN





Product description

The slim design of the EcoLine family is ideal for applications with limited space. Its modularity makes it suitable for a large selection of measuring lengths, interfaces and encoders. Due to the spring integrated into the drum as well as the adaption without coupling, it is possible to achieve high precision and stability. The special nozzle serves to protect the measuring wire from damage caused by vibration. The intuitive teach-in function provided in analog options also enables easy system integration.

At a glance

- Measured lengths of 1.25 m to 10 m
- Modular measuring system with a wide selection of interfaces/measuring lengths
- Very small, slim housing (55 mm to 190 mm) with spring integrated in the measurement drum
- Light yet shock-proof and temperature-resistant plastic housing
- Analog interface with teach-in function available on the encoder

Your benefits

- Space- and cost-saving design thanks to slimline mechanics
- Numerous combinations of interfaces and measuring lengths
- Advanced programming options lead to a reduction in the number of variants, save costs, and reduce storage
- Quick and easy commissioning thanks to analog interface and option to use low-cost interface card

Fields of application I-529
Detailed technical data. I-529
Type code. I-539
Ordering information. I-541
Dimensional drawings I-544
Recommended accessories. I-568

→ www.mysick.com/en/EcoLine

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Measuring fork height and tilt in automated guided systems
- Height measurement in small warehouse systems
- Applications in medical technology (operating tables, MRT)
- Height measurement of scissor lift tables
- Height measurement of overhead conveyors in the automotive industry

Detailed technical data

BCG

Performance

	BCG05 0 m ... 1.25 m	BCG08 0 m ... 3 m	BCG13 0 m ... 5 m	BCG19 0 m ... 10 m
Measuring range	0 m - 1.25 m	0 m ... 3 m	0 m ... 5 m	0 m ... 10 m
Reproducibility	Max. 0.2 mm [1]	Max. 0.3 mm [1]	Max. 0.5 mm [1]	Max. 1 mm [1]
Linearity	Max. ± 2 mm [1]		Max. ± 3 mm [1]	Max. ± 6 mm [1]
Hysteresis	Max. 0.5 mm [1]	Max. 1.2 mm [1]	Max. 1.5 mm [1]	Max. 3 mm [1]
Resolution (wire draw + encoder)				
Analog	4 ... 20 mA = 0.05 mm; 0 ... 10 V = 0.04 mm [2] [3]	4 ... 20 mA = 0.08 mm; 0 ... 10 V = 0.06 mm [2] [3]	4 ... 20 mA = 0.13 mm; 0 ... 10 V = 0.10 mm [2] [3]	4 ... 20 mA = 0.05 mm; 0 ... 10 V = 0.04 mm [2] [3]
SSI	0.02 mm (AHM36) [2] [3]	0.06 mm (AFM60E) [2] [3] 0.03 mm (AFM60B, AHM36) [2] [3]	0.1 mm (AFM60E) [2] [3] 0.05 mm (AFM60B, AHM36) [2] [3]	0.14 mm (AFM60E) [2] [3] 0.07 mm (AFM60B, AHM36) [2] [3]
CANopen	0.01 mm (AHM36) [2] [3]	0.03 mm (ATM60) [2] [3] 0.01 mm (AHM36) [2] [3]	0.05 mm (ATM60) [2] [3] 0.02 mm (AHM36) [2] [3]	0.07 mm (ATM60) [2] [3] 0.03 mm (AHM36) [2] [3]
DeviceNet	–	0.03 mm [2] [3]	0.05 mm [2] [3]	0.07 mm [2] [3]
PROFIBUS	–	0.03 mm [2] [3]	0.05 mm [2] [3]	0.07 mm [2] [3]
EtherNet/IP	–	0.001 mm [2] [3]		0.002 mm [2] [3]
PROFINET	–	0.001 mm [2] [3]		0.002 mm [2] [3]
EtherCAT®	–	0.001 mm [2] [3]		0.002 mm [2] [3]

[1] Value applies to wire draw mechanics.

[2] The values shown here are rounded.

[3] Sample calculation based on the BCG08 with PROFINET: 230 mm (length of wire draw per revolution - see mechanical data): 262,144 (steps per revolution) = 0.001 mm (resolution from the combination wire draw + encoder)

Interfaces

	BCG05 0 m ... 1.25 m	BCG08 0 m ... 3 m	BCG13 0 m ... 5 m	BCG19 0 m ... 10 m
Encoder	Absolute encoders			
Electrical interface	See type code			
Connection type	See type code			
Clock frequency				
Analog	32 kHz			
SSI	2 MHz (AHM36)	1 MHz (AFM60E) 2 MHz (AFM60B, AHM36)		
Address setting				
CANopen	0 ... 127 (AHM36)	0 ... 63 (ATM60) 0 ... 127 (AHM36)		
DeviceNet	–	0 ... 63, DIP switch or protocol		
PROFIBUS	–	0 ... 127, DIP switch		
EtherNet/IP	–	Via DHCP / DEC switches		
PROFINET	–	Via DCP		
Protocol				
CANopen	Communication profile DS 301 V4.02 (AHM36)	Communication profile DS 301 V4.0 (ATM60) Communication profile DS 301 V4.02 (AHM36)		
DeviceNet	–	DeviceNet Specification Release 2.0		
PROFIBUS	–	PROFIBUS DP V0		
EtherNet/IP	–	EtherNet/IP IEC 61784-1		
PROFINET	–	PROFINET IO / RT Class B		
EtherCAT®	–	EtherCAT, CoE (CiA DS-301)		
Bus termination				
CANopen	Via external terminator (AHM36)	Via DIP switches (ATM60) Via external terminator (AHM36)		
DeviceNet	–	Via DIP switches		
PROFIBUS	–	Via DIP switches		
Set (electronic adjustment)				
Analog	Teach-in functionality			
SSI	H active (L = 0 – 3 V; H = 4.0 – U_S V) (AHM36)	Via SET cable (AFM60) H active (L = 0 – 3 V; H = 4.0 – U_S V) (AHM36)		
CANopen	Via PRESET pushbutton or protocol			
DeviceNet	–	Via PRESET pushbutton or protocol		
PROFIBUS	–	Via PRESET pushbutton or protocol		
EtherNet/IP	–	Via PRESET pushbutton or protocol		
PROFINET	–	Via PRESET pushbutton or protocol		
EtherCAT®	–	Via PRESET pushbutton or protocol		
Encoder profile				
CANopen	CiA DS-406, V3.2. - Class C2 (AHM36)	Device profile DSP 406 V 2.0 (ATM60) CiA DS-406, V3.2. - Class C2 (AHM36)		
DeviceNet	–	Generic Profile		
PROFIBUS	–	Encoder profile version 1.1 Class 1 and Class2		
EtherNet/IP	–	0 x 22		
PROFINET	–	V4.1 class3		
EtherCAT®	–	CiA DS-406		

Electrical data

	BCG05 0 m ... 1.25 m	BCG08 0 m ... 3 m	BCG13 0 m ... 5 m	BCG19 0 m ... 10 m
Initialization time				
Analog	< 2 ms [1]	≤ 2 ms [1]		
SSI	≥ 50 ms (AHM36) [1]	Approx. 50 ms (AFM60) [1] ≥ 50 ms (AHM36) [1]		
CANopen	2 s (AHM36) [1]	Approx. 12 s (ATM60) [1] ≥ 2 s (AHM36) [1]		
DeviceNet	–	Approx. 12 s [1]		
PROFIBUS	–	Approx. 1 s [1]		
EtherNet/IP	–	Approx. 12 s [1]		
PROFINET	–	Approx. 12 s [1]		
EtherCAT®	–	Approx. 12 s [1]		
Supply voltage				
Analog	19 V ... 33 V			18 V ... 33 V
SSI	4.5 V ... 32 V (AHM36)	4.5 V ... 32 V (AFM60, AHM36)		
CANopen	10 V ... 30 V (AHM36)	10 V ... 32 V (ATM60) 10 V ... 30 V (AHM36)		
DeviceNet	–	10 V ... 32 V		
PROFIBUS	–	10 V ... 32 V		
EtherNet/IP	–	10 V ... 30 V		
PROFINET	–	10 V ... 30 V		
EtherCAT®	–	10 V ... 30 V		
Code type				
SSI	Gray, binary (AHM36)	Gray (AFM60) Gray, binary (AHM36)		
Power consumption				
Analog	2 W			
SSI	1.5 W (AHM36)	0.7 W (AFM60E, AFM60B) 1.5 W (AHM36)		
CANopen	1.5 W (AHM36)	2 W (ATM60) 1.5 W (AHM36)		
DeviceNet	–	2 W		
PROFIBUS	–	1.5 W		
EtherNet/IP	–	3 W		
PROFINET	–	3 W		
EtherCAT®	–	3 W		
MTTFd: mean time to dangerous failure				
SSI	230 years (AHM36) [2] [3]	250 years (AFM60) [2] [3] 230 years (AHM36) [2] [3]		
CANopen	270 years (AHM36) [2] [3]	150 years (ATM60) [2] [3] 270 years (AHM36) [2] [3]		
DeviceNet	–	150 years [2] [3]		
PROFIBUS	–	60 years [2] [3]		
EtherNet/IP	–	80 years [2] [3]		
PROFINET	–	80 years [2] [3]		
EtherCAT®	–	80 years [2] [3]		

[1] Valid positional data can be measured once this time has elapsed.

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

[3] This value relates to the connected encoder only.

Mechanical data

	BCG05 0 m ... 1.25 m	BCG08 0 m ... 3 m	BCG13 0 m ... 5 m	BCG19 0 m ... 10 m
Mass (incl. encoder)				
Analog	200 g	650 g	1.2 kg	2.3 kg
SSI	200 g (AHM36)	510 g (AFM60) 370 g (AHM36)	1.06 kg (AFM60) 920 g (AHM36)	2.16 kg (AFM60) 2.02 kg (AHM36)
CANopen	200 g (AHM36)	840 g (ATM60) 370 g (AHM36)	1.39 kg (ATM60) 920 g (AHM36)	2.49 kg (ATM60) 2.02 kg (AHM36)
DeviceNet	–	840 g	1.39 kg	2.49 kg
PROFIBUS	–	530 g	1.08 kg	2.18 kg
EtherNet/IP	–	450 g	1 kg	2.1 kg
PROFINET	–	450 g	1 kg	2.1 kg
EtherCAT®	–	450 g	1 kg	2.1 kg
Mass (mechanism)	80 g	250 g	800 g	1.9 kg
Measuring wire material	Highly flexible steel wire, 1.4401 stainless steel V4A / PA12, sheathed	Highly flexible steel wire, 1.4401 stainless steel V4A		
Mass (measuring wire)	0.58 g/m	1.2 g/m		
Material, wire draw mechanism housing	Plastic, Noryl			
Wire draw lengths per revolution	150 mm	230 mm	385 mm	555 mm
Spring return force	Approx. 1 N to approx. 1.4 N [1]	Approx. 5 N to approx. 6.3 N [1]	Approx. 4.5 N to approx. 7 N [1]	Approx. 9 N to approx. 12 N [1]
Service life of wire draw mechanism	1 mio. cycles [2]			
Actual wire draw length	1.45 m	3.2 m	5.2 m	10.2 m
Measuring wire diameter	0.45 mm	0.55 mm		
Wire acceleration	10 m/s²		4 m/s²	8 m/s²
Traversing speed	4 m/s			
Integrated encoder				
Analog	ACM36			ACM60
SSI	AHM36 SSI	AFM60 SSI AHM36 SSI		
CANopen	AHM36 CANopen	ATM60 CANopen AHM36 CANopen		
DeviceNet	–	ATM60 DeviceNet		
PROFIBUS	–	A3M60		
EtherNet/IP	–	AFM60 EtherNet/IP		
PROFINET	–	AFM60 PROFINET		
EtherCAT®	–	AFM60 EtherCAT®		
Number of steps per revolution				
SSI	8,192 (AHM36)	4,096 (AFM60E) 8,192 (AFM60B, AHM36)		
CANopen	16,384 (AHM36)	8,192 (ATM60) 16,384 (AHM36)		
DeviceNet	–	8,192		
PROFIBUS	–	8,192		
EtherNet/IP	–	262,144		
PROFINET	–	262,144		
EtherCAT®	–	262,144		

[1] These values were measured at an ambient temperature of 25 °C. There may be variations at other temperatures.

[2] A cycle is made up of a wire intake and outake.

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Subject to change without notice

	BCG05 0 m ... 1.25 m	BCG08 0 m ... 3 m	BCG13 0 m ... 5 m	BCG19 0 m ... 10 m
Article number encoder				
Analog	6039751 6039752			6045312 6045313
SSI	1068328 (AHM36)	1037649 (AFM60E) 1037863 (AFM60B) 1037438 (AFM60E) 1068330 (AHM36)		1037869 (AFM60E) 1037863 (AFM60B) 1037868 (AFM60E) 1068330 (AHM36)
CANopen	1067977 (AHM36)	1030025 (ATM60) 1065999 (AHM36)		
DeviceNet	–	1030018		
PROFIBUS	–	1051018		
EtherNet/IP	–	1055331		
PROFINET	–	1059040		
EtherCAT®	–	1059061		
Integrated mechanics	MRA-G055-101D4	MRA-G080-103D3	MRA-G130-105D3	MRA-G190-110D3
Article number mechanics	5324019	5322778	5322779	5326242

[1] These values were measured at an ambient temperature of 25 °C. There may be variations at other temperatures.

[2] A cycle is made up of a wire intake and outake.

Ambient data

	BCG05 0 m ... 1.25 m	BCG08 0 m ... 3 m	BCG13 0 m ... 5 m	BCG19 0 m ... 10 m
EMC	According to EN 61000-6-2 and EN 61000-6-3			
Enclosure rating (encoder)				
Analog	IP 65			
SSI	IP 66 / IP 67, on housing side (acc. to IEC 60529) (AHM36) IP 66 / IP 67, on shaft side (acc. to IEC 60529) (AHM36)	IP 67 (AFM60) IP 66 / IP 67, on housing side (acc. to IEC 60529) (AHM36) IP 66 / IP 67, on shaft side (acc. to IEC 60529) (AHM36)		
CANopen	IP 66 / IP 67, on housing side (acc. to IEC 60529) (AHM36) IP 66 / IP 67, on shaft side (acc. to IEC 60529) (AHM36)	IP 67 (ATM60) IP 66 / IP 67, on housing side (acc. to IEC 60529) (AHM36) IP 66 / IP 67, on shaft side (acc. to IEC 60529) (AHM36)		
DeviceNet	–	IP 67		
PROFIBUS	–	IP 67		
EtherNet/IP	–	IP 67		
PROFINET	–	IP 67		
EtherCAT®	–	IP 67		
Enclosure rating (mechanism)	IP 50			

	BCG05 0 m ... 1.25 m	BCG08 0 m ... 3 m	BCG13 0 m ... 5 m	BCG19 0 m ... 10 m
Resistance to shocks (according to EN 60068-2-27)				
Analog	50 g, 6 ms			
SSI	100 g, 6 ms (AHM36)	50 g, 6 ms (AFM60E) 70 g, 6 ms (AFM60B) 100 g, 6 ms (AHM36)		
CANopen	100 g, 6 ms (ATM60, AHM36)			
DeviceNet	–	100 g, 6 ms		
PROFIBUS	–	80 g, 6 ms		
EtherNet/IP	–	100 g, 6 ms		
PROFINET	–	100 g, 6 ms		
EtherCAT®	–	100 g, 6 ms		
Resistance to vibration (according to EN 60068-2-6)				
SSI	20 g, 10 Hz ... 2,000 Hz (AHM36)	20 g, 10 Hz ... 2,000 Hz (AFM60E, AHM36) 30 g, 10 Hz ... 2,000 Hz (AFM60B)		
CANopen	20 g, 10 Hz ... 2,000 Hz			
DeviceNet	–	20 g, 10 Hz ... 2,000 Hz		
PROFIBUS	–	30 g, 10 Hz ... 2,000 Hz		
EtherNet/IP	–	30 g, 10 Hz ... 2,000 Hz		
PROFINET	–	30 g, 10 Hz ... 2,000 Hz		
EtherCAT®	–	30 g, 10 Hz ... 2,000 Hz		
Analog	4 g, sine 5 Hz ... 100 Hz (as per EN 60068-2-6)			
Operating temperature range (encoder)				
Analog	–30 °C ... +80 °C			
SSI	–40 °C ... +100 °C (AHM36)	0 °C ... +85 °C (AFM60E) –30 °C ... +100 °C (AFM60B) –40 °C ... +100 °C (AHM36)		
CANopen	–40 °C ... +85 °C (AHM36)	–20 °C ... +85 °C (ATM60) –40 °C ... +85 °C (AHM36)		
DeviceNet	–	–20 °C ... +85 °C		
PROFIBUS	–	–10 °C ... +70 °C		
EtherNet/IP	–	–30 °C ... +85 °C		
PROFINET	–	–30 °C ... +85 °C		
EtherCAT®	–	–30 °C ... +85 °C		
Operating temperature range (mechanical)	–30 °C ... +70 °C			
Operating temperature range (combination)				
Analog	–30 °C ... +70 °C			
SSI	–30 °C ... +70 °C (AHM36)	0 °C ... +70 °C (AFM60E) –30 °C ... +70 °C (AFM60B, AHM36)		
CANopen	–30 °C ... +70 °C	–20 °C ... +70 °C (ATM60) –30 °C ... +70 °C (AHM36)		
DeviceNet	–	–20 °C ... +70 °C		
PROFIBUS	–	–10 °C ... +70 °C		
EtherNet/IP	–	–30 °C ... +70 °C		
PROFINET	–	–30 °C ... +70 °C		
EtherCAT®	–	–30 °C ... +70 °C		

	BCG05 0 m ... 1.25 m	BCG08 0 m ... 3 m	BCG13 0 m ... 5 m	BCG19 0 m ... 10 m
Relative humidity/condensation				
SSI	90% (AHM36) [1]	90% (AFM60, AHM36) [1]		
CANopen	90% (AHM36) [1]	98% (ATM60) [1] 90% (AHM36) [1]		
DeviceNet	–	98% [1]		
PROFIBUS	–	95% [1]		
EtherNet/IP	–	90% [1]		
PROFINET	–	90% [1]		
EtherCAT®	–	90% [1]		

[1] Condensation of optical surfaces not permitted.

PFG

Performance

	PFG05 0 m ... 1.25 m	PFG08 0 m ... 3 m	PFG13 0 m ... 5 m	PFG19 0 m ... 10 m
Measuring range	0 m - 1.25 m	0 m ... 3 m	0 m ... 5 m	0 m ... 10 m
Reproducibility	Max. 0.2 mm [1]	Max. 0.3 mm [1]	Max. 0.5 mm [1]	Max. 1 mm [1]
Linearity	Max. ± 2 mm [1]		Max. ± 3 mm [1]	Max. ± 6 mm [1]
Hysteresis	Max. 0.5 mm [1]	Max. 1.2 mm [1]	Max. 1.5 mm [1]	Max. 3 mm [1]
Resolution (wire draw + encoder)	0.06 mm [2] [3]	0.014 mm [2] [3]	0.023 mm [2] [3]	0.034 mm [2] [3]

[1] Value applies to wire draw mechanics.

[2] The values shown here are rounded.

[3] Sample calculation based on the PFG08 with HTL Push Pull: 230 mm (length of wire draw per revolution - see mechanical data): 16,384 (steps per revolution) = 0.014 mm (resolution from the combination wire draw + encoder)

Interfaces

Encoder	Incremental encoders
Electrical interface	See type code
Connection type	See type code

Electrical data

	PFG05 0 m ... 1.25 m	PFG08 0 m ... 3 m	PFG13 0 m ... 5 m	PFG19 0 m ... 10 m
Maximum output frequency	≤ 300 kHz	≤ 800 kHz		
Reference signal, position	90° electric, logically gated with A and B	90°, electric, logically gated with A and B/sine and cosine		
Reference signal, number	Electric, logically gated with A and B	1		
Maximum load current	≤ 30 mA			
Initialization time	≤ 3 ms [1]	≤ 32 ms, 30 ms, at mechanical zero pulse width [1]		
Supply voltage	7 V ... 30 V	4.5 V ... 32 V		
Power consumption	0.5 W	0.7 W		
MTTFd: mean time to dangerous failure	600 years [2] [3]	300 years [2] [3]		

[1] Valid positional data can be measured once this time has elapsed.

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

[3] This value relates to the connected encoder only.

Mechanical data

	PFG05 0 m ... 1.25 m	PFG08 0 m ... 3 m	PFG13 0 m ... 5 m	PFG19 0 m ... 10 m
Mass (incl. encoder)	230 g	550 g	1.1 kg	2.2 kg
Mass (mechanism)	80 g	250 g	800 g	1.9 kg
Measuring wire material	Highly flexible steel wire, 1.4401 stainless steel V4A / PA12, sheathed	Highly flexible steel wire, 1.4401 stainless steel V4A		
Mass (measuring wire)	0.58 g/m	1.2 g/m		
Material, wire draw mechanism housing	Plastic, Noryl			
Wire draw lengths per revolution	150 mm	230 mm	385 mm	555 mm
Spring return force	1 N ... 1.4 N [1]	5 N ... 6.3 N [1]	4.5 N ... 7 N [1]	9 N ... 12 N [1]
Service life of wire draw mechanism	1 mio. cycles [2]			
Actual wire draw length	1.45 m	3.2 m	5.2 m	10.2 m
Measuring wire diameter	0.45 mm	0.55 mm		
Wire acceleration	10 m/s²		4 m/s²	8 m/s²
Traversing speed	4 m/s			
Integrated encoder	DBS36 Core	DFS60		
Pulses per revolution				
Programmable	–	65,536		
Non-programmable	2,500	16,384		
Article number encoder				
TTL/RS422	1064245	1037566 1037565		
HTL/Push Pull	1064246	1037616 1037615		
TTL/HTL programmable	–	1036761 1036760		
Integrated mechanics	MRA-G055-101D4	MRA-G080-103D3	MRA-G130-105D3	MRA-G190-110D3
Article number mechanics	5324019	5322778	5322779	5326242

[1] These values were measured at an ambient temperature of 25 °C. There may be variations at other temperatures.

[2] A cycle is made up of a wire intake and outake.

Ambient data

	PFG05 0 m ... 1.25 m	PFG08 0 m ... 3 m	PFG13 0 m ... 5 m	PFG19 0 m ... 10 m
EMC	According to EN 61000-6-2 and EN 61000-6-3 (class A)	According to EN 61000-6-2 and EN 61000-6-3		
Enclosure rating (encoder)	IP 65	IP 67		
Enclosure rating (mechanism)	IP 50			
Resistance to shocks (as per EN 60068-2-27)	100 g, 6 ms	60 g, 6 ms		
Resistance to vibration (according to EN 60068-2-6)	20 g, 10 Hz ... 2,000 Hz			
Operating temperature range (encoder)				
TTL/RS422	–20 °C ... +85 °C	–40 °C ... +100 °C		
HTL/Push Pull	–20 °C ... +85 °C	–40 °C ... +100 °C		
TTL/HTL programmable	–	–40 °C ... +100 °C		
Operating temperature range (mechanical)	–30 °C ... +70 °C			
Operating temperature range (combination)				
TTL/RS422	–20 °C ... +70 °C	–30 °C ... +70 °C		
HTL/Push Pull	–20 °C ... +70 °C	–30 °C ... +70 °C		
TTL/HTL programmable	–	–30 °C ... +70 °C		
Relative humidity/condensation	90% [1]			

[1] Condensation of optical surfaces not permitted.

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Type code

EcoLine absolute

Size

0	5	55 mm (only in combination with measuring length 01)
0	8	80 mm (only in combination with measuring length 03)
1	3	130 mm (only in combination with measuring length 05)
1	9	190 mm (only in combination with measuring length 10)

Electrical interface

A	SSI
C	CANopen [1]
D	DeviceNet [1]
E	EtherCAT®
H	HIPERFACE® (on request)
K	SSI + SinCos (on request)
L	SSI + incremental HTL (on request)
I	EtherNet/IP
N	PROFINET
P	PROFIBUS
R	SSI + incrementally programmable (on request)
S	SSI + SinCos programmable (on request)
T	SSI + incremental TTL (on request)

Connection type

A	M23 male connector, 12-pin, radial (only in combination with interface A and construction sizes 08, 13 and 19)
B	Male connector, 3 x M12, axial (only in combination with the electrical interfaces E, I, N, and P with axial outlet in construction sizes 08, 13 and 19)
C	M12 male connector, 8-pin, radial (only in combination with interface A and construction sizes 08, 13 and 19)
H	Male connector for fieldbus adapter (only in combination with the electrical interfaces C and D with radial outlet in construction sizes 08, 13 and 19) [1]
K	Cable, 8-wire, universal, 1.5 m (on request)
L	Cable, 8-wire, universal, 3.0 m (on request)
M	Cable, 8-wire, universal, 5.0 m (on request)
N	Male connector, 1 x M12, 8-pin, universal (only in combination with interface A)
Q	Male connector, 1 x M12, 5-pin, universal (only in combination with interface C)

Measuring length

0	1	1.25 meter
0	3	3 meter
0	5	5 meter
1	0	10 meter

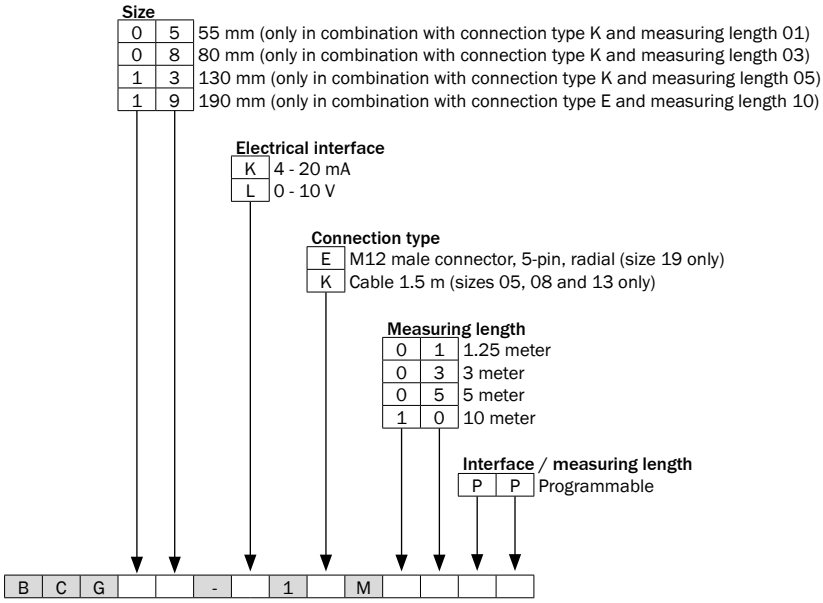
Resolution coefficient

5	5	A = SSI single-turn resolution, 8,192 steps/measuring length 1.25 m
1	8	A = SSI single-turn resolution 4,096 steps/measuring length 3 m
3	6	A = SSI single-turn resolution, 8,192 steps/measuring length 3 m
1	1	A = SSI single-turn resolution 4,096 steps/measuring length 5 m
2	1	A = SSI single-turn resolution, 8,192 steps/measuring length 5 m
0	7	A = SSI single-turn resolution 4,096 steps/measuring length 10 m
1	5	A = SSI single-turn resolution, 8,192 steps/measuring length 10 m
3	6	C = CANopen with connection type H; D = DeviceNet; P = PROFINET / measuring length 3 m
2	1	C = CANopen with connection type H; D = DeviceNet; P = PROFINET / measuring length 5 m
1	5	C = CANopen with connection type H; D = DeviceNet; P = PROFINET / measuring length 10 m
9	9	C = CANopen with connection type Q / measuring length 1.25 m
7	1	C = CANopen with connection type Q / measuring length 3 m
4	3	C = CANopen with connection type Q / measuring length 5 m
2	9	C = CANopen with connection type Q / measuring length 10 m
9	9	I = EtherNet/IP; E = EtherCAT®; N = PROFINET / measuring length 3 m
9	9	I = EtherNet/IP; E = EtherCAT®; N = PROFINET / measuring length 5 m
9	9	I = EtherNet/IP; E = EtherCAT®; N = PROFINET / measuring length 10 m

B	C	G			-		1		M					

[1] Please order fieldbus adapter for CANopen and DeviceNet with radial outlet separately.

EcoLine analog



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Ordering information

Measuring range	Electrical interface	Connection type	Type	Part no.
0 m - 1,25 m	4 mA ... 20 mA, analog	Cable, 3-wire, radial, 1.5 m	BCG05-K1KM01PP	6039745
	0 V to 10 V analog		BCG05-L1KM01PP	6039746
	SSI	Male connector, 1 x M12, 8-pin, universal	BCG05-A1NM0155	1068864
	CANopen	Male connector, 1 x M12, 5-pin, universal [2]	BCG05-C1QM0199	1068865
0 m ... 3 m	4 mA ... 20 mA, analog	Cable, 3-wire, radial, 1.5 m	BCG08-K1KM03PP	6039747
	0 V to 10 V analog		BCG08-L1KM03PP	6039748
	SSI	M12 male connector, 8-pin, radial	BCG08-A1CM0318	1054129
			BCG08-A1CM0336	1054131
		M23 male connector, 12-pin, radial	BCG08-A1AM0318	1061025
		Male connector, 1 x M12, 8-pin, universal	BCG08-A1NM0336	1068866
	CANopen	Male connector, 1 x M12, 5-pin, universal [2]	BCG08-C1QM0371	1068867
		Bus adapter with cable screw fixings or round connectors [1]	BCG08-C1HM0336	1061026
	DeviceNet	Bus adapter with cable screw fixings or round connectors [1]	BCG08-D1HM0336	1061027
	PROFIBUS	3 x M12 male connectors, 5-pin, axial	BCG08-P1BM0336	1052618
	PROFINET	3 x M12 male connectors, 4-pin, axial	BCG08-N1BM0399	1061028
	EtherNet/IP		BCG08-I1BM0399	1061029
	EtherCAT®		BCG08-E1BM0399	1061030
0 m ... 5 m	4 mA ... 20 mA, analog	Cable, 3-wire, radial, 1.5 m	BCG13-K1KM05PP	6039749
	0 V to 10 V analog		BCG13-L1KM05PP	6039750
	SSI	M12 male connector, 8-pin, radial	BCG13-A1CM0511	1061031
			BCG13-A1CM0521	1061032
		M23 male connector, 12-pin, radial	BCG13-A1AM0511	1061033
		Male connector, 1 x M12, 8-pin, universal	BCG13-A1NM0521	1068868
	CANopen	Male connector, 1 x M12, 5-pin, universal [2]	BCG13-C1QM0543	1068869
		Bus adapter with cable screw fixings or round connectors [1]	BCG13-C1HM0521	1061034
	DeviceNet	Bus adapter with cable screw fixings or round connectors [1]	BCG13-D1HM0521	1061035
	PROFIBUS	3 x M12 male connectors, 5-pin, axial	BCG13-P1BM0521	1052619
	PROFINET	3 x M12 male connectors, 4-pin, axial	BCG13-N1BM0599	1061036
	EtherNet/IP		BCG13-I1BM0599	1061037
	EtherCAT®		BCG13-E1BM0599	1061038

[1] Order adapter separately.

[2] Only in conjunction with AHM36 CANopen.

Measuring range	Electrical interface	Connection type	Type	Part no.
0 m ... 10 m	4 mA ... 20 mA, analog	1 x M12 male connector, 5-pin, radial	BCG19-K1EM10PP	6048294
	0 V to 10 V analog		BCG19-L1EM10PP	6048295
	SSI	M12 male connector, 8-pin, radial	BCG19-A1CM1007	1061039
			BCG19-A1CM1015	1061040
		Male connector, 1 x M12, 8-pin, universal	BCG19-A1NM1015	1068870
	CANopen	Male connector, 1 x M12, 5-pin, universal [2]	BCG19-C1QM1029	1068871
		Bus adapter with cable screw fixings or round connectors [1]	BCG19-C1HM1015	1061041
	DeviceNet	Bus adapter with cable screw fixings or round connectors [1]	BCG19-D1HM1015	1061042
	PROFIBUS	3 x M12 male connectors, 5-pin, axial	BCG19-P1BM1015	1052620
	PROFINET	3 x M12 male connectors, 4-pin, axial	BCG19-N1BM1099	1061043
	EtherNet/IP		BCG19-I1BM1099	1061044
	EtherCAT®		BCG19-E1BM1099	1061045

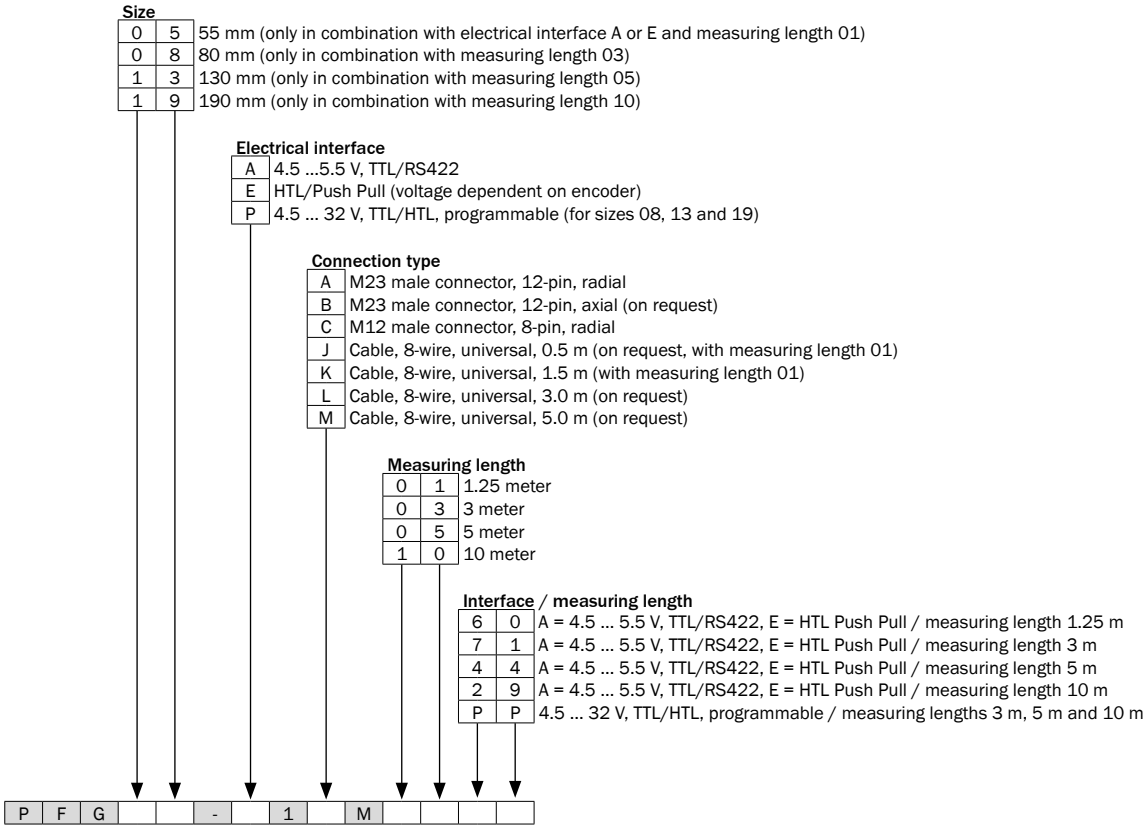
[1] Order adapter separately.

[2] Only in conjunction with AHM36 CANopen.

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EcoLine incremental

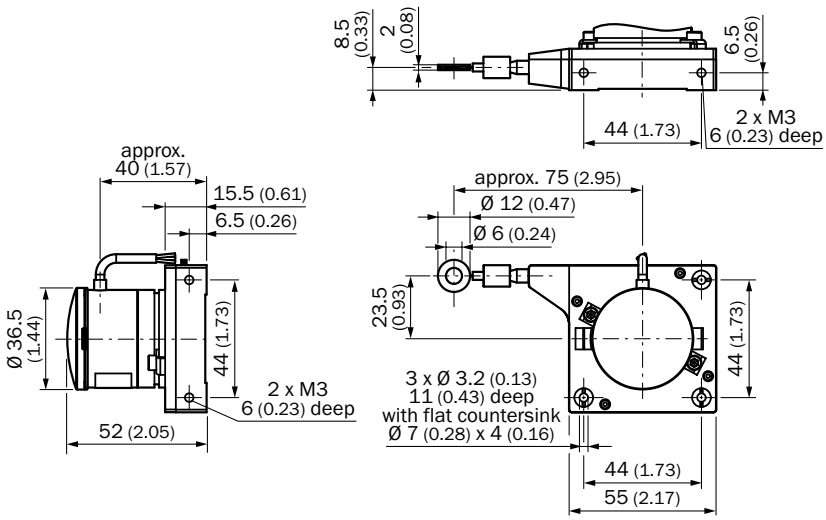


Measuring range	Electrical interface	Connection type	Type	Part no.
0 m ... 1,25 m	4.5 V ...5.5 V, TTL/RS422	Cable, 8-wire, universal, 1.5 m	PFG05-A1KM0160	1060972
	HTL/Push Pull		PFG05-E1KM0160	1060971
0 m ... 3 m	4.5 V ...5.5 V, TTL/RS422	M12 male connector, 8-pin, radial	PFG08-A1CM0371	1060974
		M23 male connector, 12-pin, radial	PFG08-A1AM0371	1060977
	HTL/Push Pull	M12 male connector, 8-pin, radial	PFG08-E1CM0371	1060979
		M23 male connector, 12-pin, radial	PFG08-E1AM0371	1060981
	TTL/HTL, programmable	M12 male connector, 8-pin, radial	PFG08-P1CM03PP	1060984
		M23 male connector, 12-pin, radial	PFG08-P1AM03PP	1075495
0 m ... 5 m	4.5 V ...5.5 V, TTL/RS422	M12 male connector, 8-pin, radial	PFG13-A1CM0544	1061015
		M23 male connector, 12-pin, radial	PFG13-A1AM0544	1061016
	HTL/Push Pull	M12 male connector, 8-pin, radial	PFG13-E1CM0544	1061017
		M23 male connector, 12-pin, radial	PFG13-E1AM0544	1061018
	TTL/HTL, programmable	M12 male connector, 8-pin, radial	PFG13-P1CM05PP	1061019
		M23 male connector, 12-pin, radial	PFG13-P1AM05PP	1075498

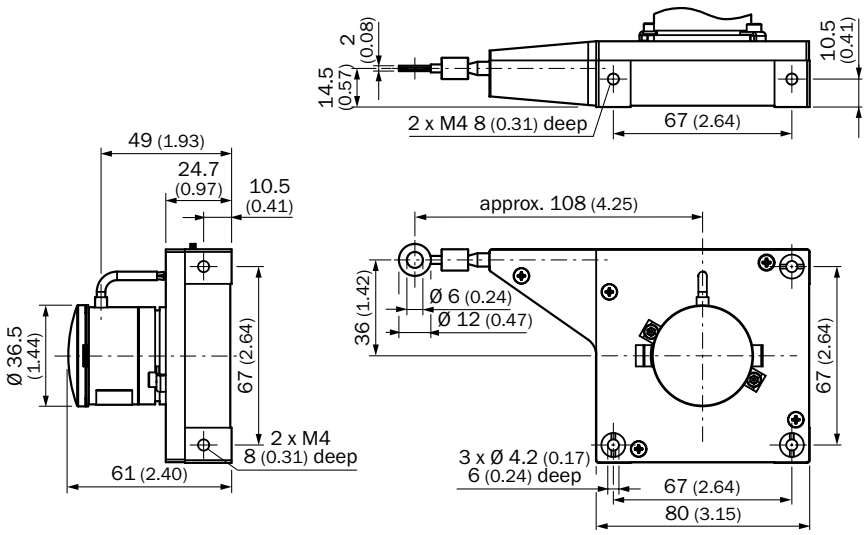
Measuring range	Electrical interface	Connection type	Type	Part no.
0 m ... 10 m	4.5 V ...5.5 V, TTL/RS422	M12 male connector, 8-pin, radial	PFG19-A1CM1029	1061020
		M23 male connector, 12-pin, radial	PFG19-A1AM1029	1061021
	HTL/Push Pull	M12 male connector, 8-pin, radial	PFG19-E1CM1029	1061022
		M23 male connector, 12-pin, radial	PFG19-E1AM1029	1061023
	TTL/HTL, programmable	M12 male connector, 8-pin, radial	PFG19-P1CM10PP	1061024
		M23 male connector, 12-pin, radial	PFG19-P1AM10PP	1075581

Dimensional drawings (dimensions in mm)

BCG05 Analog



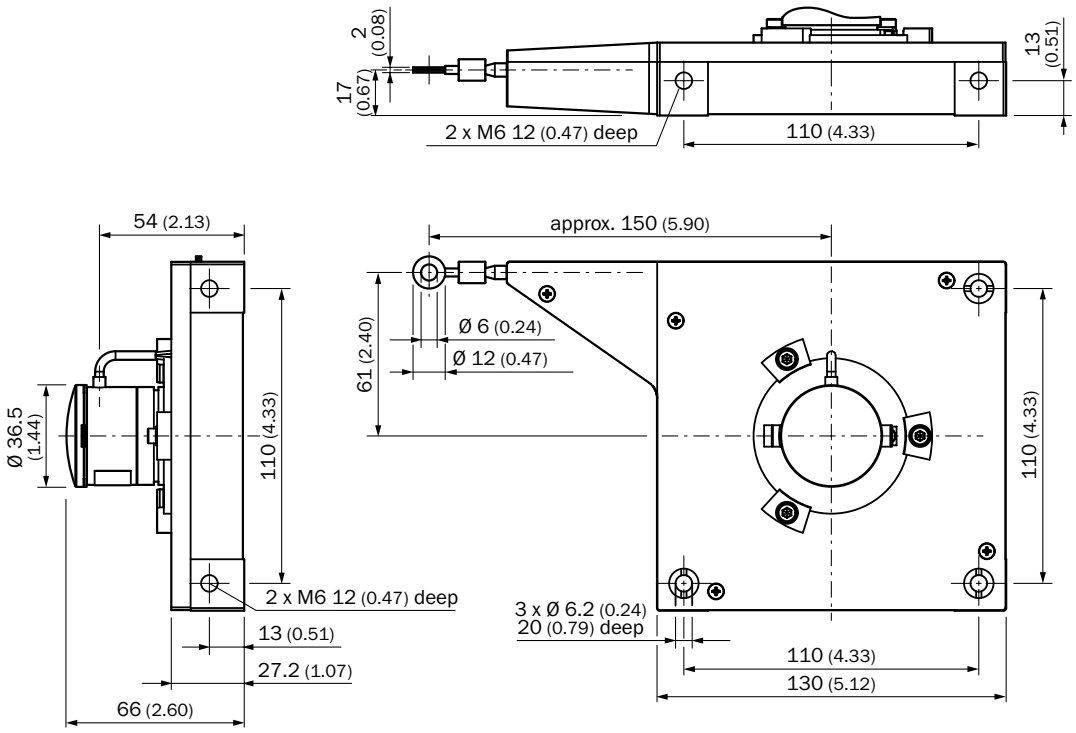
BCG08 Analog



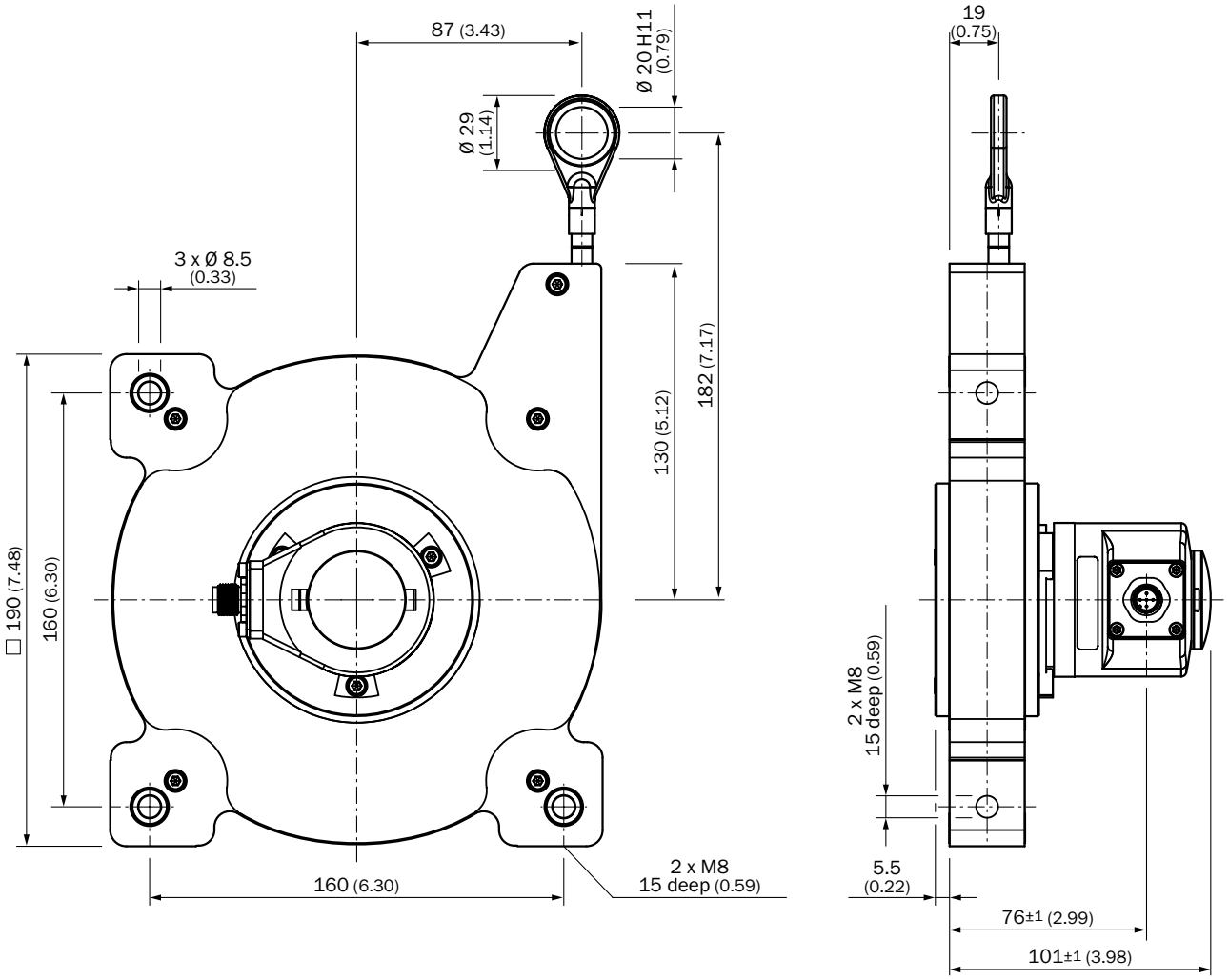
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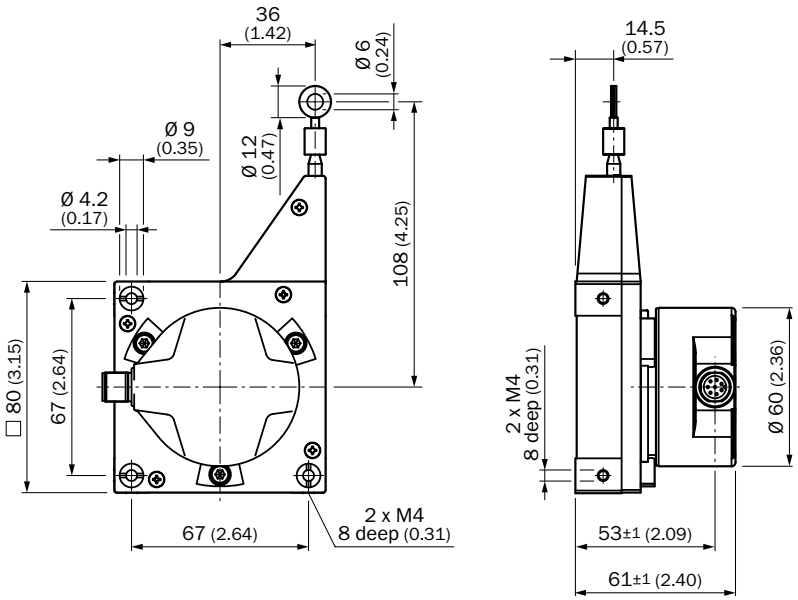
BCG13 Analog



BCG19 Analog (M12 male connector outlet)

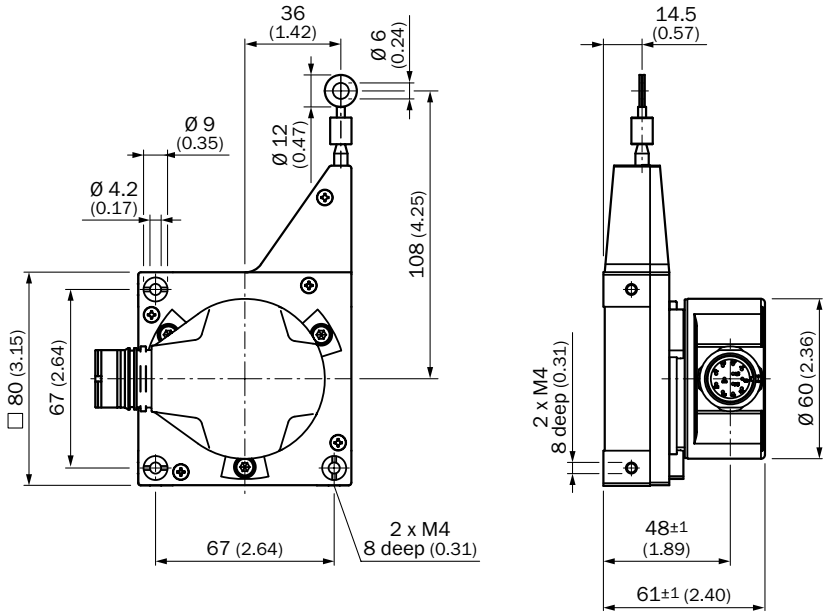


BCG08 SSI (M12 male connector outlet)

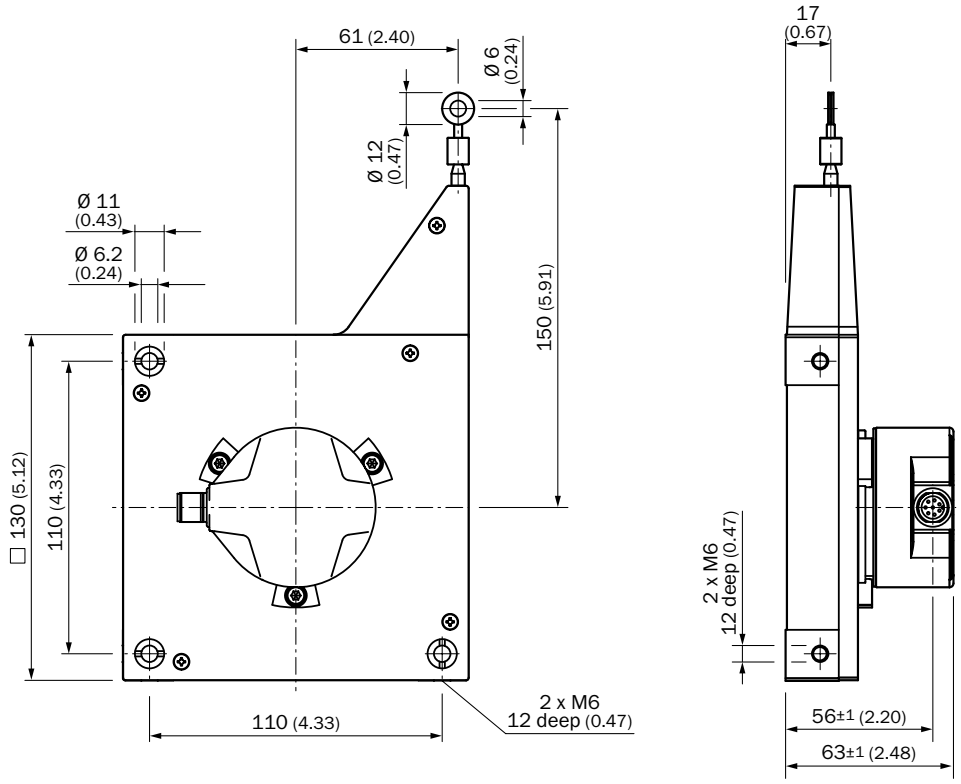


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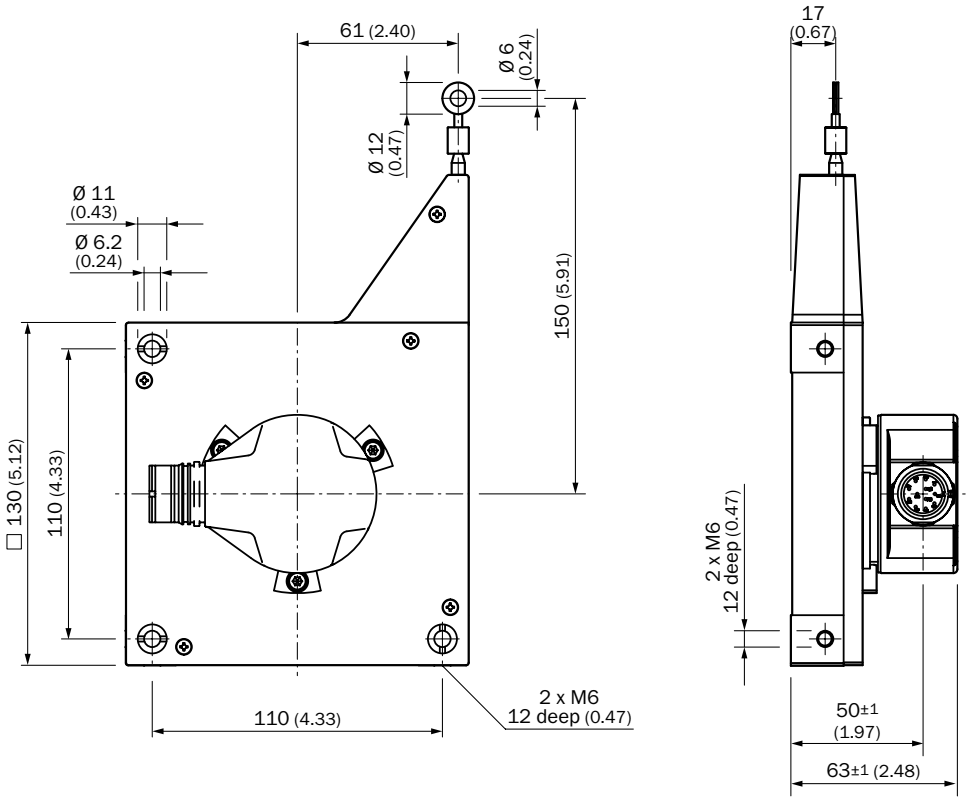
BCG08 SSI (M23 male connector outlet)



BCG13 SSI (M12 male connector outlet)

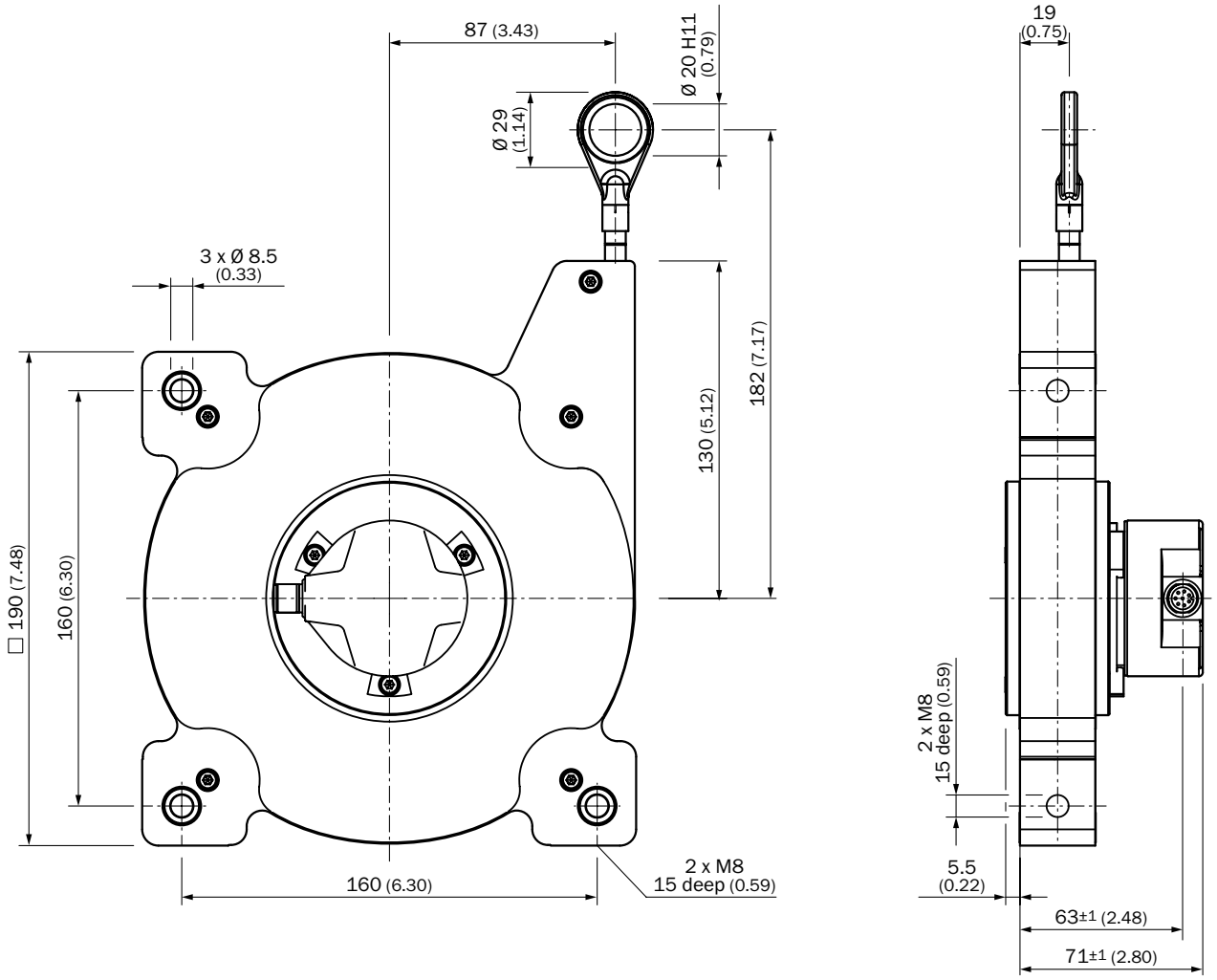


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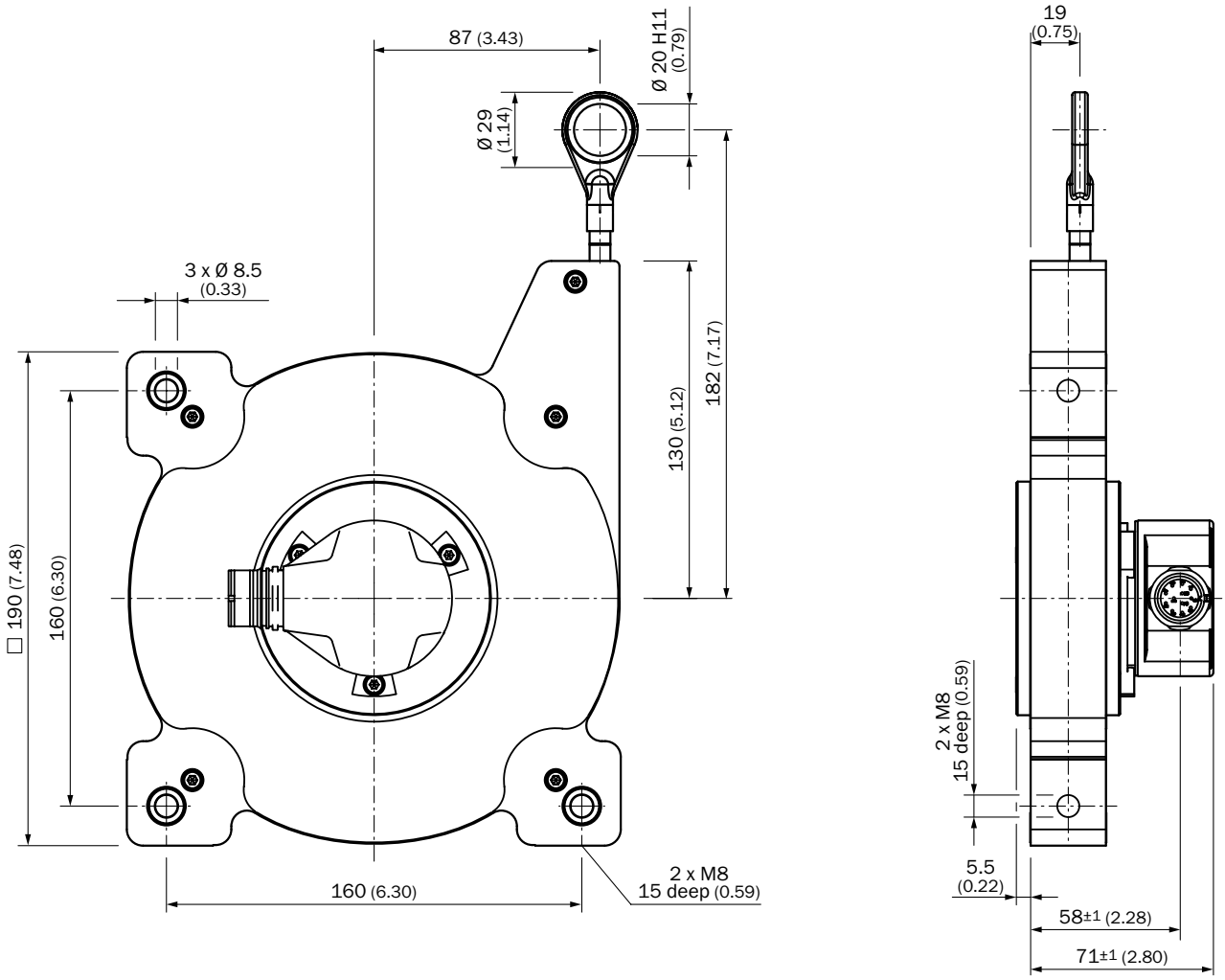


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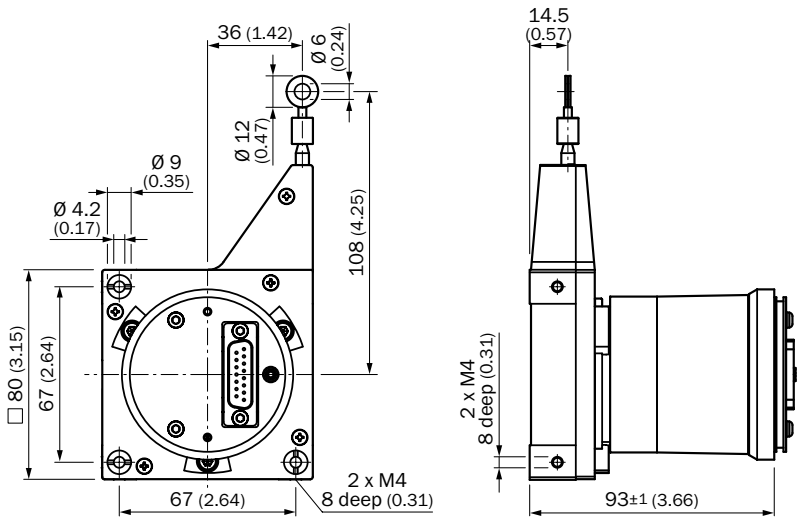
BCG19 SSI (M12 male connector outlet)



BCG19 SSI (M23 male connector outlet)

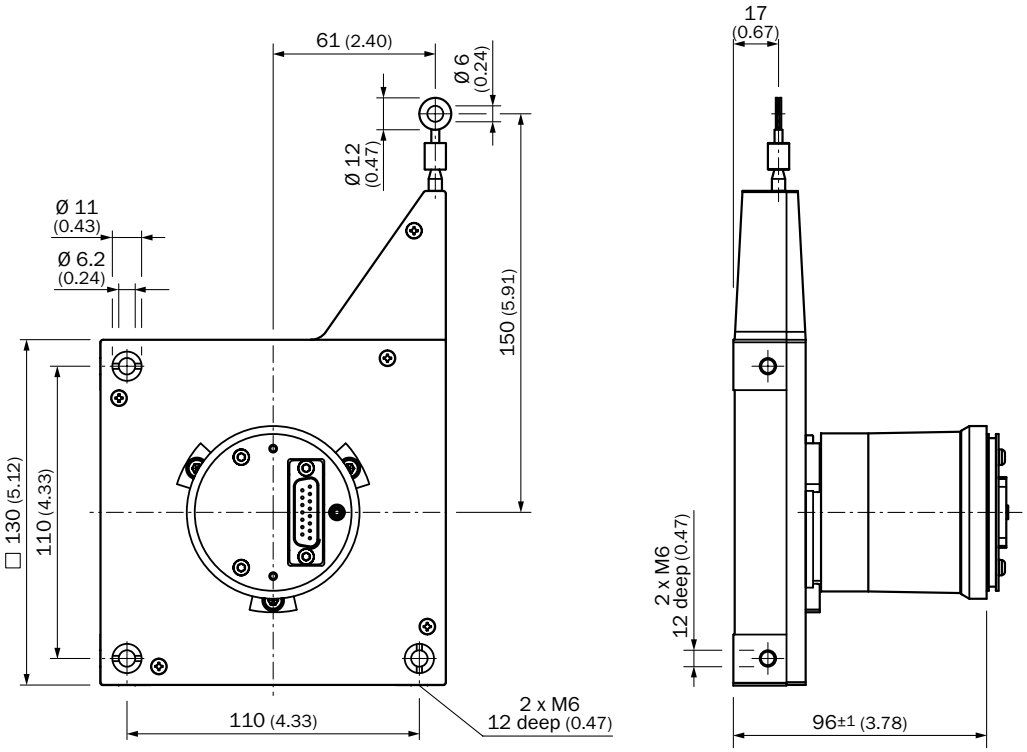


BCG08 CANopen, DeviceNet

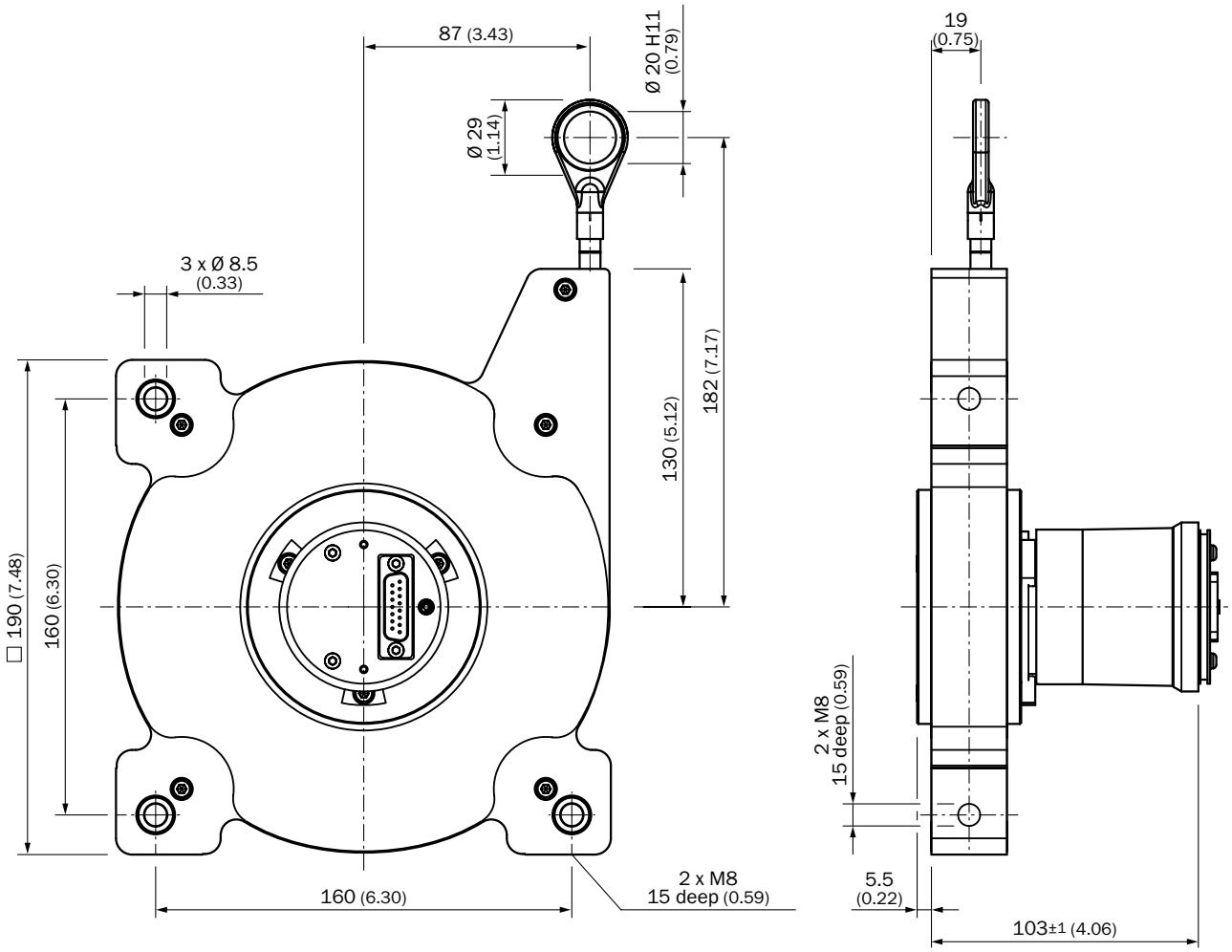


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BCG13 CANopen, DeviceNet

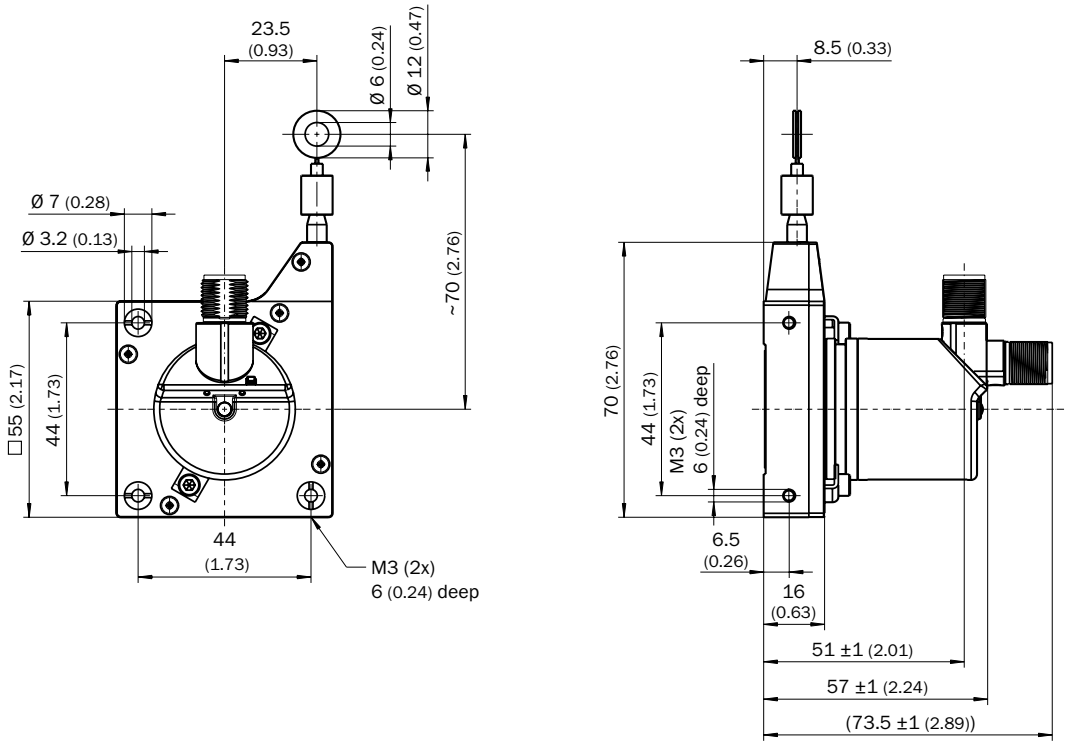


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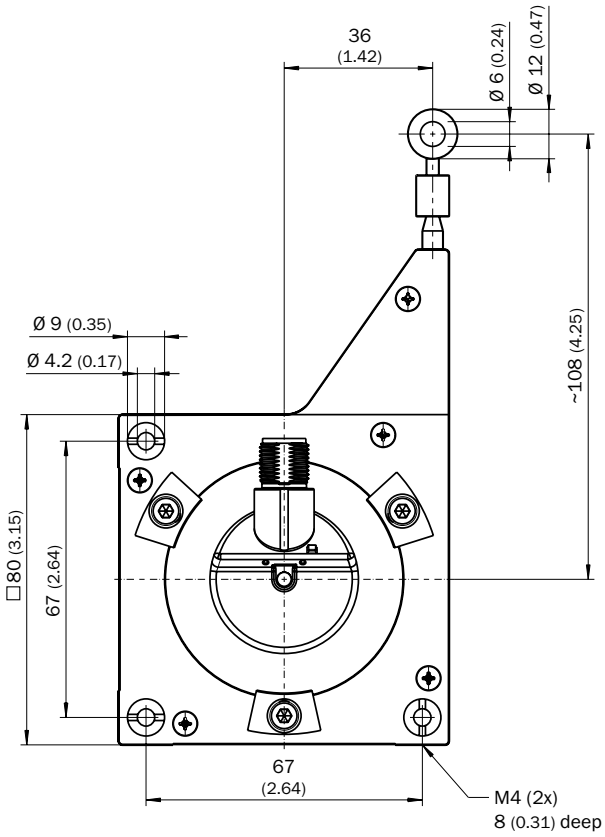


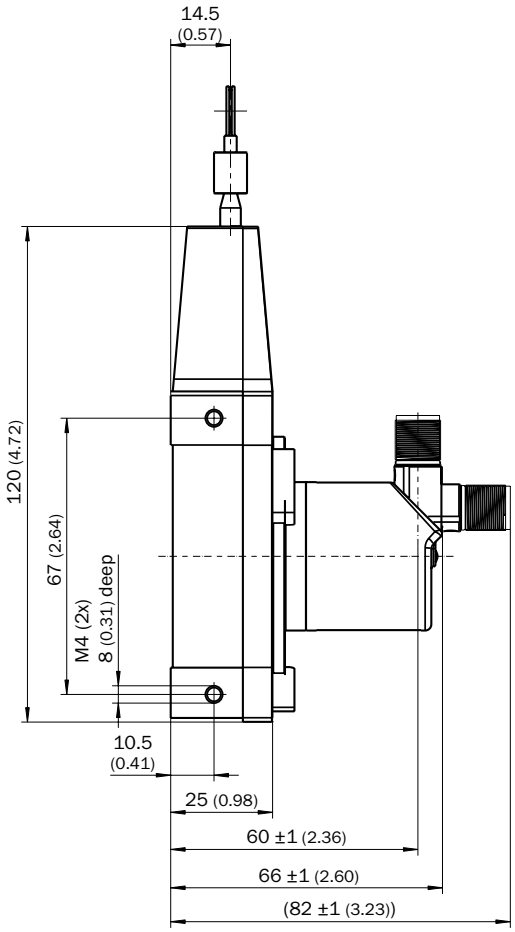
8015560/2015-09-01
Subject to change without notice

BCG05 SSI, CANopen



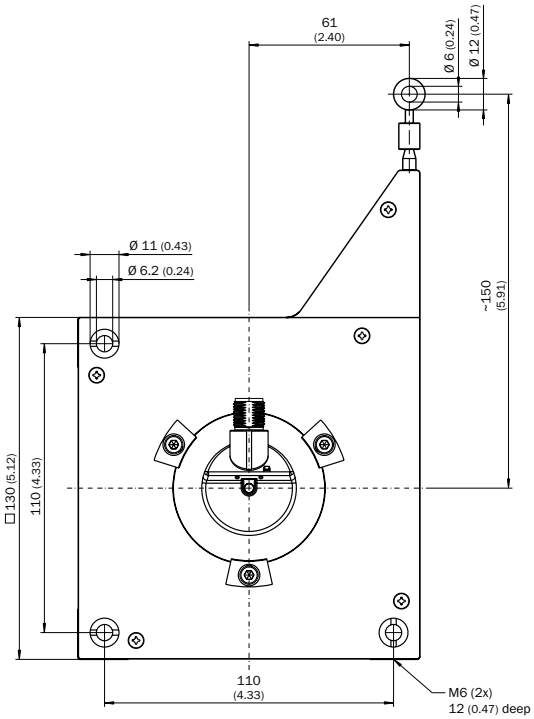
BCG08 SSI, CANopen

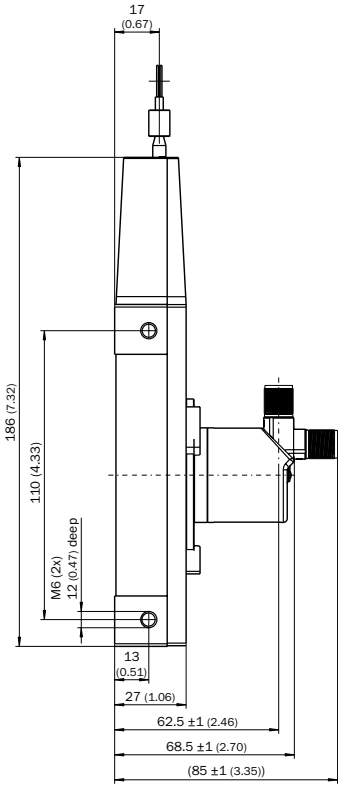




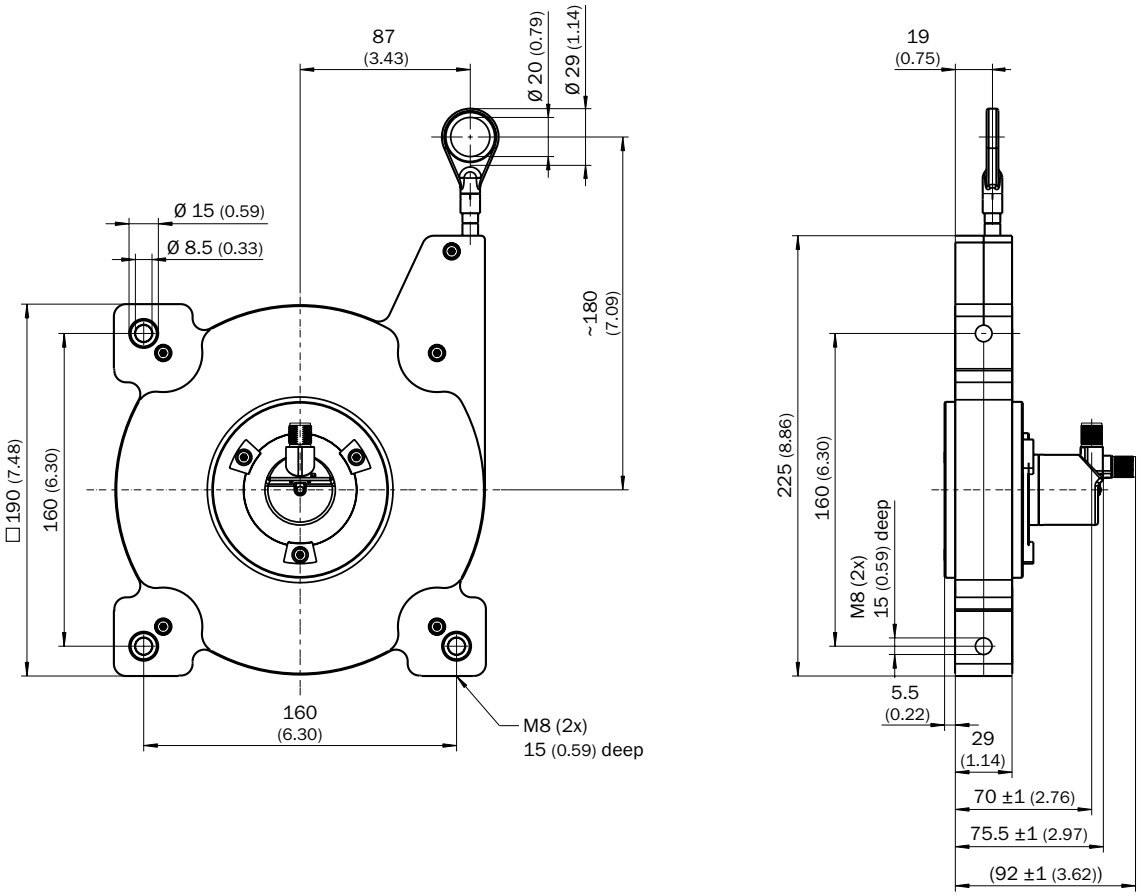
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Subject to change without notice

BCG13 SSI, CANopen

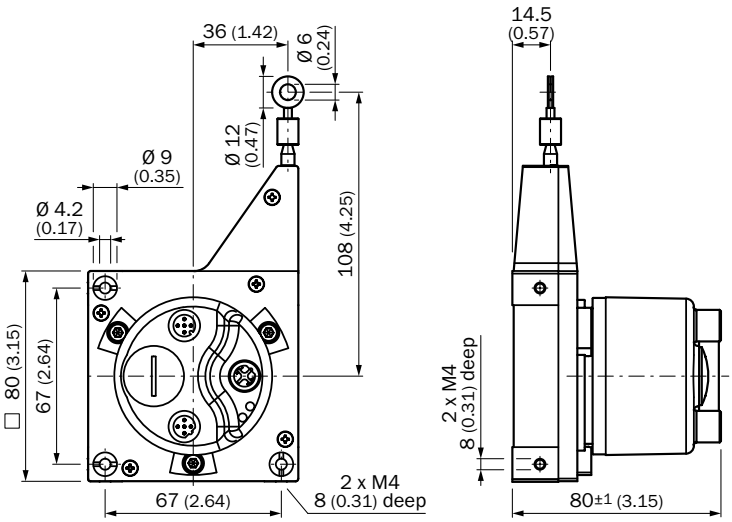




BCG19 SSI, CANopen

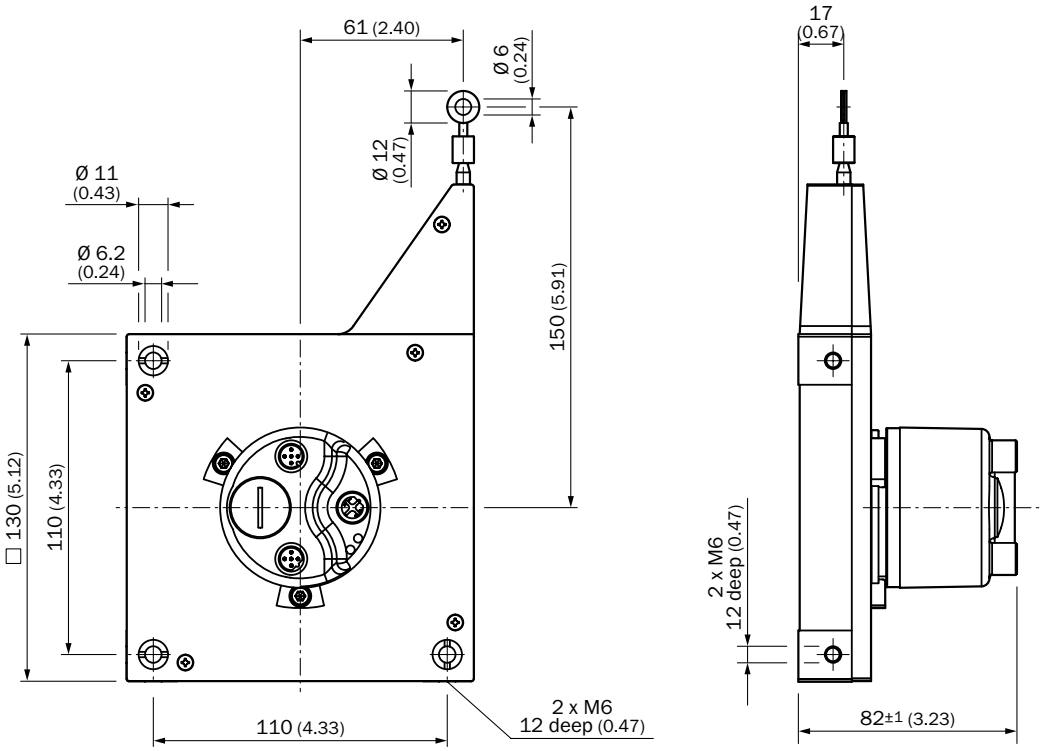


BCG08 PROFIBUS

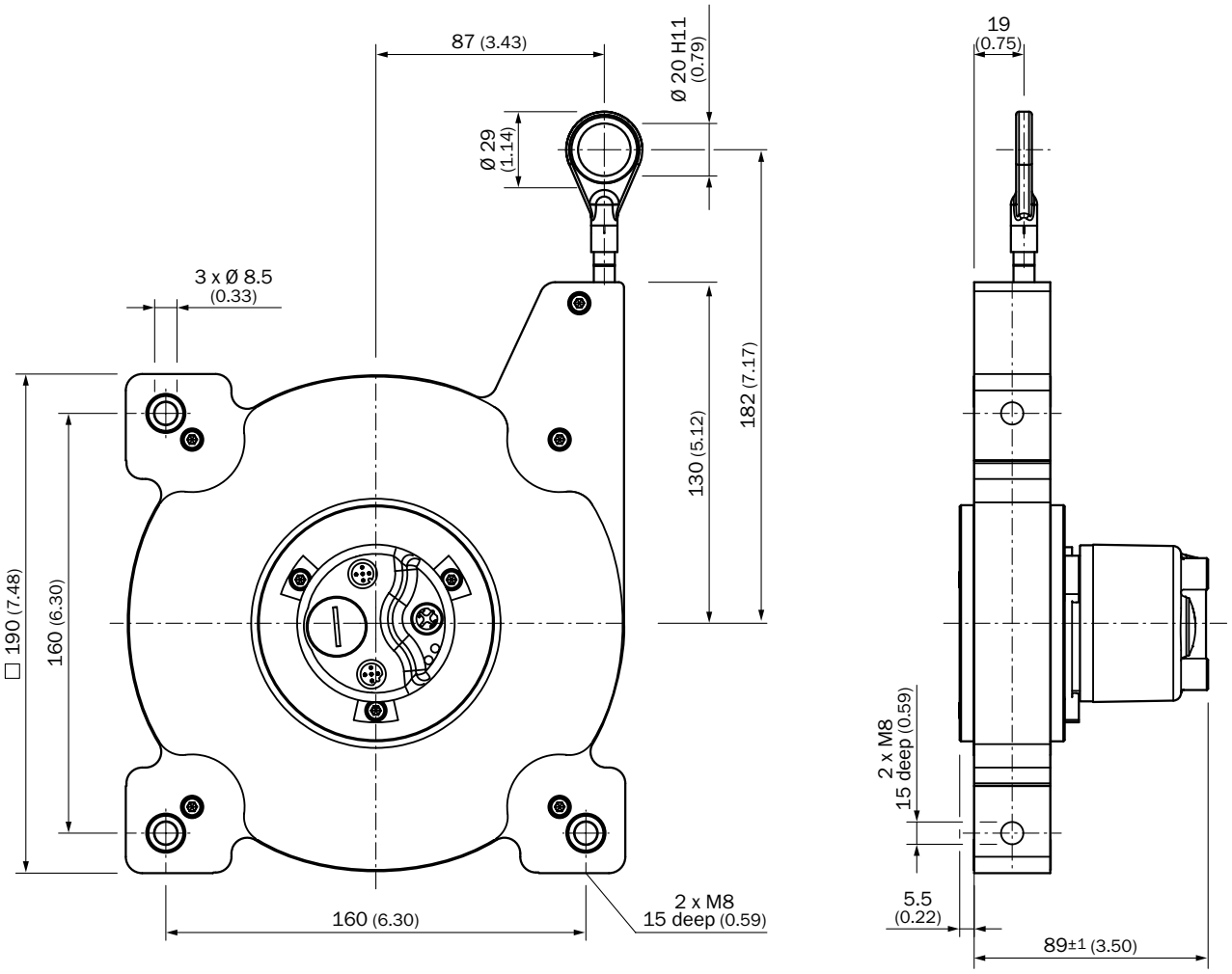


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Subject to change without notice

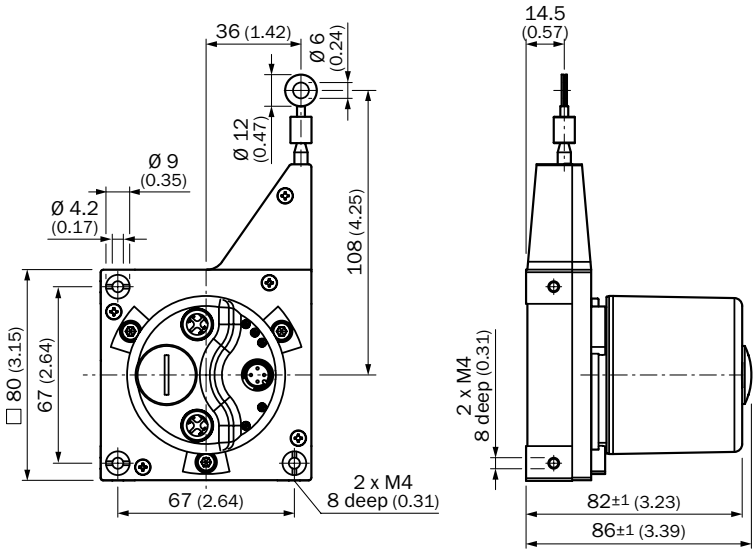
BCG013 PROFIBUS



BCG19 PROFIBUS

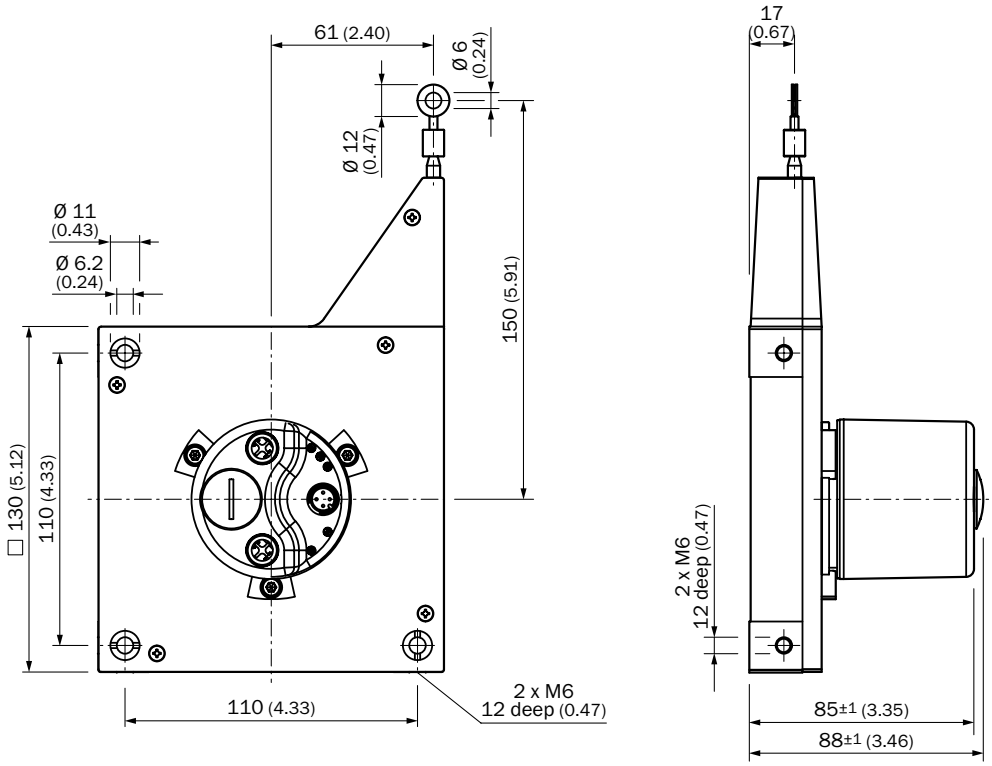


BCG08 EtherNet/IP, EtherCAT®, PROFINET

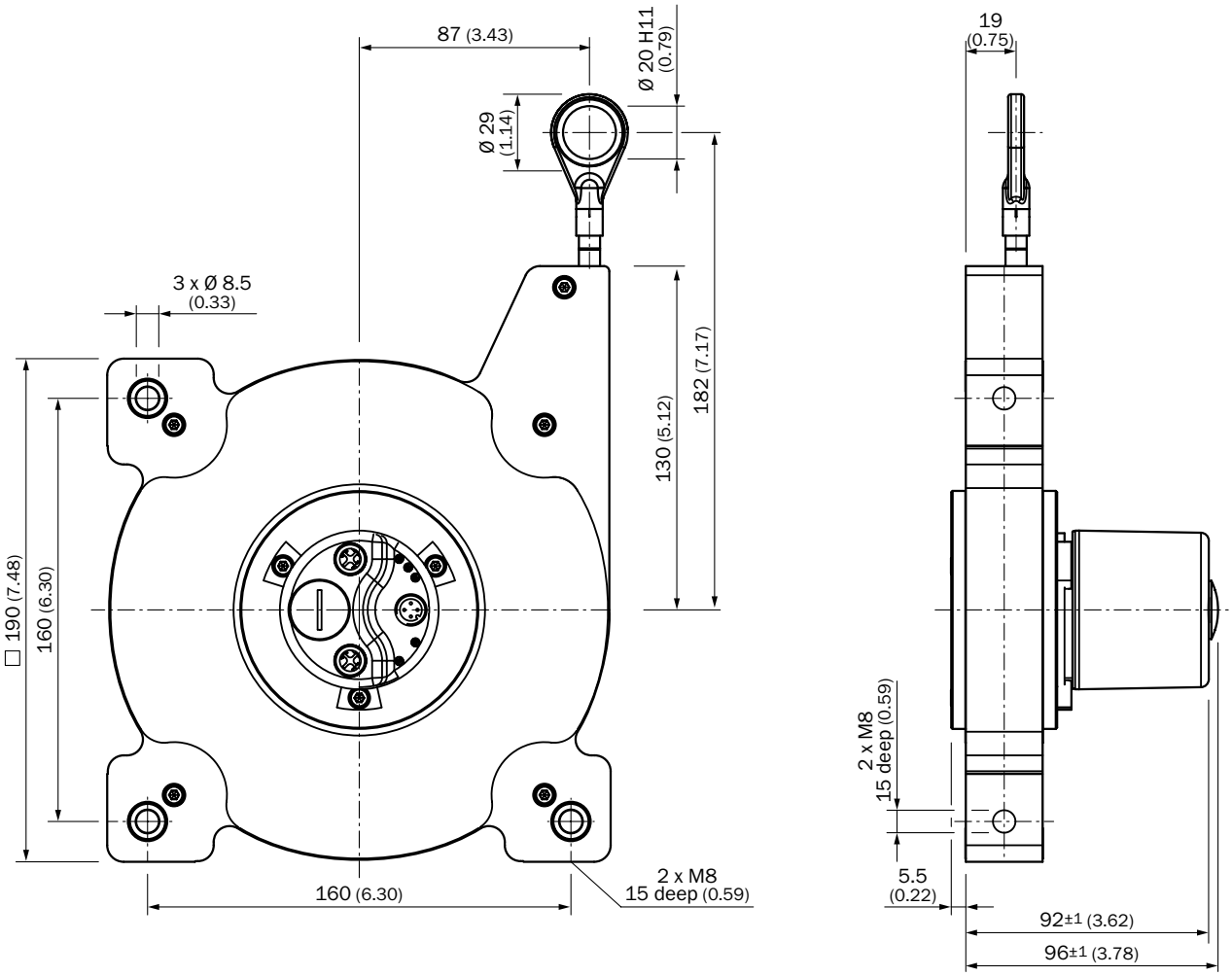


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Subject to change without notice

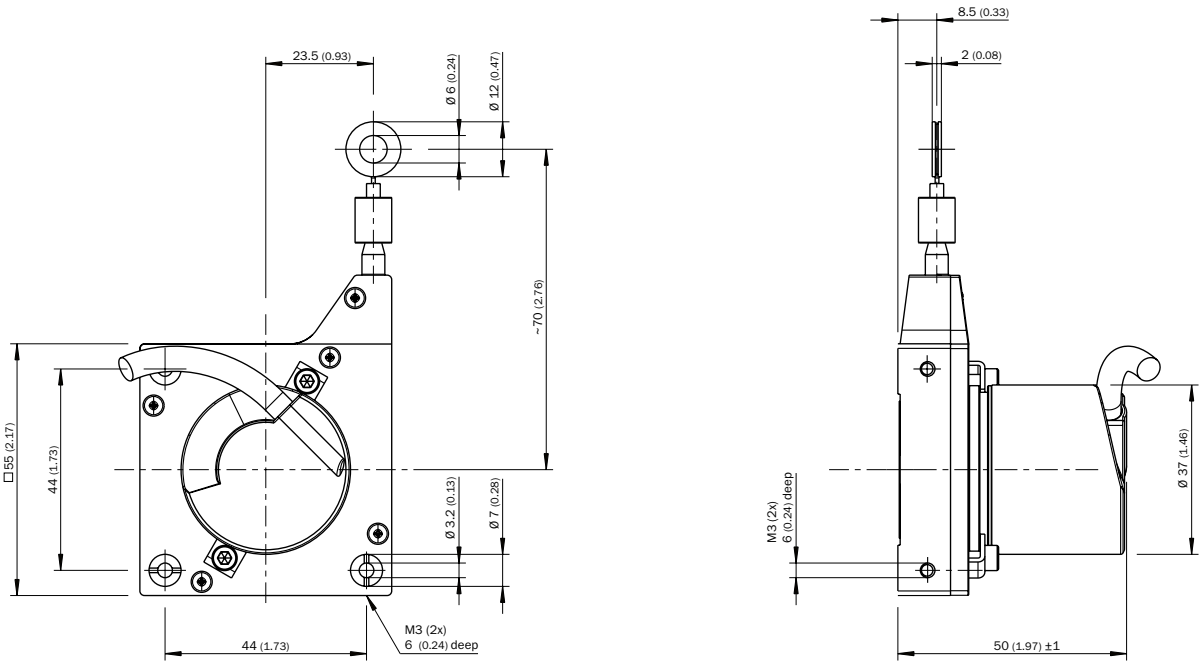
BCG13 EtherNet/IP, EtherCAT®, PROFINET



BCG19 EtherNet/IP, EtherCAT®, PROFINET

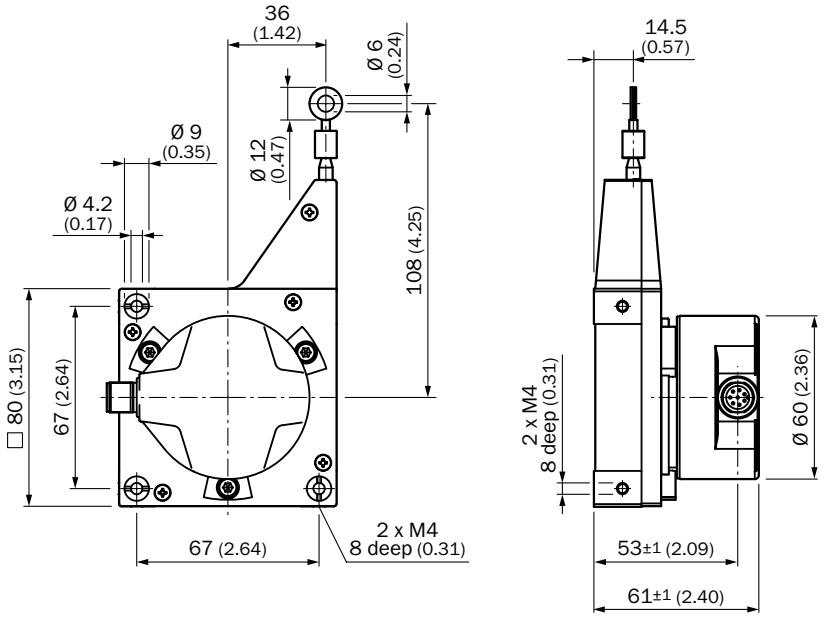


PFG05

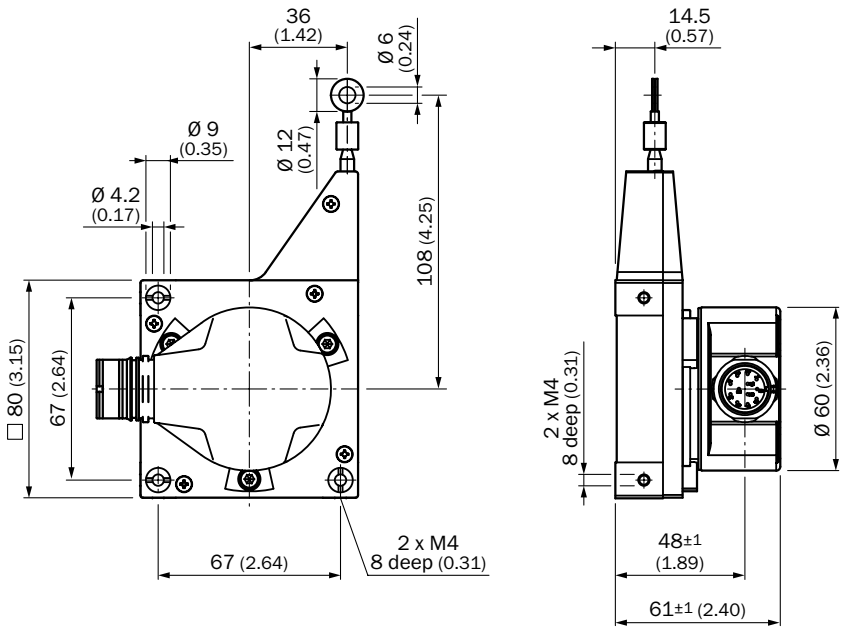


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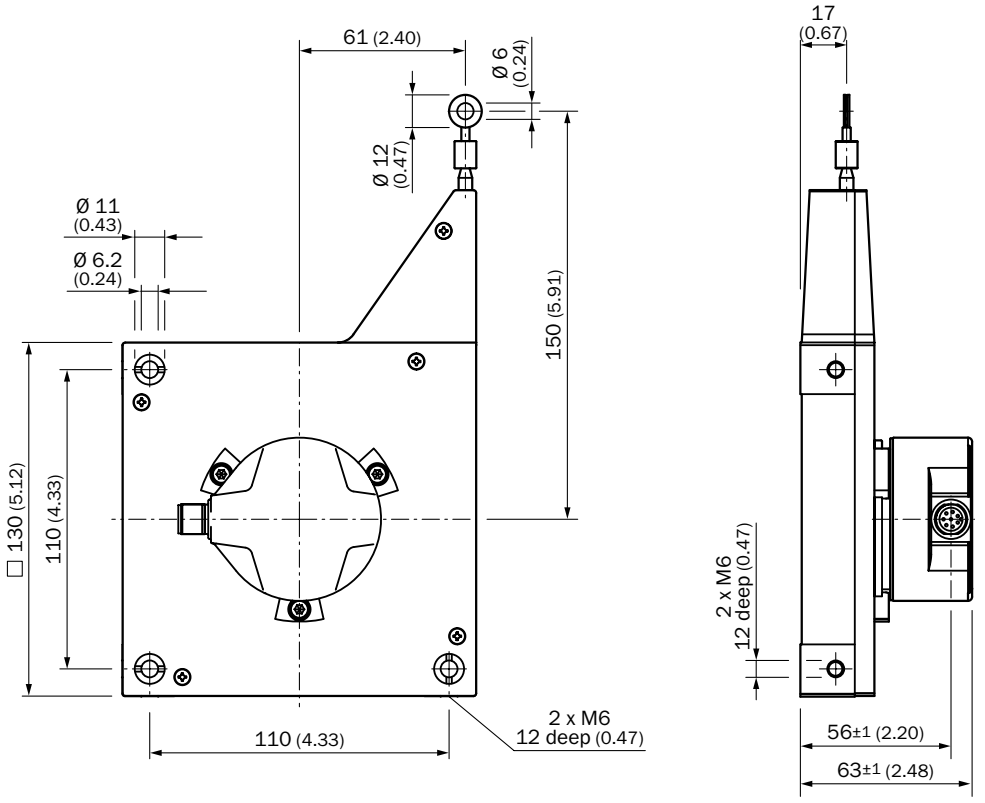
PFG08 (M12 male connector outlet)



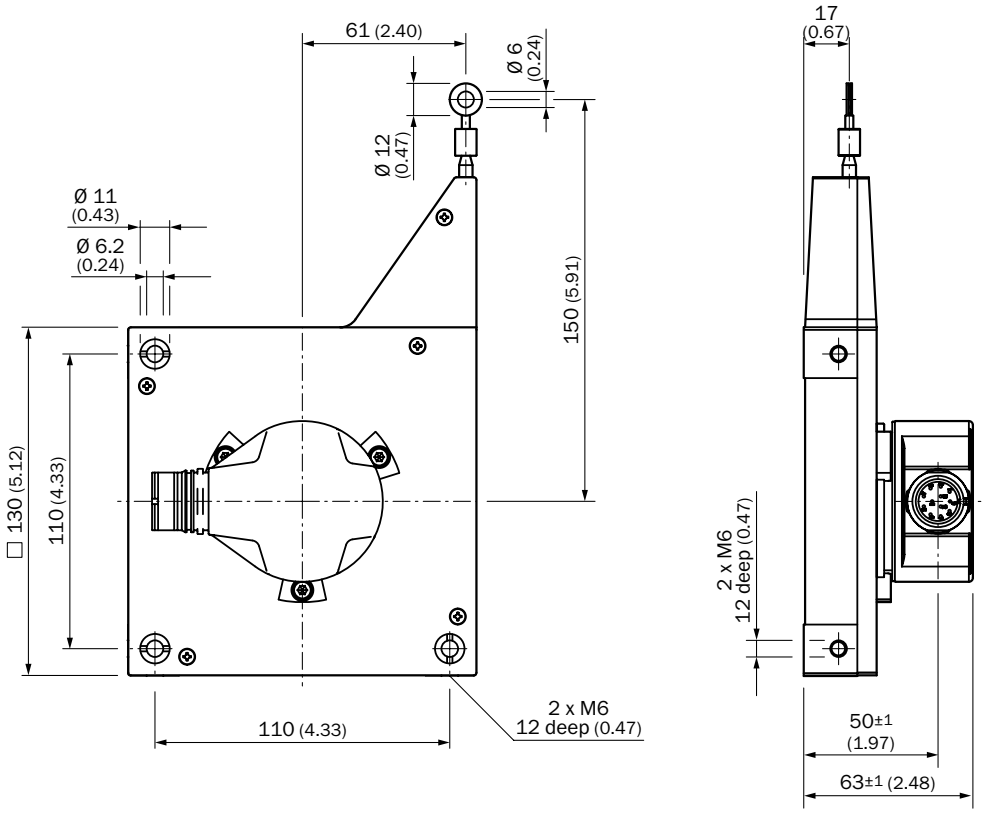
PFG08 (M23 male connector outlet)



PFG13 (M12 male connector outlet)

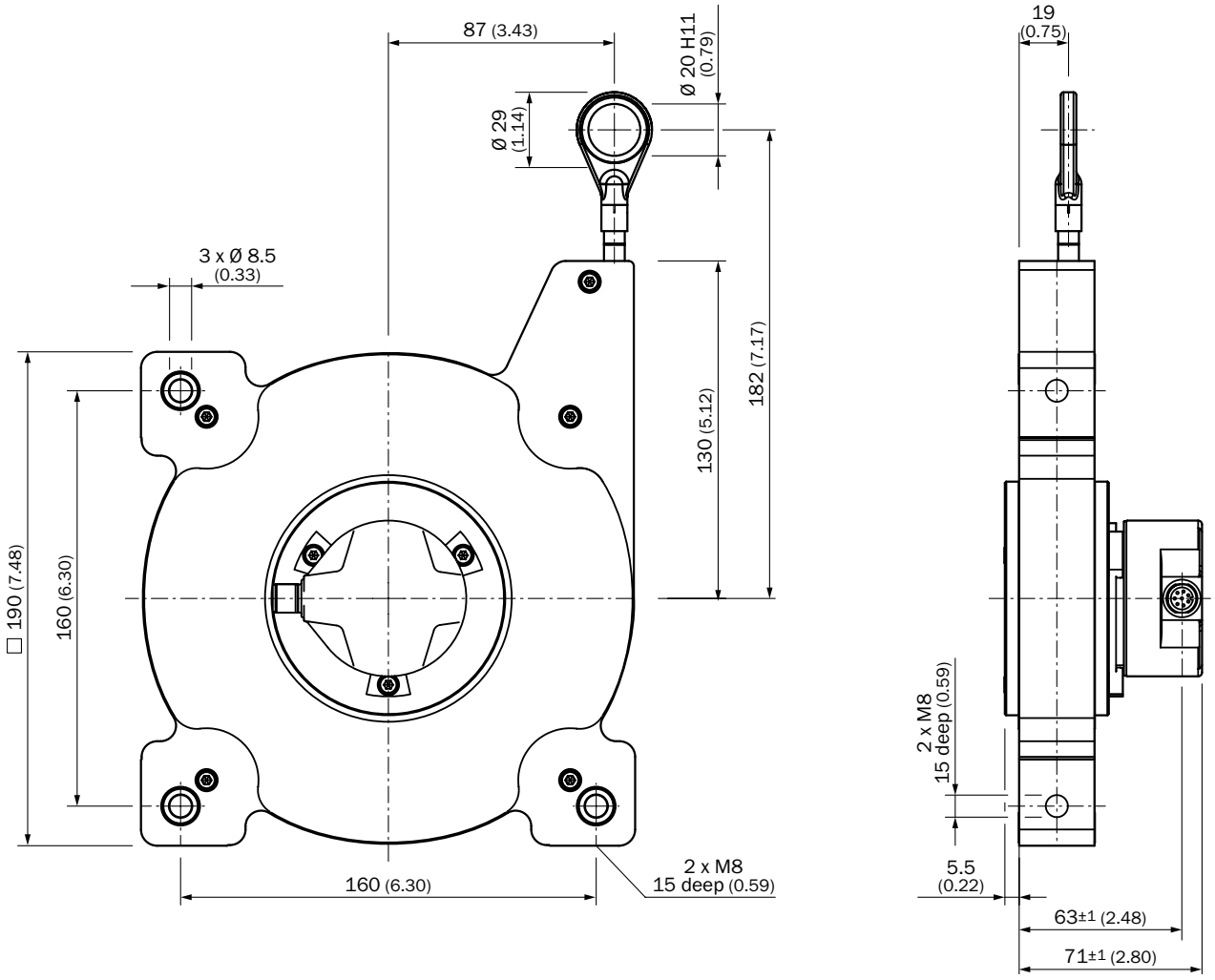


PFG13 (M23 male connector outlet)

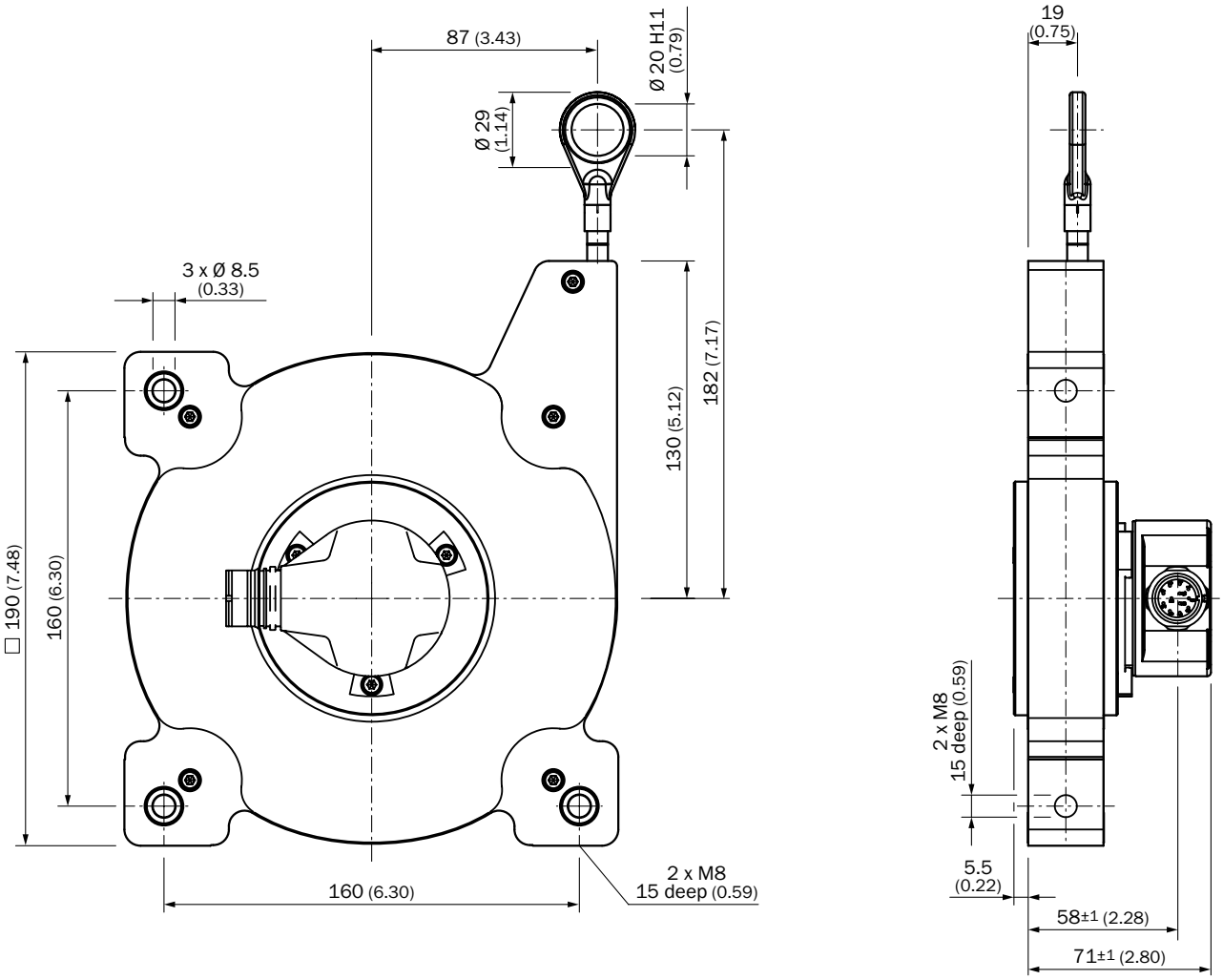


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PFG12 (M12 male connector outlet)



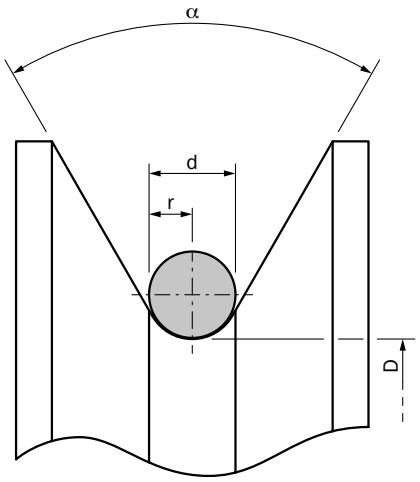
PFG08 (M23 male connector outlet)



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Deflection roller design

With the aid of deflection rollers, it is possible to guide the measuring wire of wire draw encoders over edges and around corners without significantly affecting the life time of the wire draw encoder. In this case, it must be considered that the designs of the deflection roller and of the measuring wire must be compatible in order to avoid damage to the system.



D = groove base diameter.
d = diameter of the wire incl. coating.
r = groove radius = 0.53 x d
a = groove opening angle = 60°

- The groove radius should not be too small – **recommendation: 0.53 x diameter of the wire cable**
- The groove opening angle should be neither too small nor too large – **recommendation: 60°**
- In order to ensure the longest possible system life, the deflection roller material should be neither too soft nor too hard – **recommended material: polyamide**
- The groove base diameter of the deflection roller should not be too small – **see table for recommendations**

EcoLine

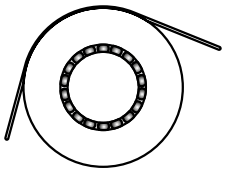
Length	Measuring wire, PA-sheathed	Diameter of the measuring wire	Structure of the measuring wire (strands x cords)	Min. groove base diameter
1.25 m	PA12	0.45 mm	7 x 7	25 mm
3 m	–	0.55 mm	1 x 19	40 mm
5 m	–	0.55 mm	1 x 19	40 mm
10 m	–	0.55 mm	1 x 19	40 mm

HighLine

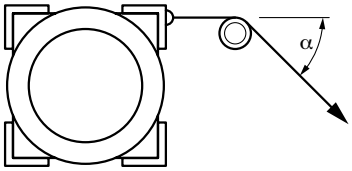
Length	Measuring wire, PA-sheathed	Diameter of the measuring wire	Structure of the measuring wire (strands x cords)	Min. groove base diameter
2 m	–	1.35 mm	7 x 19	35 mm
3 m	–	1.35 mm	7 x 19	35 mm
5 m	–	1.35 mm	7 x 19	35 mm
10 m	–	1.35 mm	7 x 19	35 mm
20 m		0.81 mm	7 x 7	35 mm
30 m		0.81 mm	7 x 7	35 mm
50 m		1.35 mm	7 x 19	35 mm

Installation of deflection rollers

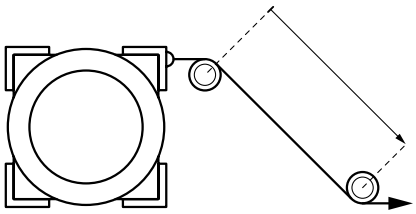
General notes on the installation of deflection rollers



The deflection roller should always be installed in a way which ensures that running is smooth. The deflection roller should ideally have an integrated ball bearing.



The smaller the deflection angle (α) achieved by a deflection roller, the less wear will appear on the measuring wire and therefore the longer the service life of the wire draw mechanism.



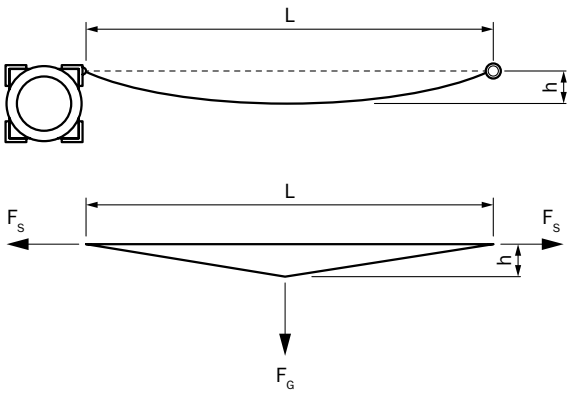
If two or more deflection rollers are needed, then the deflection rollers should always be installed at a distance from one another. The requisite distance between the deflection rollers must be accurately defined on site, accounting for specific customer requirements.

Wire sag

If the measuring wire is pulled out in a horizontal direction, this creates sag that becomes more pronounced as the wire length increases. This has particular implications for applications with obstacles that could get in the way of the moving measuring wire. However, the change in length that results from the sag, and the measurement error this leads to, are negligible.

Calculating the wire sag

The mass of the free-hanging measuring wire creates weight-related force, and this causes the wire to bend into a hyperbola-shaped line. The tension force in the measuring wire acts against the sag. As the measurement length increases, so too does the tension force as a result of the spring drive. We can imagine the hyperbola shape in a simplified format that looks approximately like a triangle.



The weight-related force of the measuring wire can be calculated using **Formula A**.
The spring rate of the spring drive is calculated using **Formula B**.
Formula C determines the sag of the measuring wire (the results of Formula A and Formula B are required in order to calculate the wire sag).
Formula D is used for calculating the measurement error.
The values found in real life will differ from the theoretical values that are calculated, as the measuring wire itself demonstrates a certain amount of resistance against the sag.

Formula A

$$F_G = 0.5 \times m_L \times g \times L$$

- F_G = weight-related force of the measuring wire [N]
- m_L = length-related mass of the measuring wire [Kg/m]
- g = gravitational acceleration 9.81 [m/s²]
- L = free length of the measuring wire [m]

Formula B

$$c = \frac{F_{S\,max} - F_{S\,min}}{L_{max}}$$

- c = spring rate of the spring drive [N/m]
- $F_{S\,max}$ = maximum tensile force in the wire [N]
- $F_{S\,min}$ = minimum tensile force in the wire [N]

Formula C

$$h = \frac{L^2 \times g \times m_L}{8 \times (c \times L + F_{min})}$$

- h = wire sag [mm]
- c = spring rate of the spring drive [N/m]
- $F_{S\,min}$ = minimum tensile force in the measuring wire [N]
- g = gravitational acceleration 9.81 [m/s²]
- m_L = length-related mass of the measuring wire [Kg/m]
- L = free length of the measuring wire [m]

Formula D

$$f = \sqrt{L^2 + 4h^2} - L$$

- f = measurement error [m]
- h = wire sag [m]
- L = free length of the measuring wire [m]

Recommended accessories

Mounting systems

Flanges

Flange plate

Figure	Brief description	Type	Part no.
	Flange adapter for EcoLine wire draw mechanisms, adaption of face mount flange with centering hub 20 mm to 50 mm servo flange	BEF-FA-020-050-007	2073774

Other mounting accessories

Figure	Brief description	Type	Part no.
	Joint ball for insertion in wire end ring with 20 mm diameter	Joint ball for BTF/ PRF/MRA wire draw	5318683

Wire draw mechanism

Wire draw mechanism for servo flange encoder

Figure	Brief description	Mea-suring length	Type	Part no.
	Ecoline wire draw mechanism for 36 series servo flange With 6 mm shaft	1.25 m	MRA-G055-101D4	5324019
	Ecoline wire draw mechanism for 60 series servo flange With 6 mm shaft	3.0 m	MRA-G080-103D3	5322778
		5.0 m	MRA-G130-105D3	5322779
		10.0 m	MRA-G190-110D3	5326242

Connectivity

Adapters and distributors

T-piece

Figure	Brief description	Type	Part no.
	CANopen, T-piece	DSC-1205T000025KM0	6030664

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 5-pin, angled Head B: cable Cable: for power supply, PUR, halogen-free, shielded, 3 x 0.34 mm², Ø 4.2 mm	5 m	DOL-1202-W05MC	6042067
		10 m	DOL-1202-W10MC	6042068

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

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Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 4-pin, straight Head B: cable Cable: for power supply, suitable for drag chain, PUR, halogen-free, unshielded, 4 x 0.34 mm², Ø 4.7 mm	2 m	DOL-1204-G02MC	6025900
		5 m	DOL-1204-G05MC	6025901
		10 m	DOL-1204-G10MC	6025902
		25 m	DOL-1204-G25MC	6034751
	Head A: female connector, M12, 4-pin, angled Head B: cable Cable: for power supply, suitable for drag chain, PUR, halogen-free, unshielded, 4 x 0.34 mm², Ø 4.7 mm	2 m	DOL-1204-W02MC	6025903
		5 m	DOL-1204-W05MC	6025904
		10 m	DOL-1204-W10MC	6025905
		25 m	DOL-1204-W25MC	6034754
	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: for power supply, suitable for drag chain, PUR, halogen-free, shielded, 5 x 0.34 mm², Ø 5.9 mm	5 m	DOL-1205-G05MAC	6036384
		10 m	DOL-1205-G10MAC	6036385
		20 m	DOL-1205-G20MAC	6036386
	Head A: female connector, M12, 5-pin, straight, A-coded Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 5 x 0.34 mm², Ø 5.9 mm	1.5 m	DOL-1205-G1M5ACS-C0	6049451
		3 m	DOL-1205-G03MACS-C0	6049452
		5 m	DOL-1205-G05MACS-C0	6049453
		10 m	DOL-1205-G10MACS-C0	6049454
	Head A: female connector, M12, 5-pin, angled, A-coded Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 5 x 0.34 mm², Ø 5.9 mm	1.5 m	DOL-1205-W1M5ACSC0	6049455
		3 m	DOL-1205-W03MACSC0	6049456
		5 m	DOL-1205-W05MACSC0	6049457
		10 m	DOL-1205-W10MACSC0	6049458
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: SSI, suitable for drag chain, PVC, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	0.5 m	DOL-2308-G0M5AA6	2048595
		1.5 m	DOL-2308-G1M5AA6	2048596
		3 m	DOL-2308-G03MAA6	2048597
		5 m	DOL-2308-G05MAA6	2048598
		10 m	DOL-2308-G10MAA6	2048599
	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: PROFIBUS, suitable for drag chain, PUR, halogen-free, shielded, 2 x 0.34 mm², Ø 8.0 mm	5 m	DOL-1205-G05MQ	6026006
		10 m	DOL-1205-G10MQ	6026008
		12 m	DOL-1205-G12MQ	6032636
		15 m	DOL-1205-G15MQ	6032637
		20 m	DOL-1205-G20MQ	6032638
		30 m	DOL-1205-G30MQ	6032639
		50 m	DOL-1205-G50MQ	6032861
	Head A: female connector, M12, 5-pin, angled, B-coded Head B: cable Cable: PROFIBUS, suitable for drag chain, PUR, shielded, 2 x 0.64 mm², Ø 7.8 mm	5 m	DOL-1205-W05MQ	6041423
		10 m	DOL-1205-W10MQ	6041425
	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: CANopen, suitable for drag chain, shielded, 2 x 0.34 mm² + 2 x 0.25 mm² + 1 x 0.34 mm², Ø 6.7 mm A-coded	2 m	DOL-1205-G02MY	6053041
		5 m	DOL-1205-G05MY	6053042
		10 m	DOL-1205-G10MY	6053043

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

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: cable Cable: incremental, suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm², 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 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	2 m	DOL-2312-G02MLA3	2030682
		7 m	DOL-2312-G07MLA3	2030685
		10 m	DOL-2312-G10MLA3	2030688
		15 m	DOL-2312-G15MLA3	2030692
		20 m	DOL-2312-G20MLA3	2030695
		25 m	DOL-2312-G25MLA3	2030699
		30 m	DOL-2312-G30MLA3	2030702
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: incremental, suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	1.5 m	DOL-2312-G1M5MA3	2029212
		3 m	DOL-2312-G03MMA3	2029213
		5 m	DOL-2312-G05MMA3	2029214
		10 m	DOL-2312-G10MMA3	2029215
		20 m	DOL-2312-G20MMA3	2029216
		30 m	DOL-2312-G30MMA3	2029217

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

Connecting cables with male connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: male connector, M12, 5-pin, straight, B-coded Head B: cable Cable: PROFIBUS, suitable for drag chain, PUR, halogen-free, shielded, 2 x 0.34 mm², Ø 8.0 mm Wire shielding: AL-PT foil, total shield, tin-plated C shield	5 m	STL-1205-G05MQ	6026005
		10 m	STL-1205-G10MQ	6026007
		12 m	STL-1205-G12MQ	6032635
	Head A: male connector, M12, 5-pin, angled, B-coded Head B: cable Cable: PROFIBUS, suitable for drag chain, PUR, shielded, 2 x 0.64 mm², Ø 7.8 mm	5 m	STL-1205-W05MQ	6041426
		10 m	STL-1205-W10MQ	6041427
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: cable Cable: EtherNet/IP, PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	STL-1204-G02ME90	6045284
		5 m	STL-1204-G05ME90	6045285
		10 m	STL-1204-G10ME90	6045286
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: cable Cable: EtherNet/IP, PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	STL-1204-W02ME90	6047912
		5 m	STL-1204-W05ME90	6047913
		10 m	STL-1204-W10ME90	6047914
		25 m	STL-1204-W20ME90	6047915
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: cable Cable: PROFINET, EtherCAT, PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	STL-1204-G02MZ90	6048247
		5 m	STL-1204-G05MZ90	6048248
		10 m	STL-1204-G10MZ90	6048249
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: cable Cable: PROFINET, EtherCAT, PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	STL-1204-W02MZ90	6048256
		5 m	STL-1204-W05MZ90	6048257
		10 m	STL-1204-W10MZ90	6048258
		25 m	STL-1204-W25MZ90	6048259

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Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 4-pin, straight, unshielded, for power supply, for cable diameter 4 mm ... 6 mm Head B: -	DOS-1204-G	6007302
	Head A: female connector, M12, 5-pin, straight, unshielded, for cable diameter 4 mm ... 6 mm Head B: -	DOS-1205-G	6009719
	Head A: female connector, M12, 4-pin, angled, unshielded, for power supply, for cable diameter 3 mm ... 6.5 mm Head B: -	DOS-1204-W	6007303
	Head A: female connector, M12, 8-pin, straight, A encoded, shielded, for cable diameter 4 mm ... 8 mm Head B: - Operating temperature: –40 °C ... +85 °C	DOS-1208-GA01	6045001
	Head A: female connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: –20 °C ... +130 °C	DOS-2312-G	6027538
	Head A: female connector, M23, 12-pin, 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: female connector, M23, 12-pin, angled, shielded, for cable diameter 4.2 mm ... 6.6 mm Head B: - Operating temperature: –20 °C ... +130 °C	DOS-2312-W01	2072580
	Head A: female connector, M12, 5-pin, straight, B-coded, shielded, PROFIBUS, for cable diameter 4 mm ... 9 mm Head B: -	DOS-1205-GQ	6021353
	Head A: female connector, M12, 5-pin, angled, B-coded, shielded, PROFIBUS, for cable diameter 4 mm ... 8 mm Head B: -	DOS-1205-WQ	6041429
	Head A: female connector, M12, 5-pin, straight, shielded, CANopen, DeviceNet, for cable diameter 4.5 mm ... 7 mm Head B: -	DOS-1205-GA	6027534
	Head A: female connector, M12, 4-pin, straight, D-coded, shielded, EtherNet/IP, for cable diameter 4 mm ... 8 mm Head B: -	DOS-1204-GE	6048153
	Head A: female connector, M12, 4-pin, angled, D-coded, shielded, EtherNet/IP, for cable diameter 4 mm ... 8 mm Head B: -	DOS-1204-WE	6048154
	Head A: female connector, M12, 4-pin, straight, D-coded, shielded, PROFINET, EtherCAT, for cable diameter 4 mm ... 8 mm	DOS-1204-GZ	6048263
	Head A: female connector, M12, 4-pin, angled, D-coded, shielded, PROFINET, EtherCAT, for cable diameter 4 mm ... 8 mm	DOS-1204-WZ	6048264

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, shielded, 2 x 0.25 mm², Ø 8.0 mm	By the meter	LTG-2102-MW	6021355
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm		LTG-2308-MWENC	6027529
	Head A: cable Head B: cable Cable: PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm		LTG-2612-MW	6028516

Other plug connectors and cables

Figure	Brief description	Type	Part no.
	A3M60 accessories sales set comprising: Female cable connector supply voltage M12 angled (6007303) Female cable connector M12 angled (6041429) Male cable connector M12 angled (6041428)	DOS-3XM12-W	2058177
	Head A: female connector, M12, 4-pin, D-coded Head B: female connector, RJ45, 8-pin Cable: shielded Switch cabinet feedthrough	Feedthrough female connector Ethernet RJ45	6048180
	Head A: male connector, M12, 4-pin, straight, B-coded Cable: PROFIBUS terminator	STE-END-Q	6021156

Male connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: male connector, M12, 5-pin, straight, unshielded, for cable diameter 4 mm ... 6 mm Head B: -	STE-1205-G	6022083
	Head A: male connector, M12, 5-pin, straight, B-coded, shielded, for cable diameter 4 mm ... 9 mm Head B: -	STE-1205-GQ	6021354
	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
	Head A: male connector, M12, 5-pin, angled, B-coded, shielded, PROFIBUS, for cable diameter 4 mm ... 8 mm Head B: -	STE-1205-WQ	6041428

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Figure	Brief description	Type	Part no.
	Head A: male connector, M12, 5-pin, straight, A encoded, shielded, CANopen, DeviceNet, for cable diameter 4 mm ... 8 mm Head B: -	STE-1205-GA	6027533
	Head A: male connector, M12, 5-pin, straight, shielded Cable: CANopen terminator	STE-1205-GKEND	6037193
	Head A: male connector, RJ45, 8-pin, straight, shielded, EtherNet/IP, for cable diameter 4.5 mm ... 8 mm Head B: -	STE-0J08-GE	6048150
	Head A: male connector, M12, 4-pin, straight, D-coded, shielded, EtherNet/IP, for cable diameter 4 mm ... 8 mm Head B: -	STE-1204-GE01	6048151
	Head A: male connector, M12, 4-pin, angled, D-coded, shielded, EtherNet/IP, for cable diameter 4 mm ... 8 mm Head B: -	STE-1204-WE	6048152
	Head A: male connector, RJ45, 4-pin, straight, shielded, PROFINET, EtherCAT, for cable diameter 4.5 mm ... 8 mm	STE-0J04-GZ	6048260
	Head A: male connector, M12, 4-pin, straight, D-coded, shielded, PROFINET, EtherCAT, for cable diameter 4 mm ... 8 mm	STE-1204-GZ	6048261
	Head A: male connector, M12, 4-pin, angled, D-coded, shielded, PROFINET, EtherCAT, for cable diameter 4 mm ... 8 mm	STE-1204-WZ	6048262

Connection cables with female and male connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M23, 12-pin, straight Head B: male connector, D-Sub, 9-pin, straight Cable: shielded, 4 x 2 x 0.08 mm²	0.5 m	DSL-3D08-G0M5AC3	2046580
	Head A: female connector, M12, 5-pin, straight Head B: male connector, M12, 5-pin, straight Cable: CANopen, suitable for drag chain, PUR, halogen-free, shielded, 2 x 0.34 mm² + 2 x 0.25 mm² + 1 x 0.34 mm², Ø 6.7 mm, A-coded	2 m	DSL-1205-G02MY	6053044
		5 m	DSL-1205-G05MY	6053045
		10 m	DSL-1205-G10MY	6053046

Connection cables with male and male connector

Figure	Brief description		Type	Part no.
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, straight, D-coded Cable: EtherNet/IP, PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	SSL-1204-G02ME90	6045222
		5 m	SSL-1204-G05ME90	6045277
		10 m	SSL-1204-G10ME90	6045279
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, M12, 4-pin, straight, D-coded Cable: EtherNet/IP, PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	SSL-1204-H02ME90	6047908
		5 m	SSL-1204-H05ME90	6047909
		10 m	SSL-1204-H10ME90	6047910
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 8-pin, straight Cable: EtherNet/IP, PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	SSL-2J04-G02ME60	6047916
		5 m	SSL-2J04-G05ME60	6047917
		10 m	SSL-2J04-G10ME60	6047918
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, RJ45, 8-pin, straight Cable: EtherNet/IP, PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	SSL-2J04-H02ME	6047911
		5 m	SSL-2J04-H05ME	6045287
		10 m	SSL-2J04-H10ME	6045288
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, M12, 4-pin, straight Cable: PROFINET, EtherCAT, PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	SSL-1204-F02MZ90	6048250
		5 m	SSL-1204-F05MZ90	6048251
		10 m	SSL-1204-F10MZ90	6048252

Figure	Brief description		Type	Part no.
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, straight Cable: PROFINET, EtherCAT, PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	SSL-1204-G02MZ90	6048241
		5 m	SSL-1204-G05MZ90	6048242
		10 m	SSL-1204-G10MZ90	6048243
	Head A: male connector, RJ45, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, angled Cable: PROFINET, EtherCAT, PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	SSL-2J04-F02MZ	6048253
		5 m	SSL-2J04-F05MZ	6048254
		10 m	SSL-2J04-F10MZ	6048255
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 4-pin, straight Cable: PROFINET, EtherCAT, PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	SSL-2J04-G02MZ60	6048244
		5 m	SSL-2J04-G05MZ60	6048245
		10 m	SSL-2J04-G10MZ60	6048246

Other accessories

Spare parts

Figure	Brief description	Type	Part no.
	Spare mounting set for MRA-G190 (10 m EcoLine)	BEF-MK-MRA-G01	5326294

Programming and configuration tools

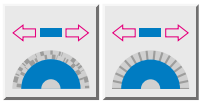
Figure	Brief description	Type	Part no.
	Programming unit [1] USB, for programmable SICK encoders AFS60, AFM60, DFS60, VFS60, DFV60 and wire draw encoders with programmable encoders.	PGT-08-S	1036616
	Programming unit display for programmable SICK DFS60, VFS60, DFV60, AFS/AFM60, AHS/AHM36 encoders, and wire draw encoders with DFS60, AFS/AFM60, and AHS/AHM36. Compact dimensions, low weight, and intuitive operation.	PGT-10-Pro	1072254

[1] Can be used with programmable incremental and absolute encoders in conjunction with the corresponding adapter cables.

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

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COMPACT DESIGN - WITH AN INTEGRATED ENCODER





Product description

In the Compact family, the encoder is integrated into the wire draw mechanics. This integration provides the encoder with the best possible protection in harsh industrial environments These encoders provide a measuring range of up to 5 m with high resolution in an absolute or incremental output.

At a glance

- Measuring lengths from 2 m to 5 m
- Integrated measuring system
- Compact housing (90 mm x 90 mm x 90 mm)
- Incremental and absolute versions
- High resolution

Your benefits

- Industrial design: the encoder is integrated in the aluminum housing, making it less susceptible to external damage and thus reducing maintenance time and costs
- Extremely precise measurements by eliminating the coupling between the encoder and the mechanism
- Space-saving installation, since the encoder is directly integrated into the wire draw mechanics.
- Very precise measurements thanks to the high resolution

More information

Fields of application I-577
Detailed technical data. I-577
Type code. I-583
Ordering information. I-583
Dimensional drawings I-584
Recommended accessories. I-588

→ www.mysick.com/en/Compact

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Automated guided systems (fork height)
- Manned forklift trucks
- Storage and rack operation equipment
- Wood processing machines
- Lifting platforms

Detailed technical data

BKS

Performance

	BKS02 0 m ... 2 m	BKS05 0 m ... 5 m
Measuring range	0 m ... 2 m	0 m ... 5 m
Linearity	≤ ± 0.7 mm	
Measurement increment	≥ 0.05 mm	
Traversing speed	3.5 m/s	
Typ. repeat accuracy	3 measuring steps	

Interfaces

Encoder	Absolute encoder
Electrical interface	12 V ... 30 V SSI
Connection type	M23 male connector, 12-pin
Clock frequency	1 MHz [1]
Interface signals	Clock +, Clock -, Data +, Data-

[1] Min. LOW level (Clock +): 500 ns.

Electrical data

Initialization time	≥ 200 ms [1]
Position forming time	0.1 ms
Supply voltage	12 V ... 30 V
Code sequence	Rising at wire pull-out
Code type	24 bit/gray
MTTFd: mean time to dangerous failure	150 years (EN ISO 13849) [2]

[1] Valid positional data can be measured once this time has elapsed.

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

Mechanical data

	BKS02 0 m ... 2 m	BKS02 0 m ... 5 m
Mass	1.5 kg	
Measuring wire material	Highly flexible stranded steel (PA 12 sheathed)	
Measuring wire diameter	0.6 mm	
Housing material	Aluminum	
Spring return force	5 N ... 6 N [1]	4 N ... 6 N [1]
Service life of wire draw mechanism	800,000 cycles [2] [3]	
Wire acceleration	≤ 20 m/s²	

[1] These values were measured at an ambient temperature of 25 °C. There may be variations at other temperatures.

[2] Mean values that depend on the type of load, a cycle is made up of a wire intake and outake.

[3] At high operating speeds over great lengths, this figure can decrease; at slow operating speeds over short lengths, it can increase.

Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-3
Enclosure rating (encoder)	IP 52 (as per IEC60529), observe specified installation location
Resistance to shocks (according to EN 60068-2-27)	20 g, 6 ms
Resistance to vibration (according to EN 60068-2-6)	10 g, 10 Hz ... 2,000 Hz
Operating temperature range (encoder)	–10 °C ... +70 °C
Storage temperature range	–20 °C ... +80 °C
Relative humidity/condensation	90% [1]

[1] Condensation of optical surfaces not permitted.

XKS

Performance

	XKS02 0 m ... 2 m	XKS05 0 m ... 5 m
Measuring range	0 m ... 2 m	0 m ... 5 m
Period length	1.1953 mm	
Linearity	≤ ± 0.7 mm	
Non-linearity	± 0.1 mm	
Measurement increment [1]	≥ 0.295 µm	
Traversing speed	3.5 m/s	
Wire acceleration	≤ 20 m/s²	
Typ. repeat accuracy	≤ 0.15°	

[1] With 12 bit resolution.

Interfaces

Encoder	Absolute encoder
Electrical interface	7 V ... 12 V HIPERFACE®
Connection type	M12 male connector, 8-pin
Interface signals	Process data channel SIN, REFSIN, COS, REFCOS: analog, differential Parameter channel RS 485: digital
Number of sine/cosine periods per revolution	128

Electrical data

Operating current	60 mA (without load)
Output frequency for sine/cosine signals	0 kHz ... 65 kHz
Available memory area	1,792 bytes
E²PROM	2048 Eeprom
Supply voltage	7 V ... 12 V
Code sequence	Rising at wire pull-out
Code type	Binary
MTTFd: mean time to dangerous failure	250 years (EN ISO 13849) [1]

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

Mechanical data

	XKS02 0 m ... 2 m	XKS05 0 m ... 5 m
Mass	1.5 kg	
Measuring wire material	Highly flexible stranded steel (PA 12 sheathed)	
Measuring wire diameter	0.6 mm	
Housing material	Aluminum	
Spring return force	5 N ... 6 N [1]	4 N ... 6 N [1]
Service life of wire draw mechanism	800,000 cycles [2] [3]	
Wire acceleration	≤ 20 m/s²	

[1] These values were measured at an ambient temperature of 25 °C. There may be variations at other temperatures.

[2] Mean values that depend on the type of load, a cycle is made up of a wire intake and outake.

[3] At high operating speeds over great lengths, this figure can decrease; at slow operating speeds over short lengths, it can increase.

Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-3
Enclosure rating (encoder)	IP 52 (as per IEC 60529), observe specified installation location
Resistance to shocks (according to EN 60068-2-27)	20 g, 6 ms
Resistance to vibration (according to EN 60068-2-6)	10 g, 10 Hz ... 2,000 Hz
Operating temperature range (encoder)	–10 °C ... +70 °C
Storage temperature range	–20 °C ... +80 °C
Relative humidity/condensation	90% [1]

[1] Condensation of optical surfaces not permitted.

PKS

Performance

	PKS02 0 m ... 2 m	PKS05 0 m ... 5 m
Measuring range	0 m ... 2 m	0 m ... 5 m
Linearity	≤ ± 0.7 mm	
Measurement increment [1]	≥ 0.05 mm	
Traversing speed	3.5 m/s	
Wire acceleration	≤ 20 m/s²	
Typ. repeat accuracy	3 measuring steps	

[1] Based on the assumption that the control/counter evaluates the edges of pulses A and B.

Interfaces

Encoder	Incremental encoders
Electrical interface	4.5 V ... 5.5 V TTL/RS422
Connection type	M23 male connector, 12-pin

Electrical data

Operating current	60 mA (without load)
Reference signal	1/765 measuring steps
Maximum load current	≤ 20 mA
Initialization time	≥ 40 ms [1]
Supply voltage	4.5 V ... 5.5 V
MTTFd: mean time to dangerous failure	400 years (EN ISO 13849) [2]

[1] Valid positional data can be measured once this time has elapsed.

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

Mechanical data

	PKS02 0 m ... 2 m	PKS05 0 m ... 5 m
Mass	1.5 kg	
Measuring wire material	Highly flexible stranded steel (PA 12 sheathed)	
Measuring wire diameter	0.6 mm	
Housing material	Aluminum	
Spring return force	5 N ... 6 N [1]	4 N ... 6 N [1]
Service life of wire draw mechanism	800,000 cycles [2] [3]	
Wire acceleration	≤ 20 m/s²	

[1] These values were measured at an ambient temperature of 25 °C. There may be variations at other temperatures.

[2] Mean values that depend on the type of load, a cycle is made up of a wire intake and outake.

[3] At high operating speeds over great lengths, this figure can decrease; at slow operating speeds over short lengths, it can increase.

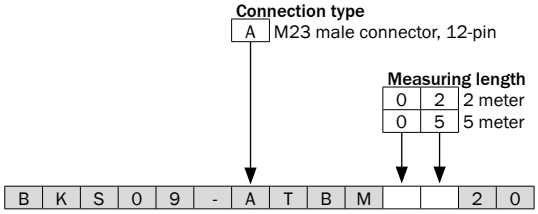
Ambient data

EMC	According to EN 61000-6-2 and EN 61000-6-3
Enclosure rating (encoder)	IP 52 (as per IEC 60529), observe specified installation location
Resistance to shocks (according to EN 60068-2-27)	20 g, 6 ms
Resistance to vibration (according to EN 60068-2-6)	10 g, 10 Hz ... 2,000 Hz
Operating temperature range (encoder)	–10 °C ... +70 °C
Storage temperature range	–20 °C ... +80 °C
Relative humidity/condensation	90% [1]

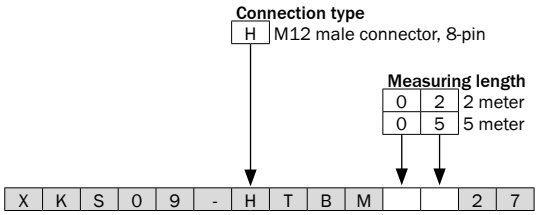
[1] Condensation of optical surfaces not permitted.

Type code

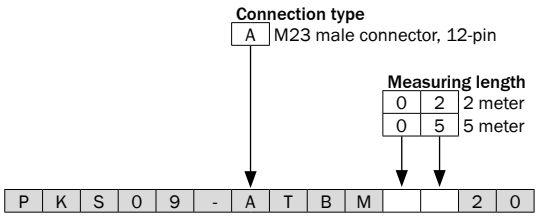
Compact absolute BKS



Compact absolute XKS



Compact incremental PKS



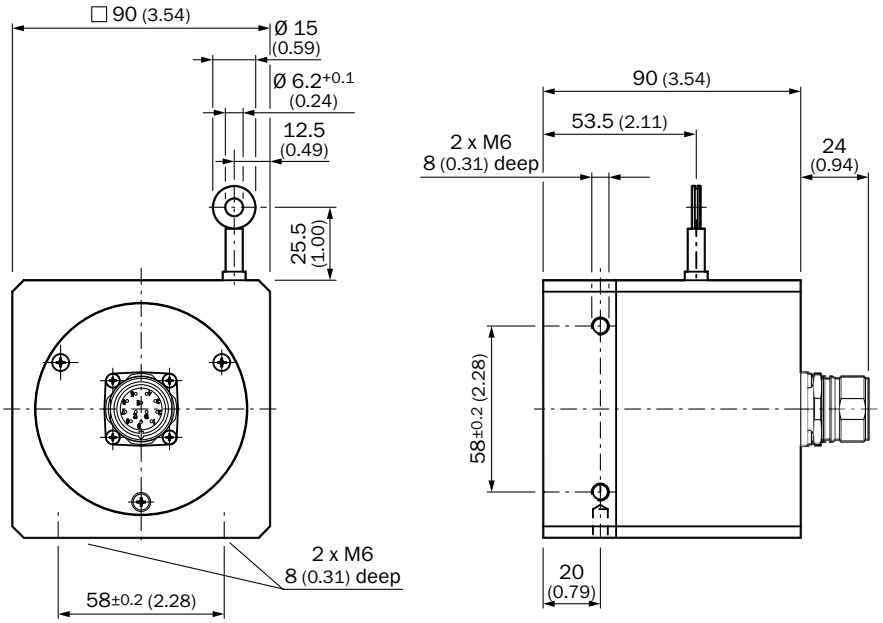
Ordering information

Measuring range	Electrical interface	Connection type	Type	Part no.
0 m ... 2 m	SSI	M23 male connector, 12-pin, radial	BKS09-ATBM0220	1035240
	7 V ... 12 V, HIPERFACE®	M12 male connector, 8-pin, radial	XKS09-HTBM0227	1035436
	4.5 V...5.5 V, TTL/RS422	M23 male connector, 12-pin, radial	PKS09-ATBM0220	1035242

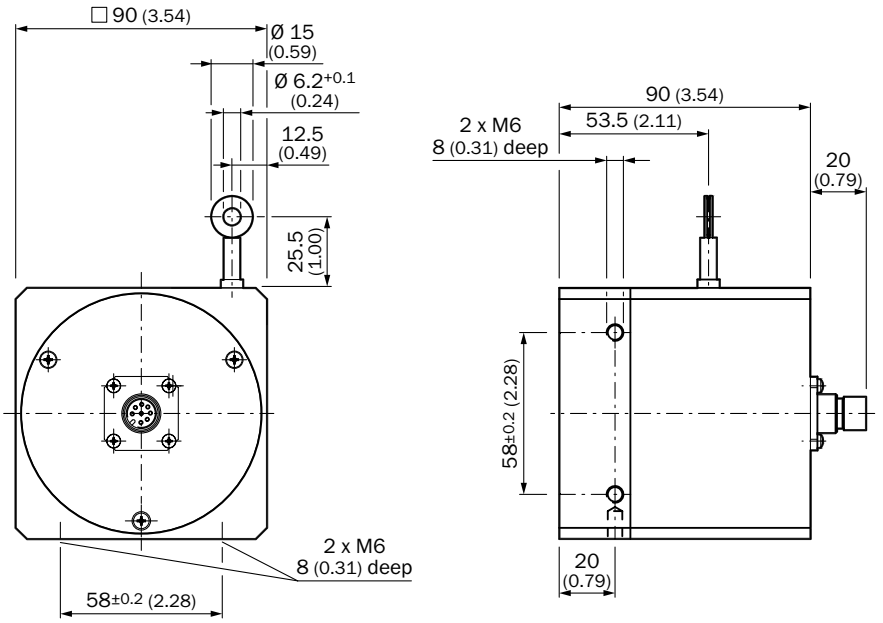
Measuring range	Electrical interface	Connection type	Type	Part no.
0 m ... 5 m	SSI	M23 male connector, 12-pin, radial	BKS09-ATBM0520	1035241
	7 V ... 12 V, HIPERFACE®	M12 male connector, 8-pin, radial	XKS09-HTBM0527	1035437
	4.5 V...5.5 V, TTL/RS422	M23 male connector, 12-pin, radial	PKS09-ATBM0520	1035243

Dimensional drawings (dimensions in mm)

BKS and PKS



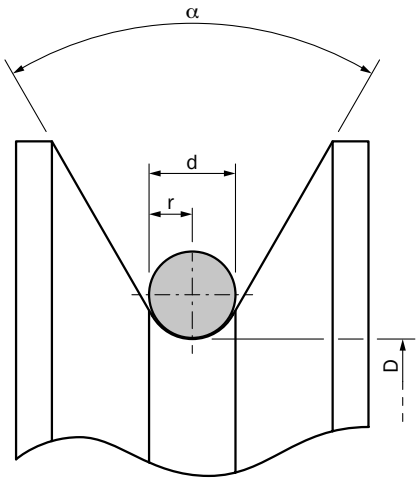
XKS



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Deflection roller design

With the aid of deflection rollers, it is possible to guide the measuring wire of wire draw encoders over edges and around corners without significantly affecting the life time of the wire draw encoder. In this case, it must be considered that the designs of the deflection roller and of the measuring wire must be compatible in order to avoid damage to the system.



D = groove base diameter.
d = diameter of the wire incl. coating.
r = groove radius = 0.53 x d
α = groove opening angle = 60°

- The groove radius should not be too small – **recommendation: 0.53 x diameter of the wire cable**
- The groove opening angle should be neither too small nor too large – **recommendation: 60°**
- In order to ensure the longest possible system life, the deflection roller material should be neither too soft nor too hard – **recommended material: polyamide**
- The groove base diameter of the deflection roller should not be too small – **see table for recommendations**

EcoLine

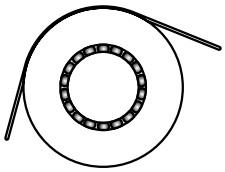
Length	Measuring wire, PA-sheathed	Diameter of the measuring wire	Structure of the measuring wire (strands x cords)	Min. groove base diameter
1.25 m	PA12	0.45 mm	7 x 7	25 mm
3 m	–	0.55 mm	1 x 19	40 mm
5 m	–	0.55 mm	1 x 19	40 mm
10 m	–	0.55 mm	1 x 19	40 mm

HighLine

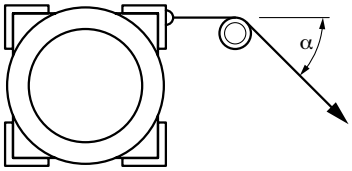
Length	Measuring wire, PA-sheathed	Diameter of the measuring wire	Structure of the measuring wire (strands x cords)	Min. groove base diameter
2 m	–	1.35 mm	7 x 19	35 mm
3 m	–	1.35 mm	7 x 19	35 mm
5 m	–	1.35 mm	7 x 19	35 mm
10 m	–	1.35 mm	7 x 19	35 mm
20 m		0.81 mm	7 x 7	35 mm
30 m		0.81 mm	7 x 7	35 mm
50 m		1.35 mm	7 x 19	35 mm

Installation of deflection rollers

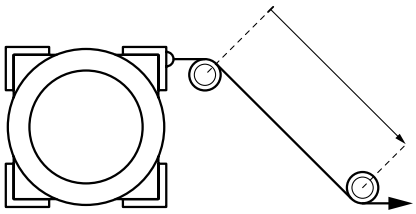
General notes on the installation of deflection rollers



The deflection roller should always be installed in a way which ensures that running is smooth. The deflection roller should ideally have an integrated ball bearing.



The smaller the deflection angle (α) achieved by a deflection roller, the less wear will appear on the measuring wire and therefore the longer the service life of the wire draw mechanism.



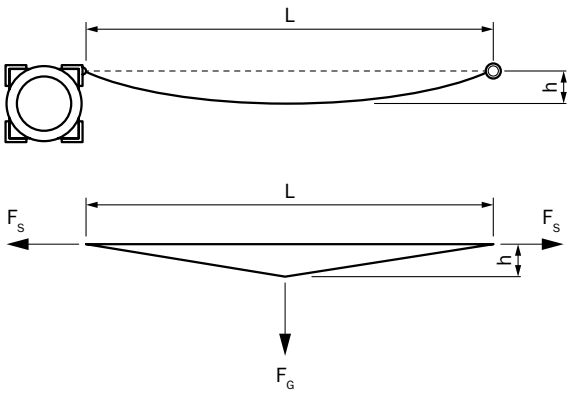
If two or more deflection rollers are needed, then the deflection rollers should always be installed at a distance from one another. The requisite distance between the deflection rollers must be accurately defined on site, accounting for specific customer requirements.

Wire sag

If the measuring wire is pulled out in a horizontal direction, this creates sag that becomes more pronounced as the wire length increases. This has particular implications for applications with obstacles that could get in the way of the moving measuring wire. However, the change in length that results from the sag, and the measurement error this leads to, are negligible.

Calculating the wire sag

The mass of the free-hanging measuring wire creates weight-related force, and this causes the wire to bend into a hyperbola-shaped line. The tension force in the measuring wire acts against the sag. As the measurement length increases, so too does the tension force as a result of the spring drive. We can imagine the hyperbola shape in a simplified format that looks approximately like a triangle.



The weight-related force of the measuring wire can be calculated using **Formula A**.
The spring rate of the spring drive is calculated using **Formula B**.
Formula C determines the sag of the measuring wire (the results of Formula A and Formula B are required in order to calculate the wire sag).
Formula D is used for calculating the measurement error.
The values found in real life will differ from the theoretical values that are calculated, as the measuring wire itself demonstrates a certain amount of resistance against the sag.

Formula A

$$F_G = 0.5 \times m_L \times g \times L$$

- F_G = weight-related force of the measuring wire [N]
- m_L = length-related mass of the measuring wire [Kg/m]
- g = gravitational acceleration 9.81 [m/s²]
- L = free length of the measuring wire [m]

Formula B

$$c = \frac{F_{S\,max} - F_{S\,min}}{L_{max}}$$

- c = spring rate of the spring drive [N/m]
- $F_{S\,max}$ = maximum tensile force in the wire [N]
- $F_{S\,min}$ = minimum tensile force in the wire [N]

Formula C

$$h = \frac{L^2 \times g \times m_L}{8 \times (c \times L + F_{min})}$$

- h = wire sag [mm]
- c = spring rate of the spring drive [N/m]
- $F_{S\,min}$ = minimum tensile force in the measuring wire [N]
- g = gravitational acceleration 9.81 [m/s²]
- m_L = length-related mass of the measuring wire [Kg/m]
- L = free length of the measuring wire [m]

Formula D

$$f = \sqrt{L^2 + 4h^2} - L$$

- f = measurement error [m]
- h = wire sag [m]
- L = free length of the measuring wire [m]

Recommended accessories

Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: SSI, PUR, shielded	2 m	DOL-2312-G02MLA5	2030680
		7 m	DOL-2312-G07MLA5	2030683
		10 m	DOL-2312-G10MLA5	2030686
		15 m	DOL-2312-G15MLA5	2030690
		20 m	DOL-2312-G20MLA5	2030693
		25 m	DOL-2312-G25MLA5	2030697
		30 m	DOL-2312-G30MLA5	2030700
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: SSI, suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm	1.5 m	DOL-2312-G1M5MA1	2029200
		3 m	DOL-2312-G03MMA1	2029201
		5 m	DOL-2312-G05MMA1	2029202
		10 m	DOL-2312-G10MMA1	2029203
		20 m	DOL-2312-G20MMA1	2029204
		30 m	DOL-2312-G30MMA1	2029205
	Head A: female connector, M12, 8-pin, straight Head B: cable Cable: incremental, suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm², 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 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	2 m	DOL-2312-G02MLA3	2030682
		7 m	DOL-2312-G07MLA3	2030685
		10 m	DOL-2312-G10MLA3	2030688
		15 m	DOL-2312-G15MLA3	2030692
		20 m	DOL-2312-G20MLA3	2030695
		25 m	DOL-2312-G25MLA3	2030699
		30 m	DOL-2312-G30MLA3	2030702
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: incremental, suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	1.5 m	DOL-2312-G1M5MA3	2029212
		3 m	DOL-2312-G03MMA3	2029213
		5 m	DOL-2312-G05MMA3	2029214
		10 m	DOL-2312-G10MMA3	2029215
		20 m	DOL-2312-G20MMA3	2029216
		30 m	DOL-2312-G30MMA3	2029217

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

Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 8-pin, straight Head B: - Cable: shielded	DOS-1208-GA	6028369

Figure	Brief description	Type	Part no.
	Head A: female connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: –20 °C ... +130 °C	DOS-2312-G	6027538
	Head A: female connector, M23, 12-pin, 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: female connector, M23, 12-pin, angled, shielded, for cable diameter 4.2 mm ... 6.6 mm Head B: - Operating temperature: –20 °C ... +130 °C	DOS-2312-W01	2072580

Cables (ready to assemble)

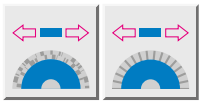
Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	By the meter	LTG-2308-MWENC	6027529
	Head A: cable Head B: cable Cable: PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm		LTG-2612-MW	6028516
	Cable: unshielded		LTG-3208-MW	6032870

Male connectors (ready to assemble)

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

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

RUGGED DESIGN MEASURES DISTANCES UP TO 50 M - THE HEAVY-DUTY WIRE DRAW ENCODER





Product description

With wire draw lengths from 2 m to 50 m, the HighLine series of wire draw encoders have enormous range. Thanks to guide rollers, the HighLine series enables flexible measurement paths - even around obstacles. Their rugged housing and dirt-resistant brush assemblies allow the encoder to be used in the toughest of environments, including dust, shock and vibration, which ensure a long service lifetime.

At a glance

- Measuring lengths: 2 m to 50 m
- Modular measuring system with a wide selection of interfaces/measuring lengths
- Very rugged system (dirt scraper, integrated brushes)
- High-quality winding mechanism and wire input
- High enclosure rating
- High resistance to shock and vibrations
- Extremely high resolution possible
- Expandable using external accessories

Your benefits

- Reliable solution for use in harsh ambient conditions
- Long service life due to rugged industrial housing
- Quick and easy installation without the need for precise linear guidance
- Low integration and maintenance costs
- Customization option reduces storage costs
- Quick and easy commissioning thanks to analog interface and option to use low-cost interface card

More information

Fields of application I-591
Detailed technical data. I-591
Type code. I-601
Ordering information. I-606
Dimensional drawings I-607
Recommended accessories. I-630

→ www.mysick.com/en/HighLine

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Positioning of storage and retrieval systems
- Positioning grippers and trolleys with cranes
- Automated guided systems
- Elevators
- Lifting platforms
- Presses

Detailed technical data

BTF

Performance

	BTF08 0 m ... 2 m	BTF08 0 m ... 3 m	BTF08 0 m ... 5 m	BTF13 0 m ... 10 m	BTF13 0 m ... 20 m	BTF13 0 m ... 30 m	BTF19 0 m ... 50 m
Measuring range	0 m ... 2 m	0 m ... 3 m	0 m ... 5 m	0 m ... 10 m	0 m ... 20 m	0 m ... 30 m	0 m ... 50 m
Reproducibility	Max. 0.2 mm [1]	Max. 0.3 mm [1]	Max. 0.5 mm [1]	Max. 1 mm [1]	Max. 2 mm [1]	Max. 3 mm [1]	Max. 5 mm [1]
Linearity	Max. ± 2 mm [1] [2]	Max. ± 3 mm [1] [2]		Max. ± 6 mm [1] [2]	Max. ± 10 mm [1] [2]	Max. ± 15 mm [1] [2]	Max. ± 24 mm [1] [2]
Hysteresis	Max. 1 mm [1]	Max. 1.5 mm [1]	Max. 2 mm [1]	Max. 4 mm [1]	Max. 6 mm [1]	Max. 8 mm [1]	Max. 10 mm [1]
Resolution (wire draw + encoder)							
Analog	4 ... 20 mA = 0.02 mm; 0 ... 10 V = 0.02 mm [3] [4]		4 ... 20 mA = 0.03 mm; 0 ... 10 V = 0.03 mm [3] [4]			–	
SSI	0.025 (ATM60) [3] [4] 0.02 (AHM36) [3] [4]		0.05 mm (ATM60) [3] [4] 0.04 mm (AHM36) [3] [4]				0.1 mm (ATM60) [3] [4] 0.06 mm (AHM36) [3] [4]
CANopen	0.02 mm (ATM60) [3] [4] 0.01 mm (AHM36) [3] [4]		0.04 mm (ATM60) [3] [4] 0.02 mm (AHM36) [3] [4]				0.06 mm (ATM60) [3] [4] 0.03 mm (AHM36) [3] [4]
DeviceNet	0.02 mm [3] [4]		0.04 mm [3] [4]				0.06 mm [3] [4]
PROFIBUS	0.02 mm [3] [4]		0.04 mm [3] [4]				0.06 mm [3] [4]
EtherNet/IP	0.001 mm [3] [4]						0.002 mm [3] [4]
PROFINET	0.001 mm [3] [4]						0.002 mm [3] [4]
EtherCAT®	0.001 mm [3] [4]						0.002 mm [3] [4]

[1] Value applies to wire draw mechanics.

[2] Value applies under consideration of the exact length of the measuring wire per revolution (located on the wire draw mechanism's label).

[3] The values shown here are rounded.

[4] Sample calculation based on the BTF08 with PROFINET: 200 mm (length of wire draw per revolution - see mechanical data): 262,144 (steps per revolution) = 0.001 mm (resolution from the combination wire draw + encoder)

Interfaces

	BTF08 0 m ... 2 m	BTF08 0 m ... 3 m	BTF08 0 m ... 5 m	BTF13 0 m ... 10 m	BTF13 0 m ... 20 m	BTF13 0 m ... 30 m	BTF19 0 m ... 50 m
Encoder	Absolute encoder						
Electrical interface	See type code						
Connection type	See type code						
Clock frequency							
Analog	32 kHz					–	
SSI	1 MHz (ATM60) 2 MHz (AHM36)						
Address setting							

	BTF08 0 m ... 2 m	BTF08 0 m ... 3 m	BTF08 0 m ... 5 m	BTF13 0 m ... 10 m	BTF13 0 m ... 20 m	BTF13 0 m ... 30 m	BTF19 0 m ... 50 m
CANopen	0 ... 63 (ATM60) 0 ... 127 (AHM36)						
DeviceNet	0 ... 63, DIP switch or protocol						
PROFIBUS	0 ... 127, DIP switch						
EtherNet/IP	Via DHCP / DEC switches						
PROFINET	Via DCP						
Protocol							
CANopen	Communication profile DS 301 V4.0 (ATM60) Communication profile DS 301 V4.02 (AHM36)						
DeviceNet	DeviceNet Specification Release 2.0						
PROFIBUS	PROFIBUS DP V0 (A3M60), profile for encoders (07hex) - Class 2 (ATM60 PROFIBUS)						
EtherNet/IP	EtherNet/IP IEC 61784-1						
PROFINET	PROFINET IO / RT Class B						
EtherCAT®	EtherCAT, CoE (CiA DS-301)						
Bus termination							
CANopen	Via DIP switches (ATM60) Via external terminator (AHM36)						
DeviceNet	Via DIP switches						
PROFIBUS	Via DIP switches						
Set (electronic adjustment)							
Analog	Teach-in functionality					–	
SSI	Via SET cable (ATM60) H active (L = 0 – 3 V; H = 4.0 – U_S V) (AHM36)						
CANopen	Via PRESET pushbutton or protocol						
DeviceNet	Via PRESET pushbutton or protocol						
PROFIBUS	Via PRESET pushbutton or protocol						
EtherNet/IP	Via PRESET pushbutton or protocol						
PROFINET	Via PRESET pushbutton or protocol						
EtherCAT®	Via PRESET pushbutton or protocol						
Encoder profile							
CANopen	Device profile DSP 406 V 2.0 (ATM60) CiA DS-406, V3.2. - Class C2 (AHM36)						
DeviceNet	Generic Profile						
PROFIBUS	Encoder profile version 1.1 Class 1 and Class2 (A3M60), profile for encoders (07hex) - Class 2 (ATM60 PROFIBUS)						
EtherNet/IP	0 x 22						
PROFINET	V4.1 class3						
EtherCAT®	CiA DS-406						

Electrical data

	BTF08 0 m ... 2 m	BTF08 0 m ... 3 m	BTF08 0 m ... 5 m	BTF13 0 m ... 10 m	BTF13 0 m ... 20 m	BTF13 0 m ... 30 m	BTF19 0 m ... 50 m
Initialization time							
Analog	≤ 2 ms [1]					–	
SSI	Approx. 1,050 ms (ATM60) [1] 100 ms (AHM36) [1]						
CANopen	Approx. 12 s (ATM60) [1] 2 s (AHM36) [1]						
DeviceNet	Approx. 12 s [1]						
PROFIBUS	Approx. 1 s (A3M60), approx. 12 s (ATM60 PROFIBUS) [1]						
EtherNet/IP	Approx. 12 s [1]						
PROFINET	Approx. 12 s [1]						
EtherCAT®	Approx. 12 s [1]						
Supply voltage							
Analog	18 V ... 33 V					–	
SSI	4.5 V DC ... 32 V DC (AHM36) 10 V ... 32 V (ATM60)						
CANopen	10 V ... 32 V (ATM60) 10 V ... 30 V (AHM36)						
DeviceNet	10 V ... 32 V						
PROFIBUS	10 V ... 32 V						
EtherNet/IP	10 V ... 30 V						
PROFINET	10 V ... 30 V						
EtherCAT®	10 V ... 30 V						
Code type							
SSI	Gray (ATM60) Gray, binary (AHM36)						
Power consumption							
Analog	2 W					–	
SSI	0.8 W (ATM60) 1.5 W (AHM36)						
CANopen	2 W (ATM60) 1.5 W (AHM36)						
DeviceNet	2 W						
PROFIBUS	1,5 W (A3M60) 2 W (ATM60 PROFIBUS)						
EtherNet/IP	3 W						
PROFINET	3 W						
EtherCAT®	3 W						

[1] Valid positional data can be measured once this time has elapsed.

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

[3] This value relates to the connected encoder only.

	BTF08 0 m ... 2 m	BTF08 0 m ... 3 m	BTF08 0 m ... 5 m	BTF13 0 m ... 10 m	BTF13 0 m ... 20 m	BTF13 0 m ... 30 m	BTF19 0 m ... 50 m
MTTFd: mean time to dangerous failure							
SSI	150 years (ATM60) [2) 3)] 230 years (AHM36) [2) 3)]						
CANopen	150 years (ATM60) [2) 3)] 270 years (AHM36) [2) 3)]						
DeviceNet	150 years [2) 3)]						
PROFIBUS	60 years (A3M60) [2) 3)] 150 years (ATM60 PROFIBUS) [2) 3)]						
EtherNet/IP	80 years [2) 3)]						
PROFINET	80 years [2) 3)]						
EtherCAT®	80 years [2) 3)]						

[1)] Valid positional data can be measured once this time has elapsed.

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

[3)] This value relates to the connected encoder only.

Mechanical data

	BTF08 0 m ... 2 m	BTF08 0 m ... 3 m	BTF08 0 m ... 5 m	BTF13 0 m ... 10 m	BTF13 0 m ... 20 m	BTF13 0 m ... 30 m	BTF19 0 m ... 50 m
Mass (incl. encoder)							
Analog	1.7 kg	1.9 kg	3.2 kg	3.9 kg	5.4 kg	–	
SSI	1.8 kg (ATM60) 1.42 kg (AHM36)	2 kg (ATM60) 1.62 kg (AHM36)	3.3 kg (ATM60) 2.92 kg (AHM36)	4 kg (ATM60) 3.62 kg (AHM36)	5.5 kg (ATM60) 5.12 kg (AHM36)	6.7 kg (ATM60) 6.32 kg (AHM36)	17 kg (ATM60) 16.62 kg (AHM36)
CANopen	1.89 kg (ATM60) 1.42 kg (AHM36)	2.09 kg (ATM60) 1.62 kg (AHM36)	3.39 kg (ATM60) 2.92 kg (AHM36)	4.09 kg (ATM60) 3.62 kg (AHM36)	5.59 kg (ATM60) 5.12 kg (AHM36)	6.79 kg (ATM60) 6.32 kg (AHM36)	17.09 kg (ATM60) 16.62 kg (AHM36)
DeviceNet	1.89 kg	2.09 kg	3.39 kg	4.09 kg	5.59 kg	6.79 kg	17.09 kg
PROFIBUS	1.58 kg (A3M60) 1.89 kg (ATM60 PROFIBUS)	1.78 kg (A3M60) 2.09 kg (ATM60 PROFIBUS)	3.08 kg (A3M60) 3.39 kg (ATM60 PROFIBUS)	3.78 kg (A3M60) 4.09 kg (ATM60 PROFIBUS)	5.28 kg (A3M60) 5.59 kg (ATM60 PROFIBUS)	6.48 kg (A3M60) 6.79 kg (ATM60 PROFIBUS)	16.78 kg (A3M60) 17.09 kg (ATM60 PROFIBUS)
EtherNet/IP	1.5 kg	1.7 kg	3 kg	3.7 kg	5.2 kg	6.4 kg	16.7 kg
PROFINET	1.5 kg	1.7 kg	3 kg	3.7 kg	5.2 kg	6.4 kg	16.7 kg
EtherCAT®	1.5 kg	1.7 kg	3 kg	3.7 kg	5.2 kg	6.4 kg	16.7 kg
Mass (mechanism)	1.3 kg	1.5 kg	2.8 kg	3.5 kg	5 kg	6.2 kg	16.5 kg
Measuring wire material	Highly flexible steel wire, 1.4401 stainless steel V4A						
Mass (measuring wire)	7.1 g/m				2.6 g/m		7.1 g/m
Material, wire draw mechanism housing	Aluminum (anodized), zinc die cast		Aluminum (anodized), plastic				Aluminum (anodized), zinc die cast
Wire draw lengths per revolution	200 mm [1]		334.1 mm [1]		332.4 mm [1]		491.5 mm [1]
Spring return force	6 N ... 14 N [2]		15 N ... 20 N [2]	10 N ... 20 N [2]			18 N ... 37 N [2]
Service life of wire draw mechanism	1 mio. cycles [3]						
Actual wire draw length	2.2 m	3.2 m	5.2 m	10.2 m	20.2 m	30.2 m	50.2 m
Measuring wire diameter	1.35 mm				0.81 mm		1.35 mm
Wire acceleration	40 m/s²		70 m/s²	40 m/s²	30 m/s²	15 m/s²	18 m/s²
Traversing speed	4 m/s						
Integrated encoder							
Analog	ACM60					–	
SSI	ATM60 SSI AHM36 SSI						
CANopen	ATM60 CANopen AHM36 CANopen						
DeviceNet	ATM60 DeviceNet						
PROFIBUS	A3M60, ATM60 PROFIBUS						
EtherNet/IP	AFM60 EtherNet/IP						
PROFINET	AFM60 PROFINET						
EtherCAT®	AFM60 EtherCAT®						

[1] The data shown here are average values. The exact lengths are listed on the label for the wire draw mechanism.

[2] These values were measured at an ambient temperature of 25 °C. There may be variations at other temperatures.

[3] A cycle is made up of a wire intake and outake.

	BTF08 0 m ... 2 m	BTF08 0 m ... 3 m	BTF08 0 m ... 5 m	BTF13 0 m ... 10 m	BTF13 0 m ... 20 m	BTF13 0 m ... 30 m	BTF19 0 m ... 50 m
Number of steps per revolution							
SSI	8,000 (ATM60) 8,192 (AHM36)		6,680 (ATM60) 8,192 (AHM36)				4,900 (ATM60) 8,192 (AHM36)
CANopen	8,192 (ATM60) 16,384 (AHM36)						
DeviceNet	8,192						
PROFIBUS	8,192						
EtherNet/IP	262,144						
PROFINET	262,144						
EtherCAT®	262,144						
Article number encoder							
Analog	6045312 6045313					–	
SSI	1034293 (ATM60) 1068330 (AHM36)		1034294 (ATM60)		1034295 (ATM60)		1034296 (ATM60)
CANopen	1030025 (ATM60) 1065999 (AHM36)						
DeviceNet	1030018						
PROFIBUS	1051018 (A3M60) 1030014 (ATM60)						
EtherNet/IP	1055331						
PROFINET	1059040						
EtherCAT®	1059061						
Integrated mechanics	MRA-F080-102D2	MRA-F080-103D2	MRA-F130-105D2	MRA-F130-110D2	MRA-F130-120D1	MRA-F130-130D1	MRA-F190-150D2
Article number mechanics	6028625	6030125	6028626	6028627	6028628	6028629	6028630

[1] The data shown here are average values. The exact lengths are listed on the label for the wire draw mechanism.

[2] These values were measured at an ambient temperature of 25 °C. There may be variations at other temperatures.

[3] A cycle is made up of a wire intake and outake.

Ambient data

	BTF08 0 m ... 2 m	BTF08 0 m ... 3 m	BTF08 0 m ... 5 m	BTF13 0 m ... 10 m	BTF13 0 m ... 20 m	BTF13 0 m ... 30 m	BTF19 0 m ... 50 m
EMC	According to EN 61000-6-2 and EN 61000-6-3						
Enclosure rating (encoder)							
Analog	IP 65					–	
SSI	IP 67 (ATM60) IP 66 / IP 67, on the housing side (as per IEC 60529) (AHM36) IP 66 / IP 67, on the shaft side (as per IEC 60529) (AHM36)						
CANopen	IP 67 (ATM60) IP 66 / IP 67, on the housing side (as per IEC 60529) (AHM36) IP 66 / IP 67, on the shaft side (as per IEC 60529) (AHM36)						
DeviceNet	IP 67						
PROFIBUS	IP 67						
EtherNet/IP	IP 67						
PROFINET	IP 67						
EtherCAT®	IP 67						

	BTF08 0 m ... 2 m	BTF08 0 m ... 3 m	BTF08 0 m ... 5 m	BTF13 0 m ... 10 m	BTF13 0 m ... 20 m	BTF13 0 m ... 30 m	BTF19 0 m ... 50 m
Enclosure rating (mechanism)	IP 64						IP 31
Resistance to shocks (as per EN 60068-2-27)							
Analog	50 g, 6 ms					–	
SSI	10 g, 6 ms (ATM60) 100 g, 6 ms (AHM36)						
CANopen	100 g, 6 ms						
DeviceNet	100 g, 6 ms						
PROFIBUS	100 g, 6 ms						
EtherNet/IP	100 g, 6 ms						
PROFINET	100 g, 6 ms						
EtherCAT®	100 g, 6 ms						
Resistance to vibrations (as per EN 60068-2-6)							
SSI	20 g, 10 Hz ... 2,000 Hz (ATM60, AHM36)						
CANopen	20 g, 10 Hz ... 2,000 Hz						
DeviceNet	20 g, 10 Hz ... 2,000 Hz						
PROFIBUS	30 g, 10 Hz ... 2,000 Hz						
EtherNet/IP	30 g, 10 Hz ... 2,000 Hz						
PROFINET	30 g, 10 Hz ... 2,000 Hz						
EtherCAT®	30 g, 10 Hz ... 2,000 Hz						
Analog	4 g, sine 5 Hz ... 100 Hz					–	
Operating temperature range (encoder)							
Analog	–30 °C ... +80 °C					–	
SSI	–20 °C ... +85 °C (ATM60) –40 °C ... +100 °C (AHM36)						
CANopen	–20 °C ... +85 °C (ATM60 CANopen) –40 °C ... +85 °C (AHM36 CANopen)						
DeviceNet	–20 °C ... +85 °C						
PROFIBUS	–10 °C ... +70 °C (A3M60) –20 °C ... +85 °C (ATM60 PROFIBUS)						
EtherNet/IP	–30 °C ... +85 °C						
PROFINET	–30 °C ... +85 °C						
EtherCAT®	–30 °C ... +85 °C						
Operating temperature range (mechanical)	–30 °C ... +70 °C						

	BTF08 0 m ... 2 m	BTF08 0 m ... 3 m	BTF08 0 m ... 5 m	BTF13 0 m ... 10 m	BTF13 0 m ... 20 m	BTF13 0 m ... 30 m	BTF19 0 m ... 50 m
Operating temperature range (combination)							
Analog	–30 °C ... +70 °C					–	
SSI	–20 °C ... +70 °C (ATM60) –30 °C ... +70 °C (AHM36)						
CANopen	–20 °C ... +70 °C (ATM60 CANopen) –30 °C ... +70 °C (AHM36 CANopen)						
DeviceNet	–20 °C ... +70 °C						
PROFIBUS	–10 °C ... +70 °C (A3M60) –20 °C ... +70 °C (ATM60 PROFIBUS)						
EtherNet/IP	–30 °C ... +70 °C						
PROFINET	–30 °C ... +70 °C						
EtherCAT®	–30 °C ... +70 °C						
Relative humidity/condensation							
SSI	90% (ATM60, AHM36) [1]						
CANopen	98% (ATM60) [1] 90% (AHM36) [1]						
DeviceNet	98% [1]						
PROFIBUS	95% [1] (A3M60) 98% [1] (ATM60)						
EtherNet/IP	90% [1]						
PROFINET	90% [1]						
EtherCAT®	90% [1]						

[1] Condensation of optical surfaces not permitted.

8015560/2015-09-01
Subject to change without notice

PRF

Performance

	PRF08 0 m ... 2 m	PRF08 0 m ... 3 m	PRF13 0 m ... 5 m	PRF13 0 m ... 10 m	PRF13 0 m ... 20 m	PRF13 0 m ... 30 m	PRF19 0 m ... 50 m
Measuring range	0 m ... 2 m	0 m ... 3 m	0 m ... 5 m	0 m ... 10 m	0 m ... 20 m	0 m ... 30 m	0 m ... 50 m
Reproducibility	Max. 0.2 mm [1]	Max. 0.3 mm [1]	Max. 0.5 mm [1]	Max. 1 mm [1]	Max. 2 mm [1]	Max. 3 mm [1]	Max. 5 mm [1]
Linearity	Max. ± 2 mm [1] [2]	Max. ± 3 mm [1] [2]		Max. ± 6 mm [1] [2]	Max. ± 10 mm [1] [2]	Max. ± 15 mm [1] [2]	Max. ± 24 mm [1] [2]
Hysteresis	Max. 1 mm [1]	Max. 1.5 mm [1]	Max. 2 mm [1]	Max. 4 mm [1]	Max. 6 mm [1]	Max. 8 mm [1]	Max. 10 mm [1]
Resolution (wire draw + encoder)	0.1 mm [3] [4]		0.2 mm [3] [4]				0.4 mm [3] [4]

[1] Value applies to wire draw mechanics.

[2] Value applies under consideration of the exact length of the measuring wire per revolution (located on the wire draw mechanism's label).

[3] The values shown here are rounded.

[4] Sample calculation based on the PRF08 with HTL Push Pull: 200 mm (length of wire draw per revolution - see mechanical data): 2,000 (steps per revolution) = 0.1 mm (resolution from the combination wire draw + encoder)

Interfaces

Encoder	Incremental encoders
Electrical interface	See type code
Connection type	See type code

Electrical data

Maximum output frequency	≤ 600 kHz
Reference signal, position	Electric, logically gated with A and B
Reference signal, number	1 electric, logically gated with A and B
Maximum load current	≤ 30 mA
Initialization time	≤ 32 ms, 30 ms, at mechanical zero pulse width [1] [1]
Supply voltage	4.5 V ... 32 V
Power consumption	0.7 W
MTTFd: mean time to dangerous failure	300 years [2] [3]

[1] Valid positional data can be measured once this time has elapsed.

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

[3] This value relates to the connected encoder only.

Mechanical data

	PRF08 0 m ... 2 m	PRF08 0 m ... 3 m	PRF13 0 m ... 5 m	PRF13 0 m ... 10 m	PRF13 0 m ... 20 m	PRF13 0 m ... 30 m	PRF19 0 m ... 50 m
Mass (incl. encoder)	1.6 kg	1.8 kg	3.1 kg	3.8 kg	5.3 kg	6.5 kg	16.8 kg
Measuring wire material	Highly flexible steel wire, 1.4401 stainless steel V4A						
Mass (measuring wire)	7.1 g/m				2.6 g/m		7.1 g/m
Material, wire draw mechanism housing	Aluminum (anodized), zinc die cast		Aluminum (anodized), plastic				Aluminum (anodized), zinc die cast

[1] The data shown here are average values. The exact lengths are listed on the label for the wire draw mechanism.

[2] These values were measured at an ambient temperature of 25 °C. There may be variations at other temperatures.

[3] A cycle is made up of a wire intake and outake.

[4] The fitted DFS60 encoders are programmed with the specified number of lines and interface ex-works. Separate programming devices are available for the DFS60 encoders and can be used to adjust the electrical interface (TTL/HTL) and the number of lines (up to a maximum of 10,000 lines) in accordance with the customer's requirements.

	PRF08 0 m ... 2 m	PRF08 0 m ... 3 m	PRF13 0 m ... 5 m	PRF13 0 m ... 10 m	PRF13 0 m ... 20 m	PRF13 0 m ... 30 m	PRF19 0 m ... 50 m
Wire draw lengths per revolution	200 mm [1]		334.1 mm [1]		332.4 mm [1]		491.5 mm [1]
Spring return force	6 N ... 14 N [2]		15 N ... 20 N [2]				18 N ... 37 N [2]
Service life of wire draw mechanism	1 mio. cycles [3]						
Actual wire draw length	2.2 m	3.2 m	5.2 m	10.2 m	20.2 m	30.2 m	50.2 m
Measuring wire diameter	1.35 mm				0.81 mm		1.35 mm
Wire acceleration	40 m/s²		70 m/s²	40 m/s²	30 m/s²	15 m/s²	18 m/s²
Traversing speed	4 m/s						
Integrated encoder	DFS60 programmable						
Pulses per revolution	2,000 [4]		1,670 [4]		1,662 [4]		1,225 [4]
Article number encoder	-						
Integrated mechanics	MRA-F080-102D2	MRA-F080-103D2	MRA-F130-105D2	MRA-F130-110D2	MRA-F130-120D1	MRA-F130-130D1	MRA-F190-150D2
Article number mechanics	6028625	6030125	6028626	6028627	6028628	6028629	6028630

[1] The data shown here are average values. The exact lengths are listed on the label for the wire draw mechanism.

[2] These values were measured at an ambient temperature of 25 °C. There may be variations at other temperatures.

[3] A cycle is made up of a wire intake and outake.

[4] The fitted DFS60 encoders are programmed with the specified number of lines and interface ex-works. Separate programming devices are available for the DFS60 encoders and can be used to adjust the electrical interface (TTL/HTL) and the number of lines (up to a maximum of 10,000 lines) in accordance with the customer's requirements.

Ambient data

	PRF08 0 m ... 2 m	PRF08 0 m ... 3 m	PRF13 0 m ... 5 m	PRF13 0 m ... 10 m	PRF13 0 m ... 20 m	PRF13 0 m ... 30 m	PRF19 0 m ... 50 m
EMC	According to EN 61000-6-2 and EN 61000-6-3						
Enclosure rating (encoder)	IP 67						
Enclosure rating (mechanism)	IP 64						IP 31
Resistance to shocks (according to EN 60068-2-27)	60 g, 6 ms						
Resistance to vibration (according to EN 60068-2-6)	20 g, 10 Hz ... 2,000 Hz						
Operating temperature range (encoder)	–40 °C ... +100 °C						
Operating temperature range (mechanical)	–30 °C ... +70 °C						
Operating temperature range (combination)	–30 °C ... +70 °C						
Relative humidity/condensation	90% [1]						

[1] Condensation of optical surfaces not permitted.

Type code

HighLine absolute

Size

0	8	80 mm (only in conjunction with measuring lengths 02 and 03)
1	3	130 mm (only in conjunction with measuring lengths 05, 10, 20, 30)
1	9	190 mm (only in conjunction with measuring length 50)

Electrical interface

A	SSI
C	CANopen [1]
D	DeviceNet [1]
E	EtherCAT®
H	HIPERFACE® (on request)
K	SSI + SinCos (on request)
L	SSI + incremental HTL (on request)
I	EtherNet/IP
N	PROFINET
P	PROFIBUS [1]
R	SSI + incrementally programmable (on request)
S	SSI + SinCos programmable (on request)
T	SSI + incremental TTL (on request)

Connection type

A	Male connector, M23, 12-pin, radial (only in combination with interface A)
B	Male connector, 3 x M12, axial (only in combination with the electrical interfaces E, I, N, and P with axial outlet)
C	Male connector, M12, 8-pin, radial (only in combination with interface A)
H	Male connector for fieldbus adapters (in combination with the electrical interfaces C, D, and P with radial outlet) [1]
K	Cable, 8-wire, universal, 1.5 m (on request)
L	Cable, 8-wire, universal, 3.0 m (on request)
M	Cable, 8-wire, universal, 5.0 m (on request)
N	Male connector, 1 x M12, 8-pin, universal (only in combination with interface A)
Q	Male connector, 1 x M12, 5-pin, universal (only in combination with interface C)

Measuring length

0	2	2 meter
0	3	3 meter
0	5	5 meter
1	0	10 meter
2	0	20 meter
3	0	30 meter
5	0	50 meter

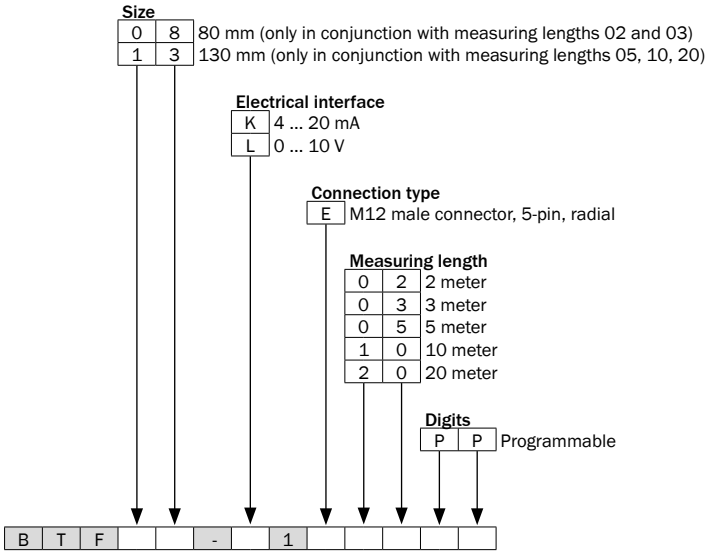
Interface / measuring length

4	0	A = SSI with connection type A / measuring length 2 m, 3 m
2	0	A = SSI with connection type A / measuring length 5 m, 10 m, 20 m, 30 m
1	0	A = SSI with connection type A / measuring length 50 m
4	1	A = SSI with connection type N / measuring length 2 m, 3 m
2	4	A = SSI with connection type N / measuring length 5 m, 10 m
2	5	A = SSI with connection type N / measuring length 20 m, 30 m
1	7	A = SSI with connection type N / measuring length 50 m
4	1	C = CANopen with connection type H; D = DeviceNet; P = PROFINET / measuring length 2 m, 3 m
2	5	C = CANopen with connection type H; D = DeviceNet; P = PROFINET / measuring length 5 m, 10 m, 20 m, 30 m
1	7	C = CANopen with connection type H; D = DeviceNet; P = PROFINET / measuring length 50 m
8	2	C = CANopen with connection type Q / measuring length 2 m, 3 m
4	9	C = CANopen with connection type Q / measuring length 5 m, 10 m, 20 m, 30 m
3	3	C = CANopen with connection type Q / measuring length 50 m
9	9	I = EtherNet/IP; E = EtherCAT®; N = PROFINET / measuring length 2 m, 3 m
9	9	I = EtherNet/IP; E = EtherCAT®; N = PROFINET / measuring length 5 m, 10 m, 20 m, 30 m
9	9	I = EtherNet/IP; E = EtherCAT®; N = PROFINET / measuring length 50 m

B	T	F			-		1		M				

[1] Please order fieldbus adapter for CANopen, DeviceNet, and PROFIBUS with radial outlet separately.

HighLine analog



Ordering information

Measuring range	Electrical interface	Connection type	Type	Part no.
0 m ... 2 m	4 mA ... 20 mA, analog	1 x M12 male connector, 5-pin, radial	BTF08-K1EM02PP	1060964
	0 V to 10 V analog		BTF08-L1EM02PP	1060965
	SSI	M23 male connector, 12-pin, radial	BTF08-A1AM0240	1034299
		Male connector, 1 x M12, 8-pin, universal	BTF08-A1NM0241	1068884
	CANopen	Male connector, 1 x M12, 5-pin, universal	BTF08-C1QM0282	1068885
		Bus adapter with cable screw fixings or round connectors, radial [1]	BTF08-C1HM0241	1034317
	DeviceNet	Bus adapter with cable screw fixings or round connectors, radial [1]	BTF08-D1HM0241	1034311
	PROFIBUS	3 x M12 male connectors, 5-pin, axial	BTF08-P1BM0241	1060966
		Bus adapter with cable screw fixings or round connectors, radial [1]	BTF08-P1HM0241	1034305
	PROFINET	3 x M12 male connectors, 4-pin, axial	BTF08-N1BM0299	1060967
	EtherNet/IP		BTF08-I1BM0299	1060968
	EtherCAT®		BTF08-E1BM0299	1060969

[1] Order adapter separately.

Measuring range	Electrical interface	Connection type	Type	Part no.
0 m ... 3 m	4 mA ... 20 mA, analog	1 x M12 male connector, 5-pin, radial	BTF08-K1EM03PP	1060970
	0 V to 10 V analog		BTF08-L1EM03PP	1060973
	SSI	M23 male connector, 12-pin, radial	BTF08-A1AM0340	1034892
		Male connector, 1 x M12, 8-pin, universal	BTF08-A1NM0341	1068886
	CANopen	Male connector, 1 x M12, 5-pin, universal	BTF08-C1QM0382	1068887
		Bus adapter with cable screw fixings or round connectors, radial [1]	BTF08-C1HM0341	1034895
	DeviceNet	Bus adapter with cable screw fixings or round connectors, radial [1]	BTF08-D1HM0341	1034894
	PROFIBUS	3 x M12 male connectors, 5-pin, axial	BTF08-P1BM0341	1060975
		Bus adapter with cable screw fixings or round connectors, radial [1]	BTF08-P1HM0341	1034893
	PROFINET	3 x M12 male connectors, 4-pin, axial	BTF08-N1BM0399	1060976
	EtherNet/IP		BTF08-I1BM0399	1060978
	EtherCAT®		BTF08-E1BM0399	1060980
0 m ... 5 m	4 mA ... 20 mA, analog	1 x M12 male connector, 5-pin, radial	BTF13-K1EM05PP	1060982
	0 V to 10 V analog		BTF13-L1EM05PP	1060983
	SSI	M23 male connector, 12-pin, radial	BTF13-A1AM0520	1034300
		Male connector, 1 x M12, 8-pin, universal	BTF13-A1NM0524	1068888
	CANopen	Male connector, 1 x M12, 5-pin, universal	BTF13-C1QM0549	1068889
		Bus adapter with cable screw fixings or round connectors, radial [1]	BTF13-C1HM0525	1034318
	DeviceNet	Bus adapter with cable screw fixings or round connectors, radial [1]	BTF13-D1HM0525	1034312
	PROFIBUS	3 x M12 male connectors, 5-pin, axial	BTF13-P1BM0525	1060985
		Bus adapter with cable screw fixings or round connectors, radial [1]	BTF13-P1HM0525	1034306
	PROFINET	3 x M12 male connectors, 4-pin, axial	BTF13-N1BM0599	1060986
	EtherNet/IP		BTF13-I1BM0599	1060987
	EtherCAT®		BTF13-E1BM0599	1060988

[1] Order adapter separately.

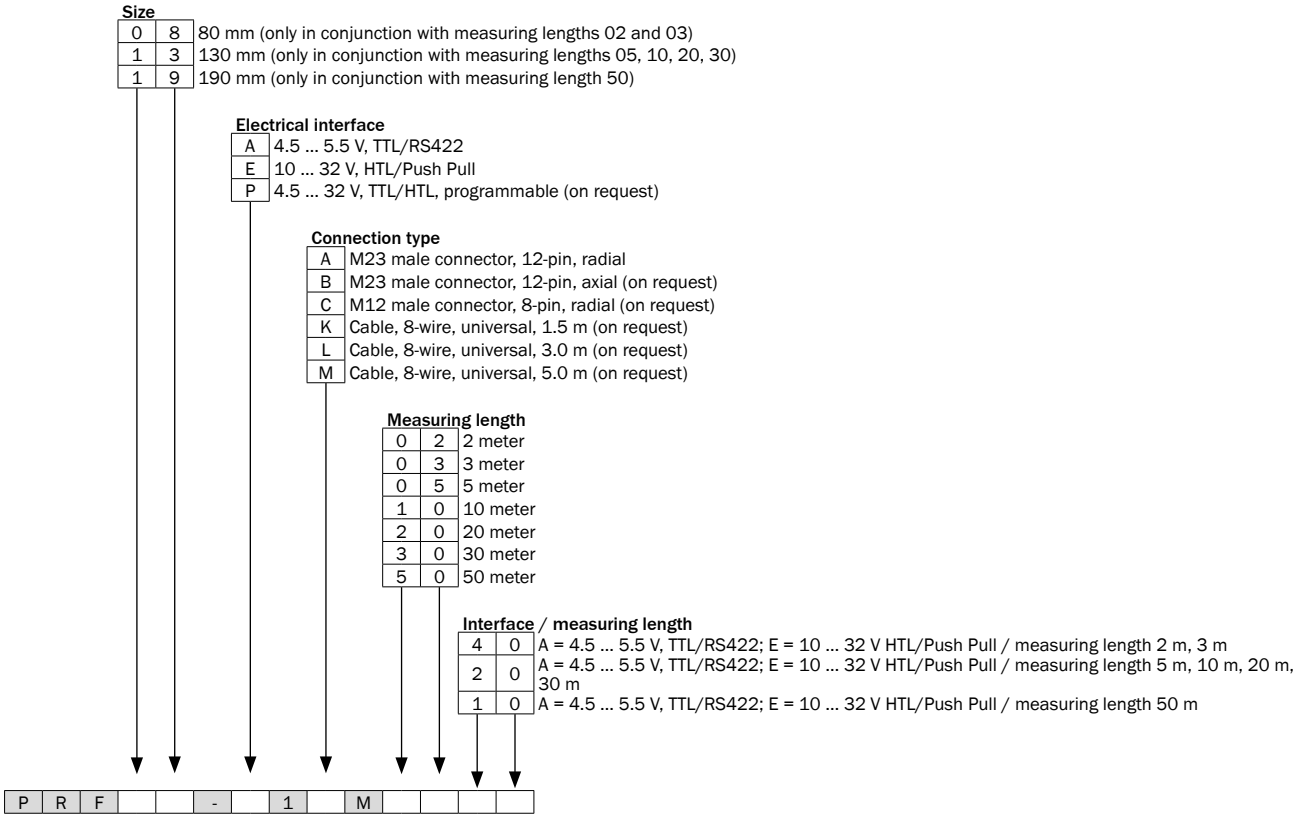
Measuring range	Electrical interface	Connection type	Type	Part no.
0 m ... 10 m	4 mA ... 20 mA, analog	1 x M12 male connector, 5-pin, radial	BTF13-K1EM10PP	1060989
	0 V ... 10 V analog		BTF13-L1EM10PP	1060990
	SSI	M23 male connector, 12-pin, radial	BTF13-A1AM1020	1034301
		Male connector, 1 x M12, 8-pin, universal	BTF13-A1NM1024	1068890
	CANopen	Male connector, 1 x M12, 5-pin, universal	BTF13-C1QM1049	1068891
		Bus adapter with cable screw fixings or round connectors, radial [1]	BTF13-C1HM1025	1034319
	DeviceNet	Bus adapter with cable screw fixings or round connectors, radial [1]	BTF13-D1HM1025	1034313
	PROFIBUS	3 x M12 male connectors, 5-pin, axial	BTF13-P1BM1025	1060991
		Bus adapter with cable screw fixings or round connectors, radial [1]	BTF13-P1HM1025	1034307
	PROFINET	3 x M12 male connectors, 4-pin, axial	BTF13-N1BM1099	1060992
	EtherNet/IP		BTF13-I1BM1099	1060993
	EtherCAT®		BTF13-E1BM1099	1060994
0 m ... 20 m	4 mA ... 20 mA, analog	1 x M12 male connector, 5-pin, radial	BTF13-K1EM20PP	1060995
	0 V ... 10 V analog		BTF13-L1EM20PP	1060996
	SSI	M23 male connector, 12-pin, radial	BTF13-A1AM2020	1034302
		Male connector, 1 x M12, 8-pin, universal	BTF13-A1NM2025	1068892
	CANopen	Male connector, 1 x M12, 5-pin, universal	BTF13-C1QM2049	1068893
		Bus adapter with cable screw fixings or round connectors, radial [1]	BTF13-C1HM2025	1034320
	DeviceNet	Bus adapter with cable screw fixings or round connectors, radial [1]	BTF13-D1HM2025	1034314
	PROFIBUS	3 x M12 male connectors, 5-pin, axial	BTF13-P1BM2025	1060997
		Bus adapter with cable screw fixings or round connectors, radial [1]	BTF13-P1HM2025	1034308
	PROFINET	3 x M12 male connectors, 4-pin, axial	BTF13-N1BM2099	1060998
	EtherNet/IP		BTF13-I1BM2099	1060999
	EtherCAT®		BTF13-E1BM2099	1061000
0 m ... 30 m	SSI	M23 male connector, 12-pin, radial	BTF13-A1AM3020	1034303
		Male connector, 1 x M12, 8-pin, universal	BTF13-A1NM3025	1068894
	CANopen	Male connector, 1 x M12, 5-pin, universal	BTF13-C1QM3049	1068896
		Bus adapter with cable screw fixings or round connectors, radial [1]	BTF13-C1HM3025	1034321
	DeviceNet	Bus adapter with cable screw fixings or round connectors, radial [1]	BTF13-D1HM3025	1034315
	PROFIBUS	3 x M12 male connectors, 5-pin, axial	BTF13-P1BM3025	1061003
		Bus adapter with cable screw fixings or round connectors, radial [1]	BTF13-P1HM3025	1034309
	PROFINET	3 x M12 male connectors, 4-pin, axial	BTF13-N1BM3099	1061004
	EtherNet/IP		BTF13-I1BM3099	1061005
	EtherCAT®		BTF13-E1BM3099	1061006

[1] Order adapter separately.

Measuring range	Electrical interface	Connection type	Type	Part no.
0 m ... 50 m	SSI	M23 male connector, 12-pin, radial	BTF19-A1AM5010	1034304
		Male connector, 1 x M12, 8-pin, universal	BTF19-A1NM5017	1068897
	CANopen	Male connector, 1 x M12, 5-pin, universal	BTF19-C1QM5033	1068898
		Bus adapter with cable screw fixings or round connectors, radial [1]	BTF19-C1HM5017	1034322
	DeviceNet	Bus adapter with cable screw fixings or round connectors, radial [1]	BTF19-D1HM5017	1034316
	PROFIBUS	3 x M12 male connectors, 5-pin, axial	BTF19-P1BM5017	1061009
		Bus adapter with cable screw fixings or round connectors, radial [1]	BTF19-P1HM5017	1034310
	PROFINET	3 x M12 male connectors, 4-pin, axial	BTF19-N1BM5099	1061010
	EtherNet/IP		BTF19-I1BM5099	1061011
	EtherCAT®		BTF19-E1BM5099	1061012

[1] Order adapter separately.

HighLine incremental



Ordering information

- Connection type: M23 male connector, 12-pin, radial

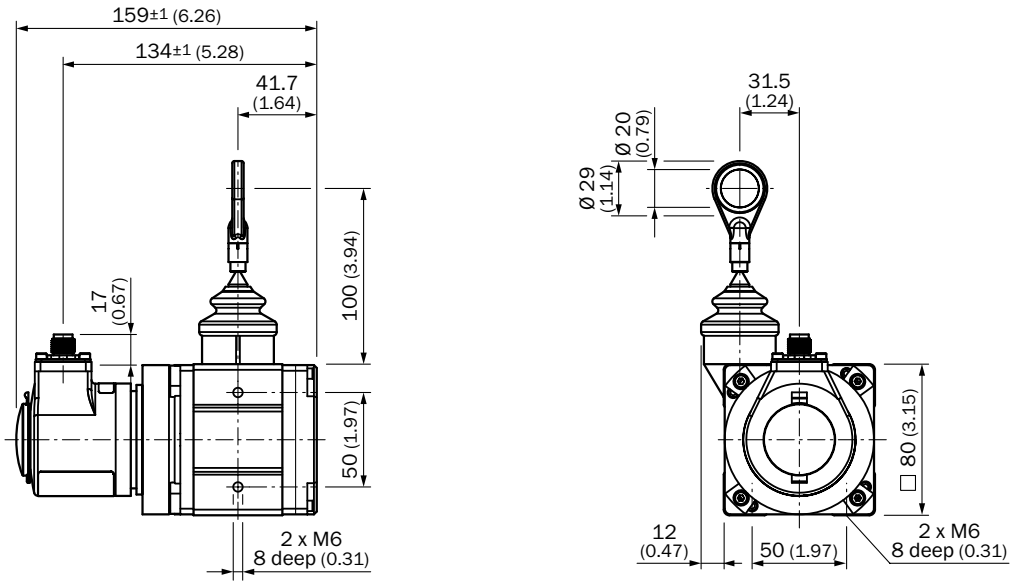
Measuring range	Electrical interface	Type	Part no.
0 m ... 2 m	4.5 V...5.5 V, TTL/RS422	PRF08-A1AM0240	1034323
	10 V ... 32 V, HTL/Push Pull	PRF08-E1AM0240	1034335
0 m ... 3 m	4.5 V...5.5 V, TTL/RS422	PRF08-A1AM0340	1034896
	10 V ... 32 V, HTL/Push Pull	PRF08-E1AM0340	1034898
0 m ... 5 m	4.5 V...5.5 V, TTL/RS422	PRF13-A1AM0520	1034324
	10 V ... 32 V, HTL/Push Pull	PRF13-E1AM0520	1034336
0 m ... 10 m	4.5 V...5.5 V, TTL/RS422	PRF13-A1AM1020	1034325
	10 V ... 32 V, HTL/Push Pull	PRF13-E1AM1020	1034337
0 m ... 20 m	4.5 V...5.5 V, TTL/RS422	PRF13-A1AM2020	1034326
	10 V ... 32 V, HTL/Push Pull	PRF13-E1AM2020	1034338
0 m ... 30 m	4.5 V...5.5 V, TTL/RS422	PRF13-A1AM3020	1034327
	10 V ... 32 V, HTL/Push Pull	PRF13-E1AM3020	1034339
0 m ... 50 m	4.5 V...5.5 V, TTL/RS422	PRF19-A1AM5010	1034328
	10 V ... 32 V, HTL/Push Pull	PRF19-E1AM5010	1034340

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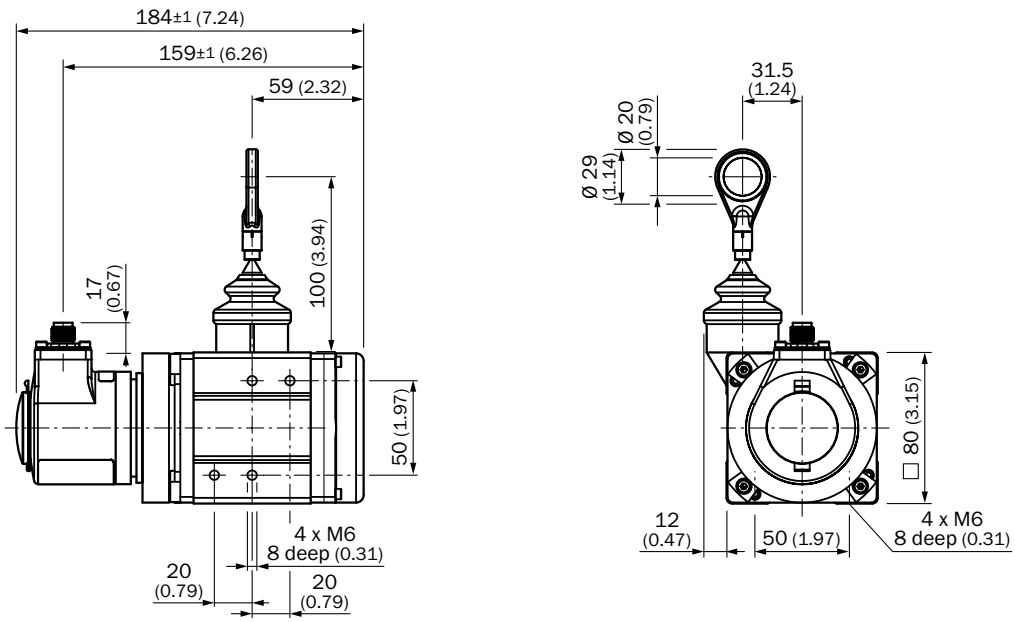
Subject to change without notice

Dimensional drawings (dimensions in mm)

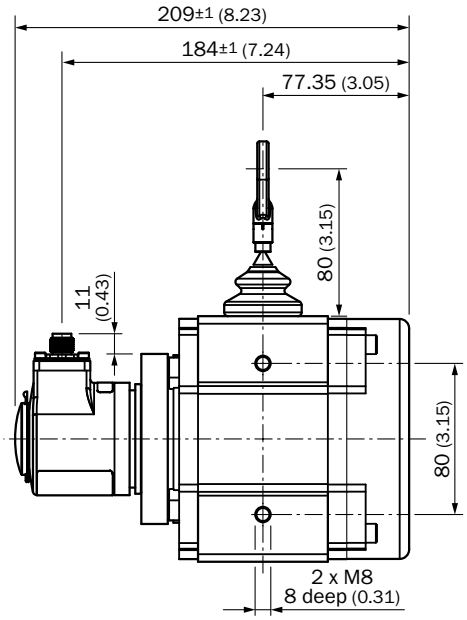
BTF08 up to 2 m
Analog

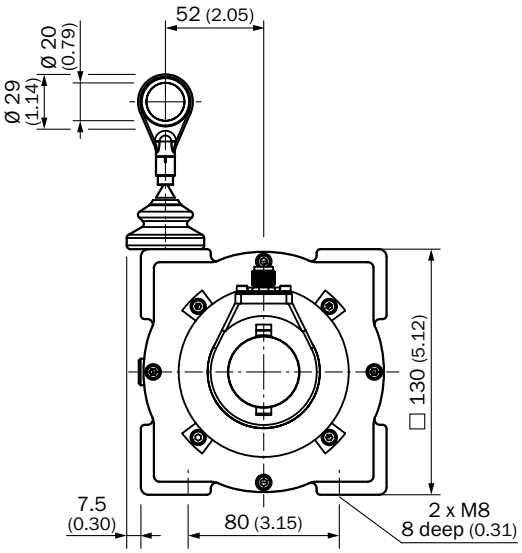


BTF08 up to 3 m
Analog

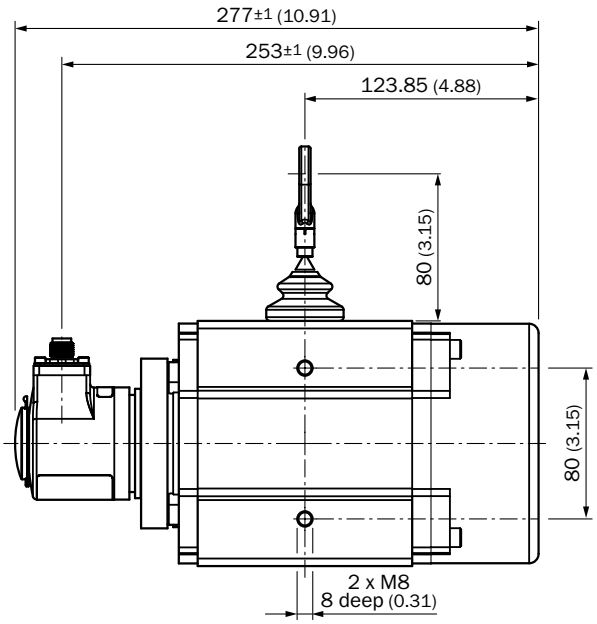


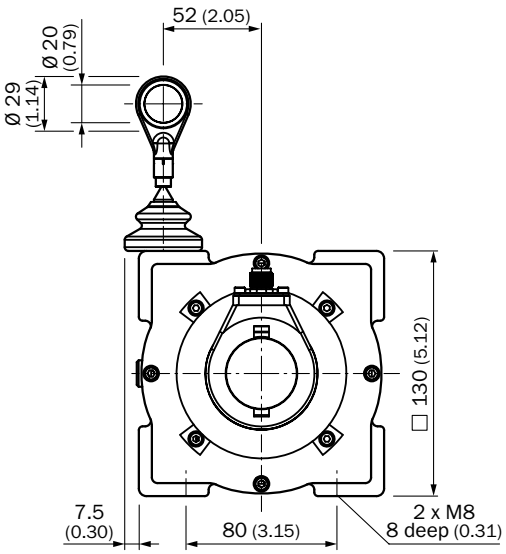
BTF13 up to 5 m
Analog





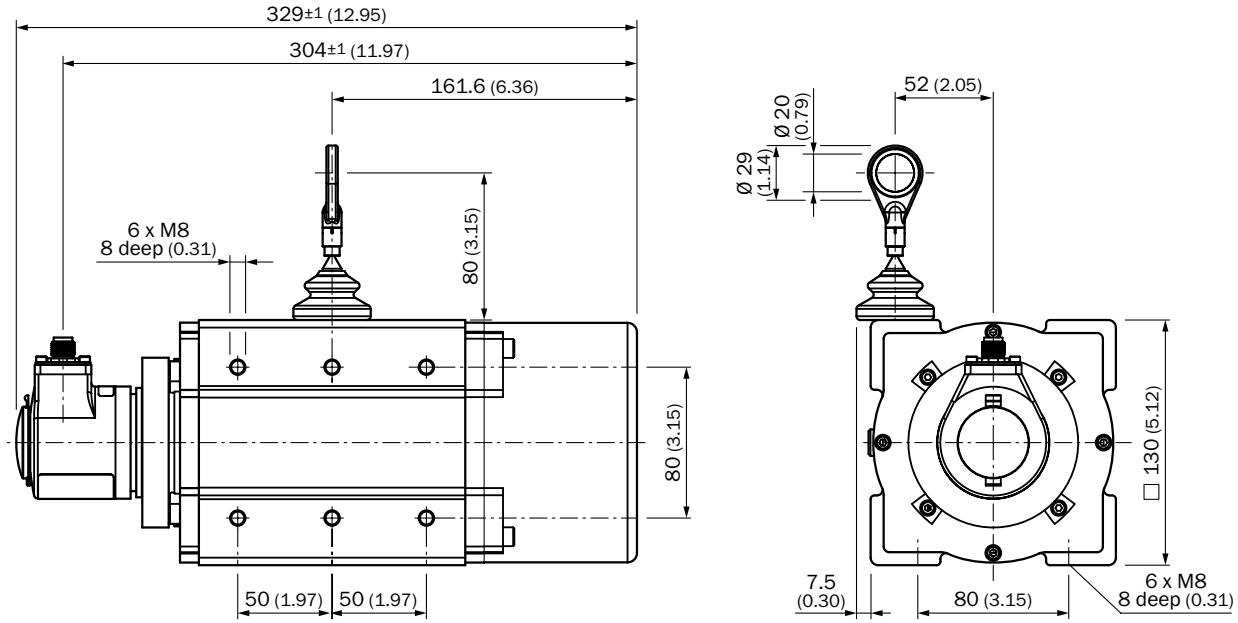
BTF13 up to 10 m
Analog



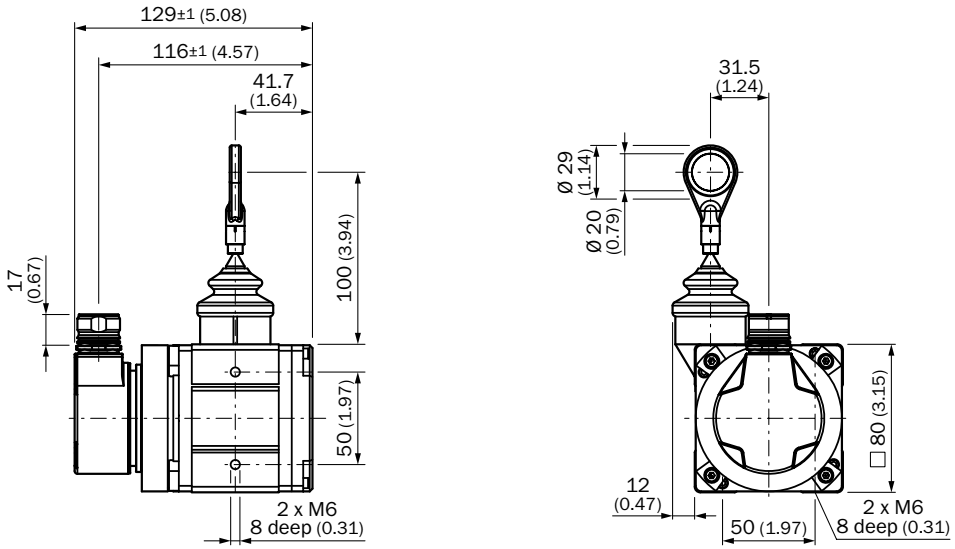


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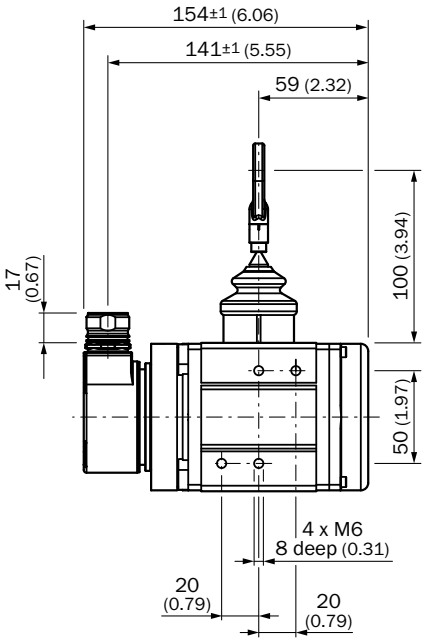
BTF13 up to 20 m
Analog

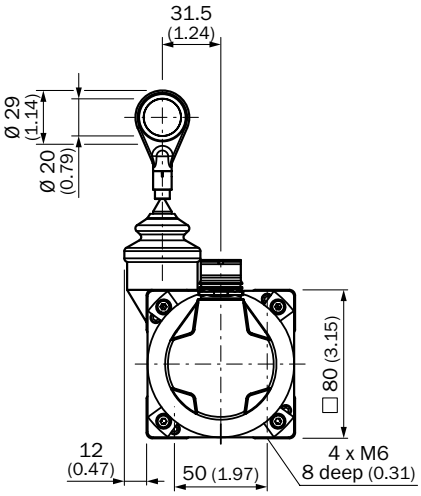


BTF08 up to 2 m
SSI

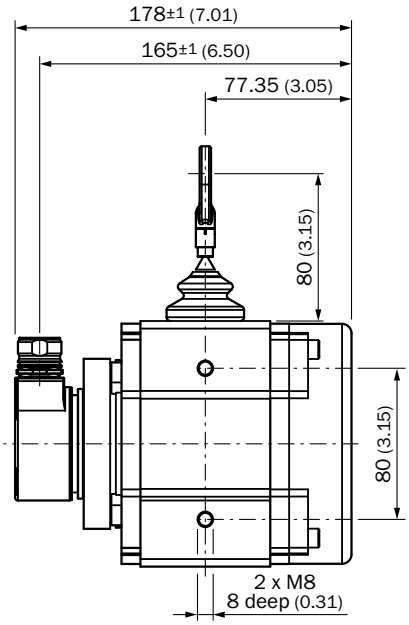


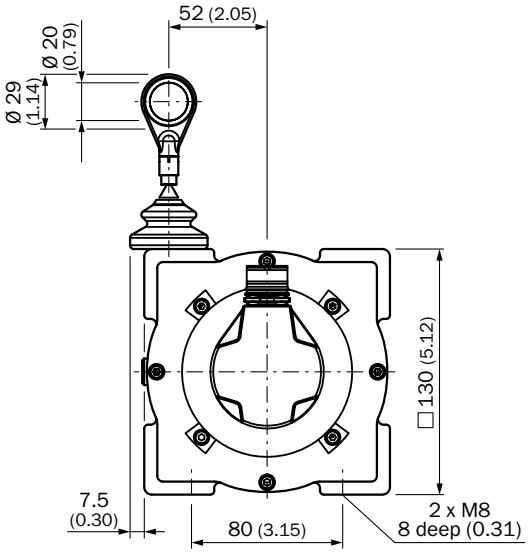
BTF08 up to 3 m
SSI



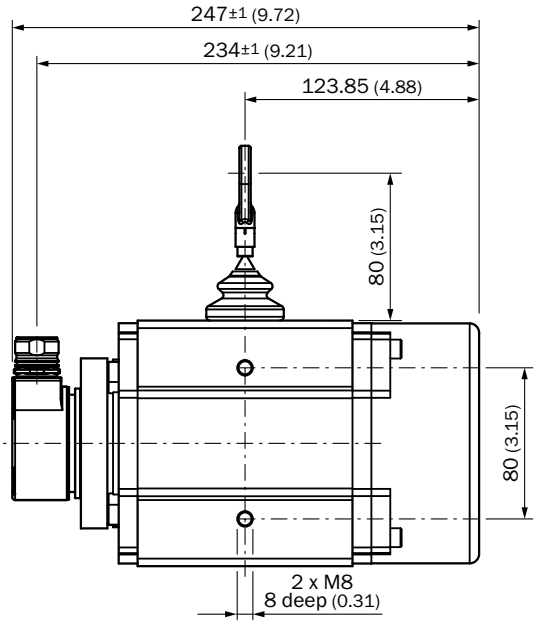


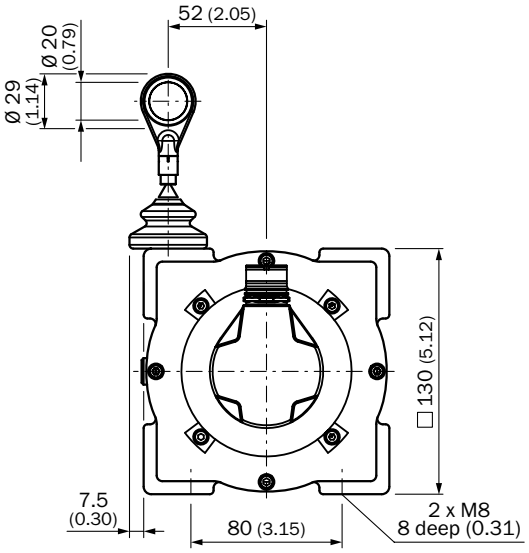
BTF13 up to 5 m
SSI



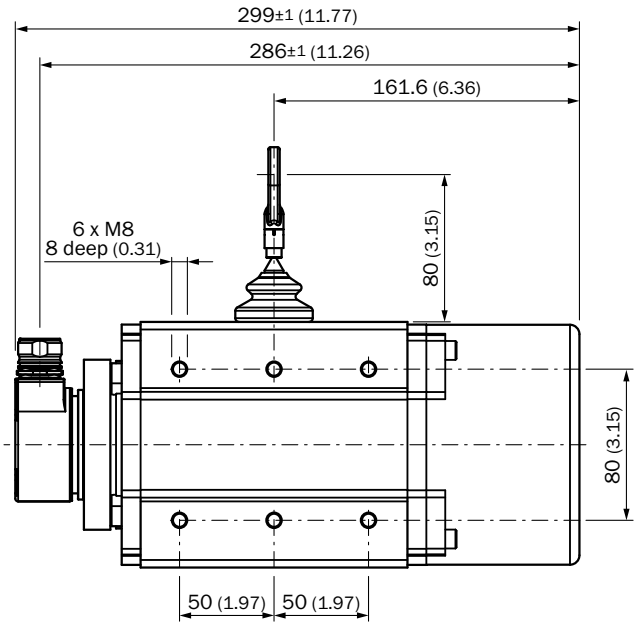


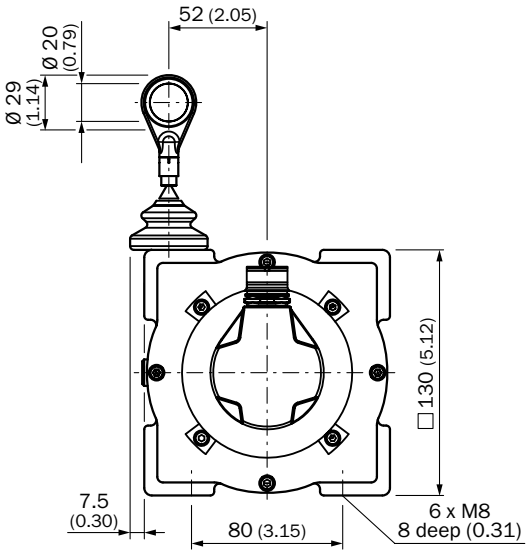
BTF13 up to 10 m
SSI



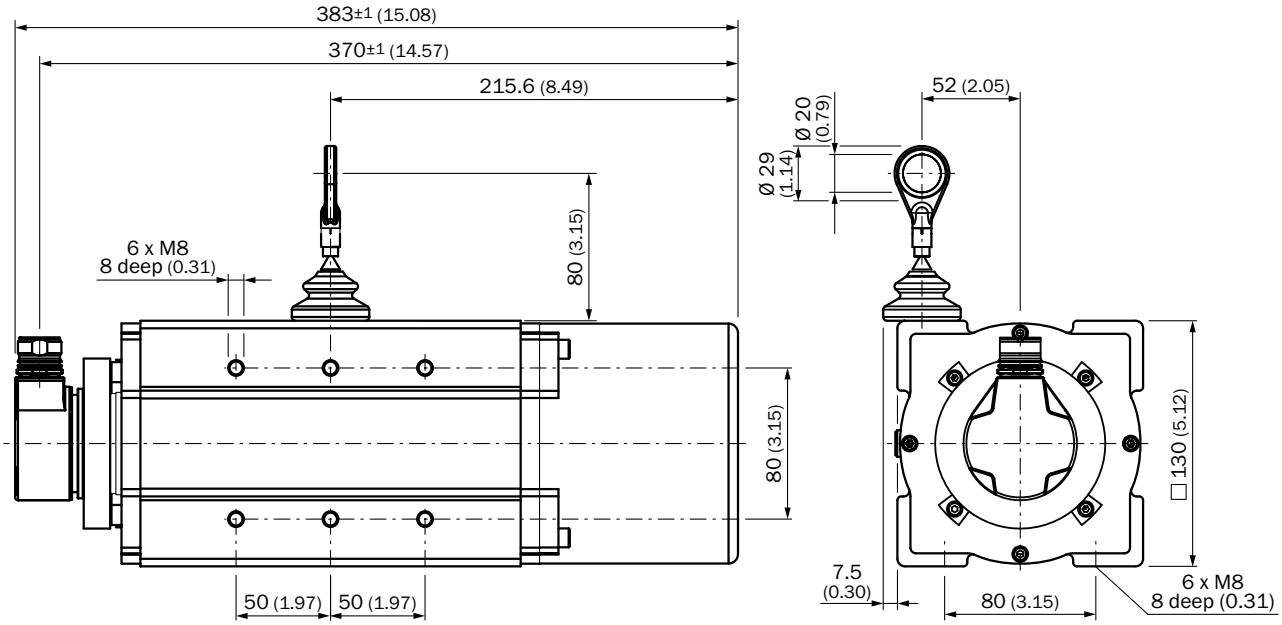


BTF13 up to 20 m
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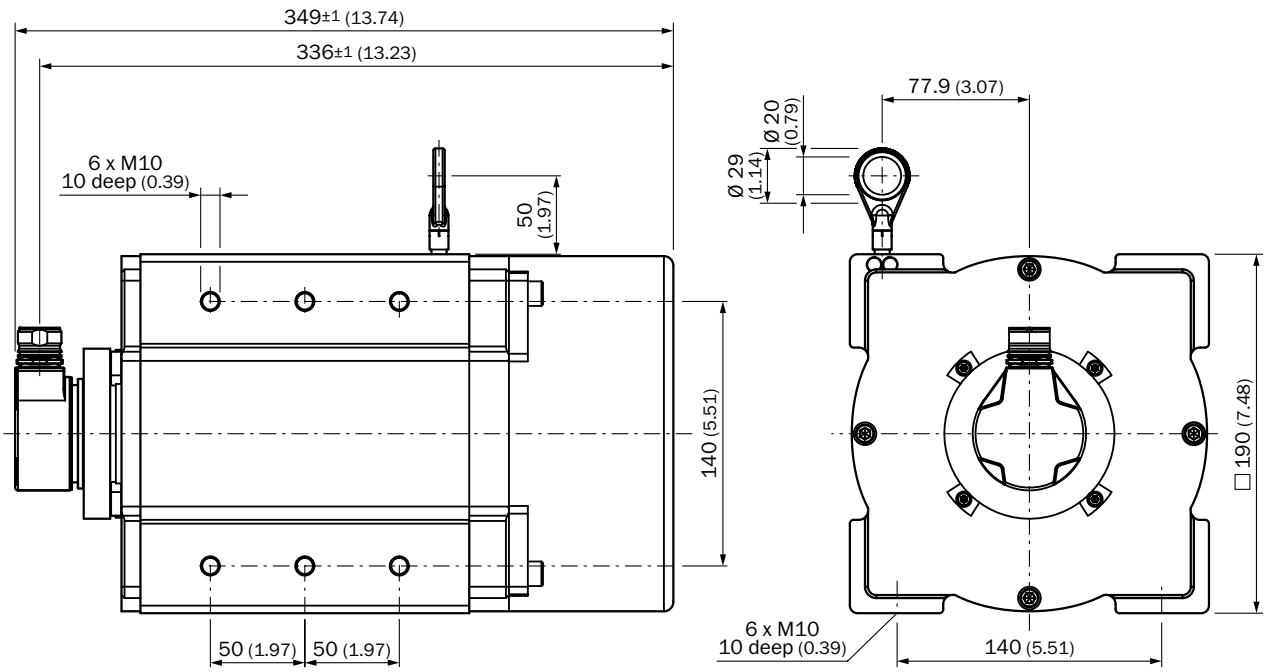




BTF13 up to 20 m
SSI

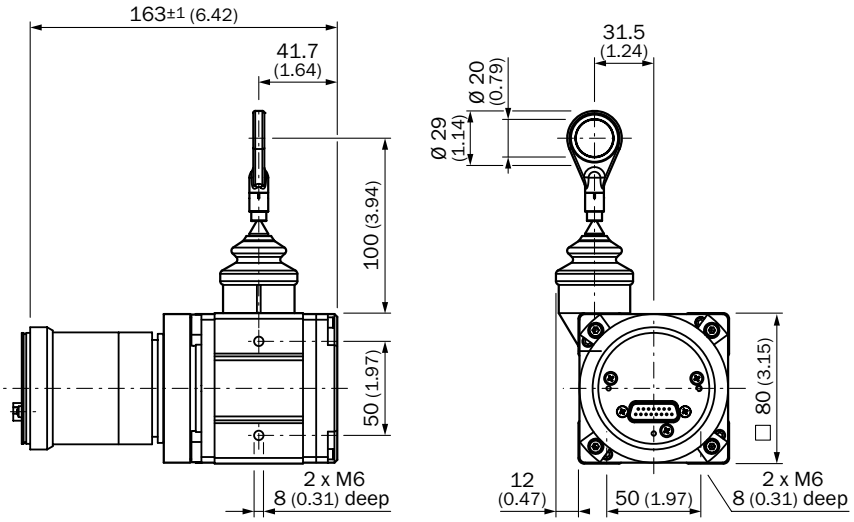


BTF19 up to 50 m
SSI

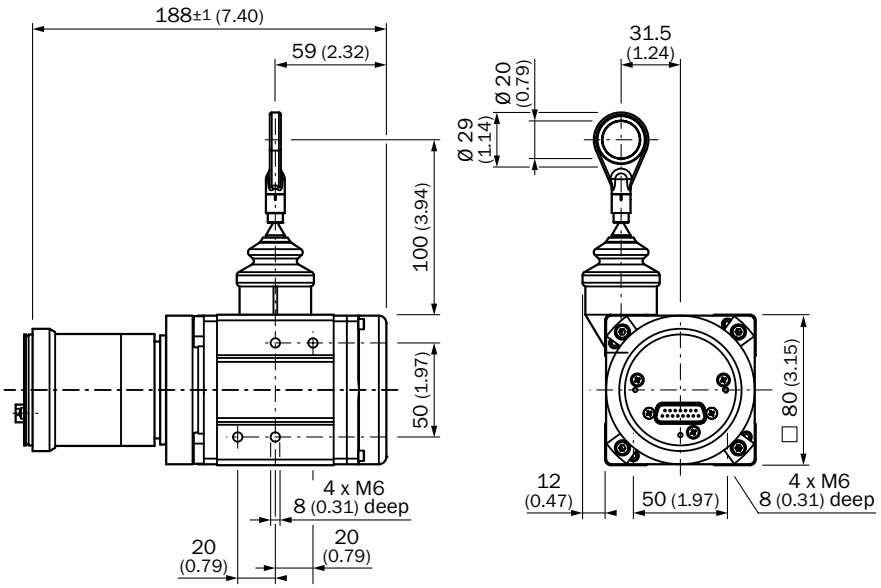


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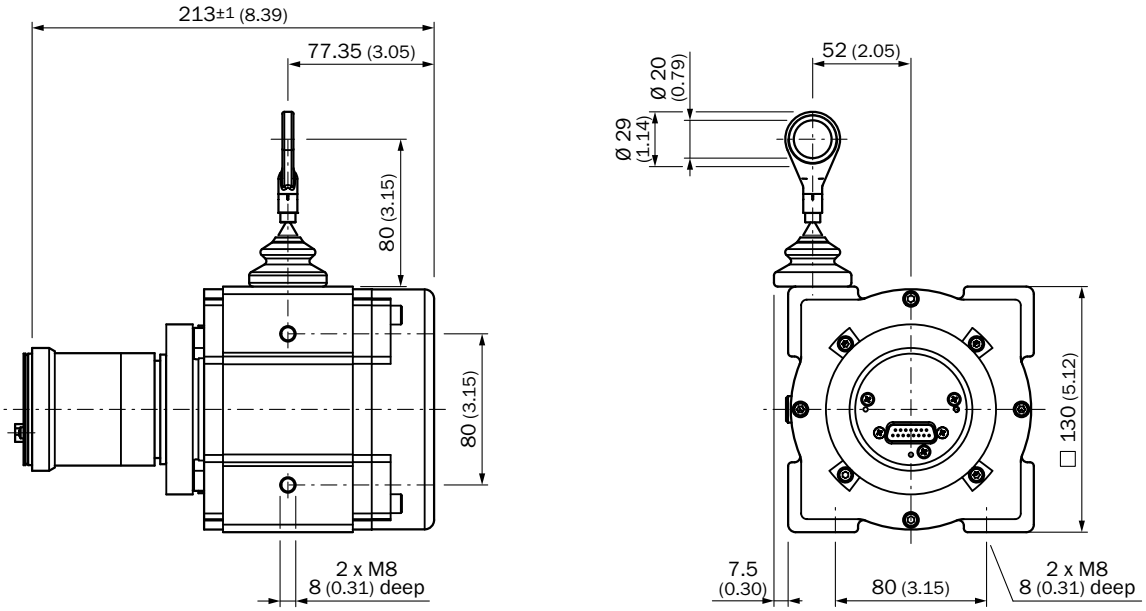
BTF08 up to 2 m
CANopen, PROFIBUS, DeviceNet (ATM60)



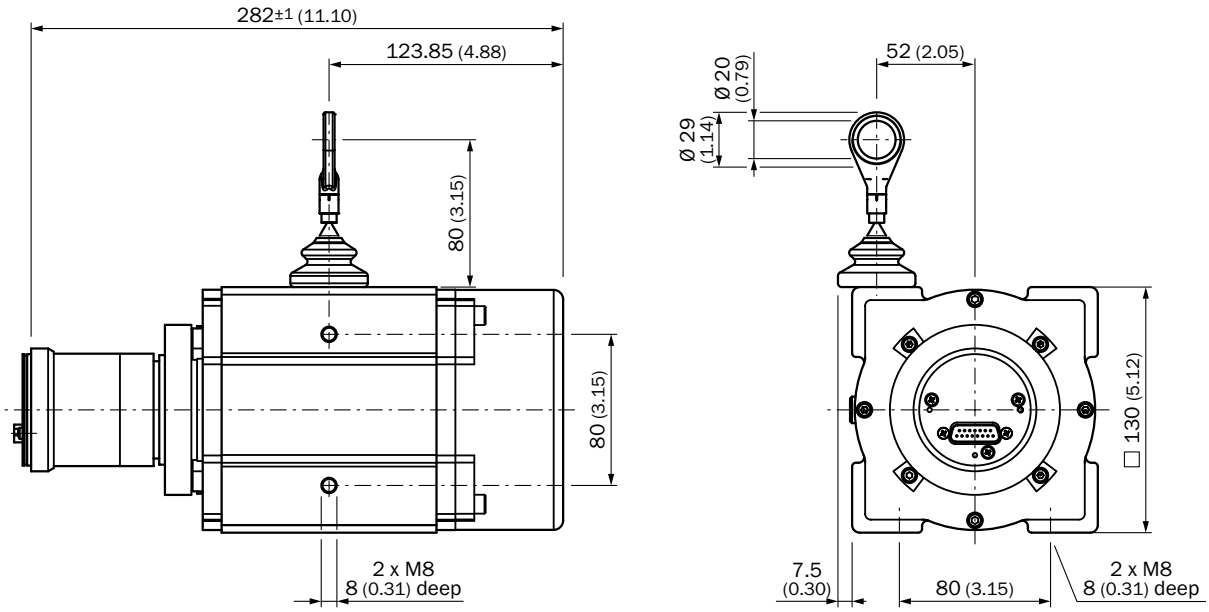
BTF08 up to 3 m
CANopen, PROFIBUS, DeviceNet (ATM60)



BTF13 up to 5 m
CANopen, PROFIBUS, DeviceNet (ATM60)

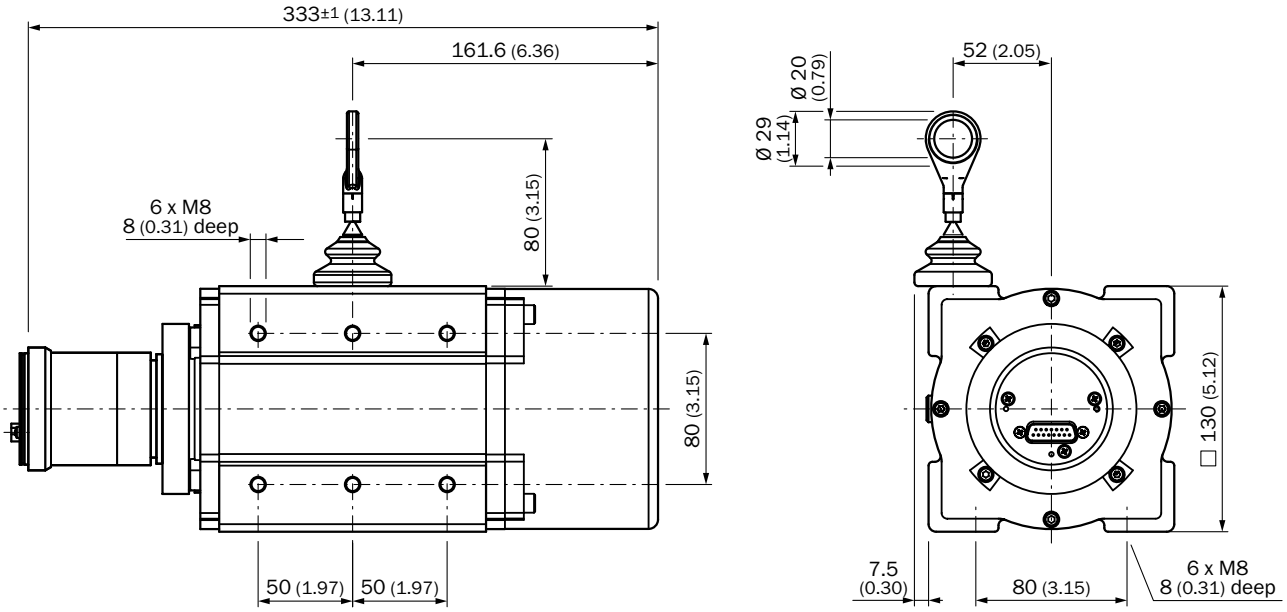


BTF13 up to 10 m
CANopen, PROFIBUS, DeviceNet (ATM60)

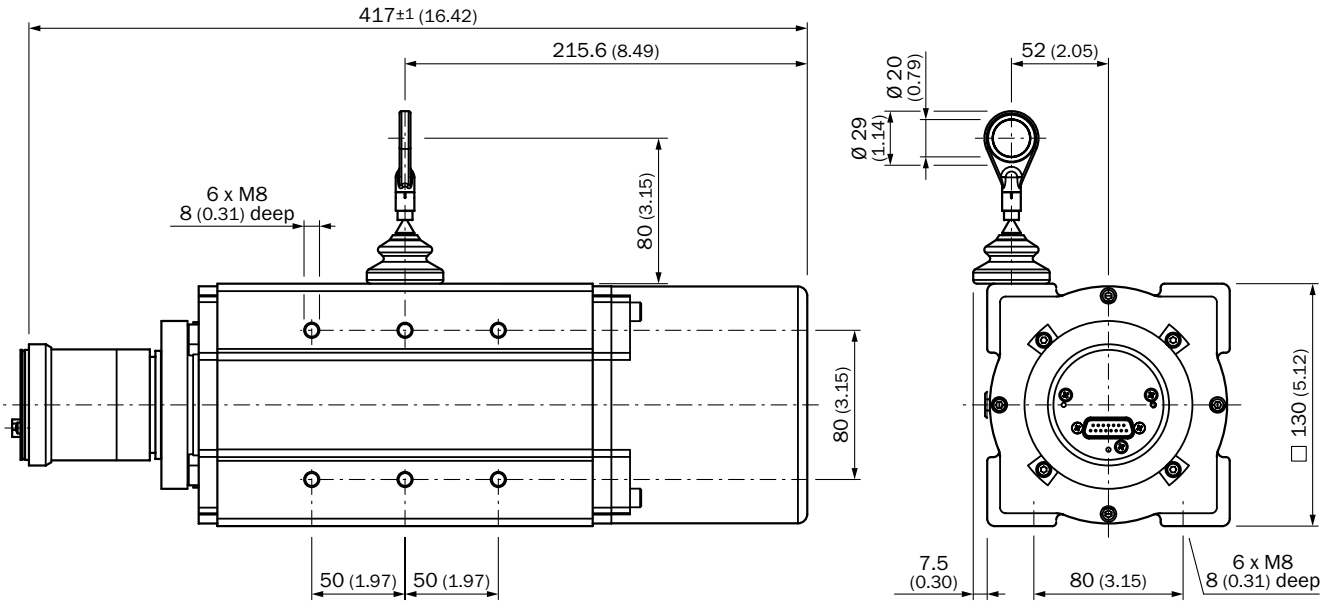


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Subject to change without notice

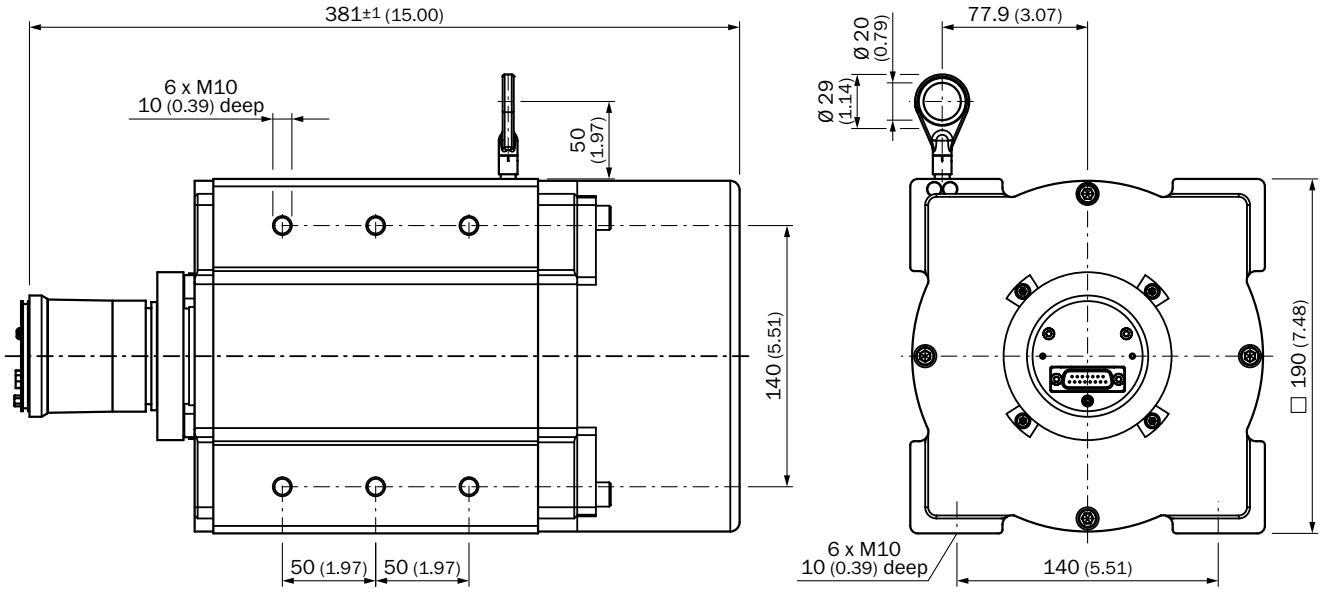
BTF13 up to 20 m
CANopen, PROFIBUS, DeviceNet (ATM60)



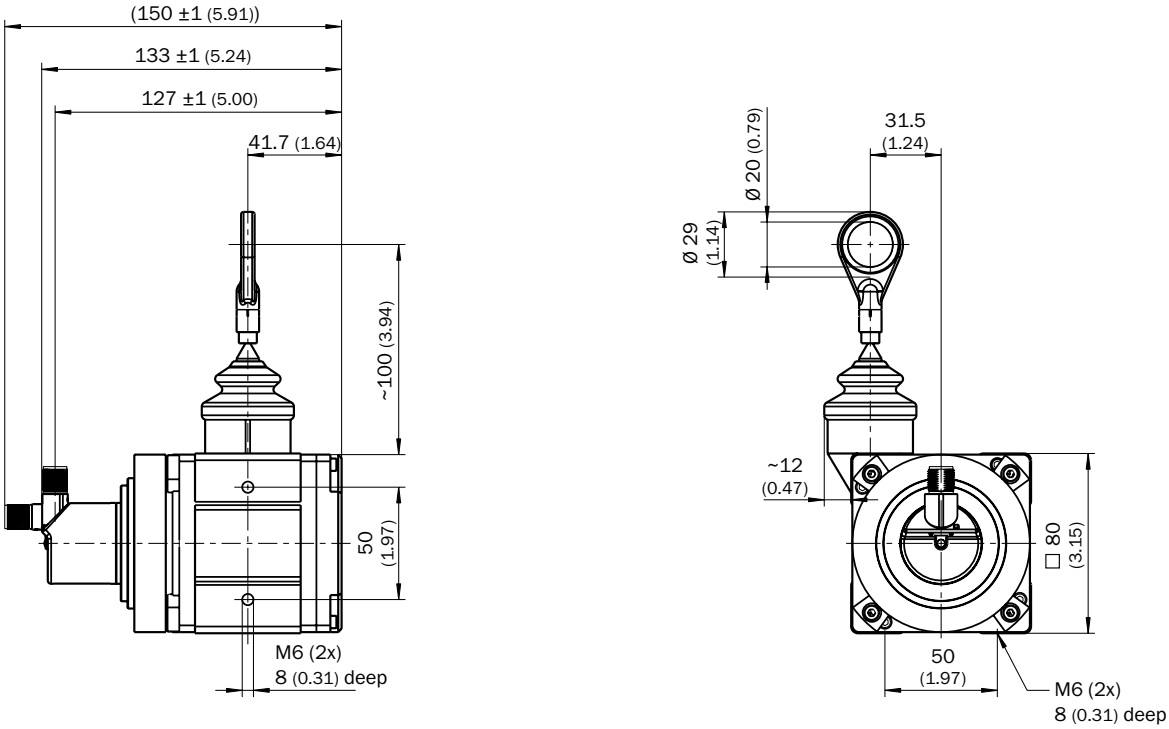
BTF13 up to 30 m
CANopen, PROFIBUS, DeviceNet (ATM60)



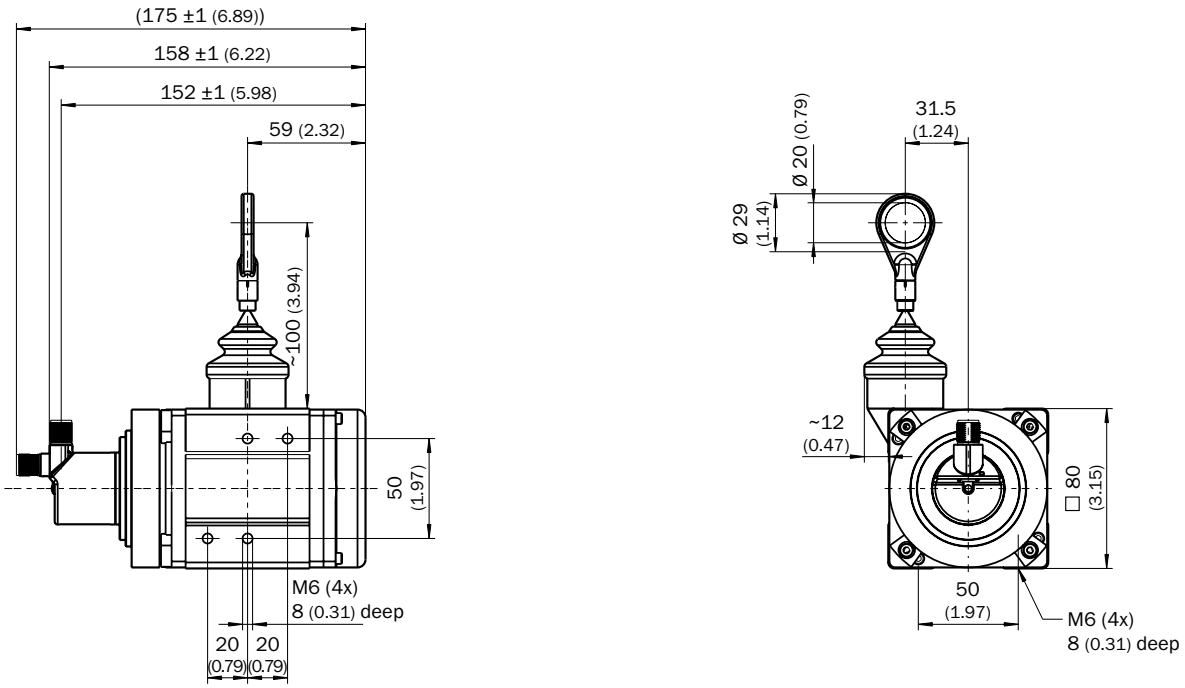
BTF19 up to 50 m
CANopen, PROFIBUS, DeviceNet (ATM60)



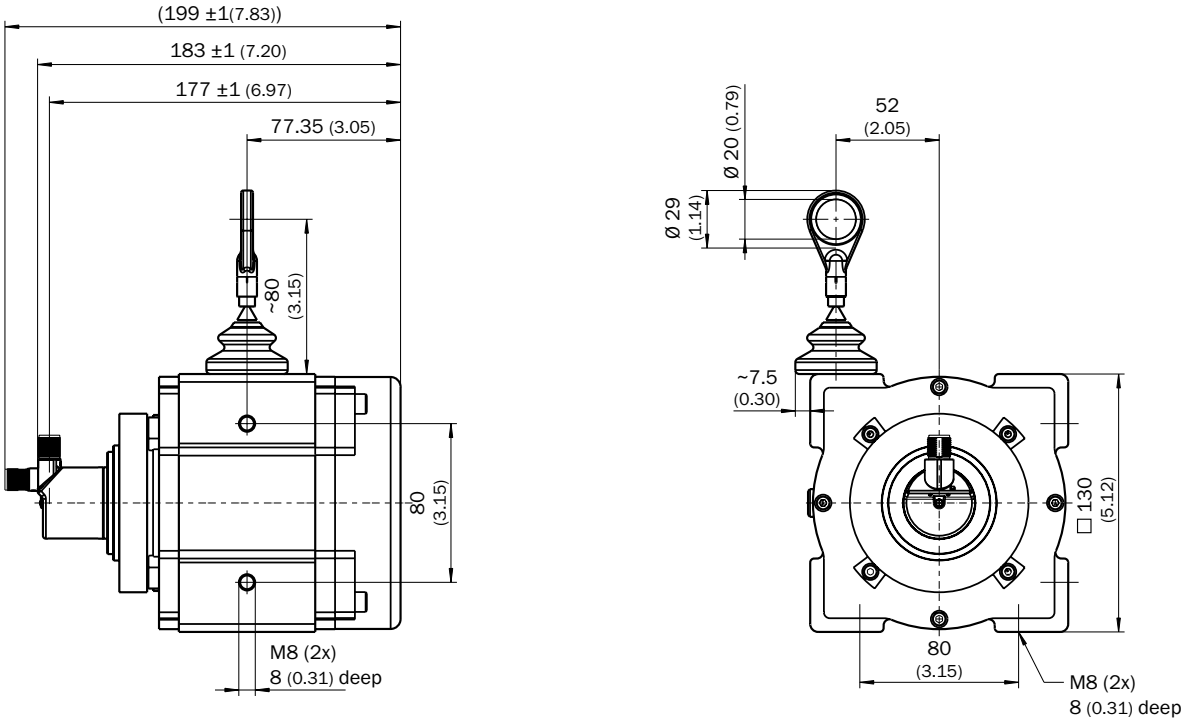
BTF08 up to 2 m
CANopen, SSI (AHM36)



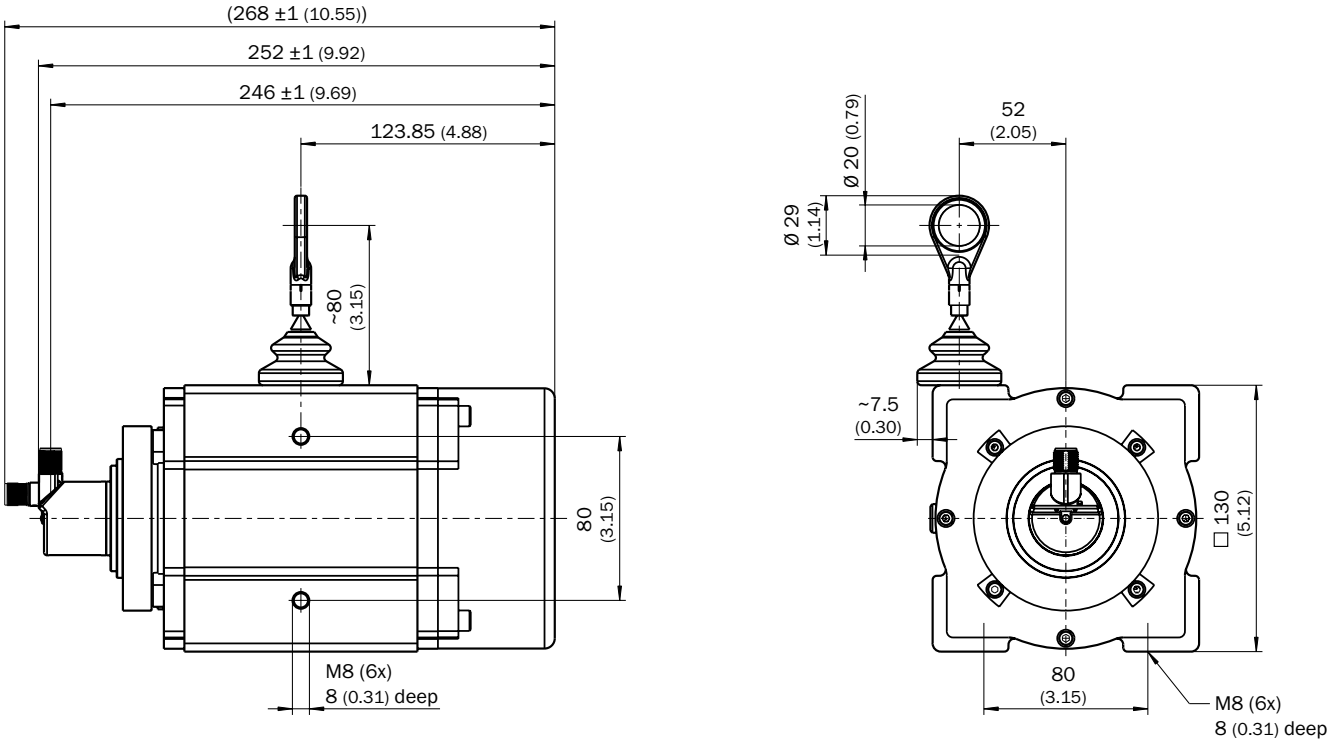
BTF08 up to 3 m
CANopen, SSI (AHM36)



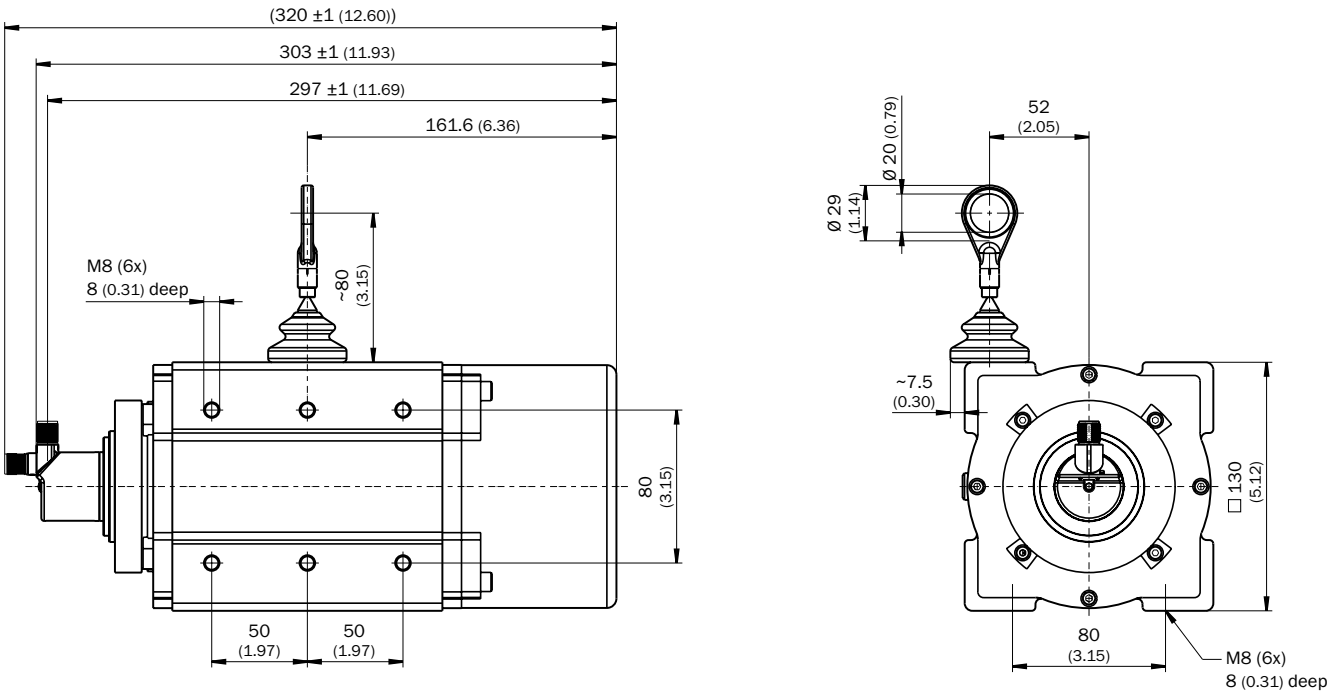
BTF13 up to 5 m
CANopen, SSI (AHM36)



BTF13 up to 10 m
CANopen, SSI (AHM36)

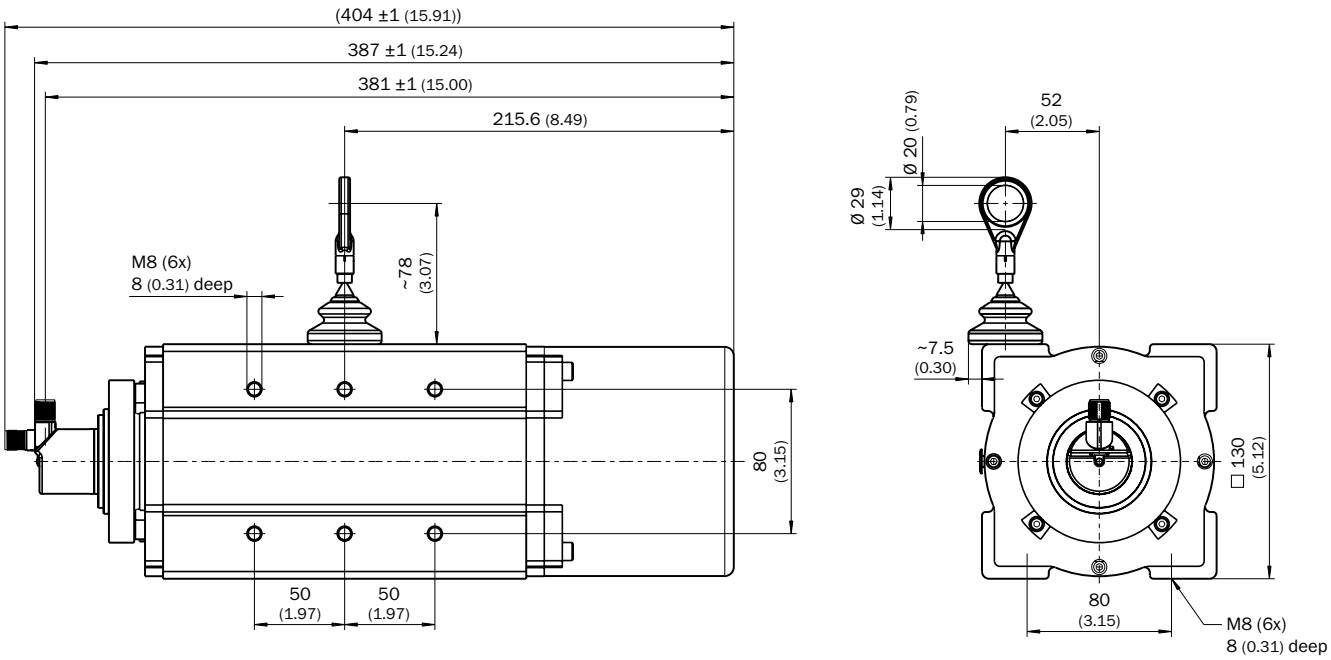


BTF13 up to 20 m
CANopen, SSI (AHM36)

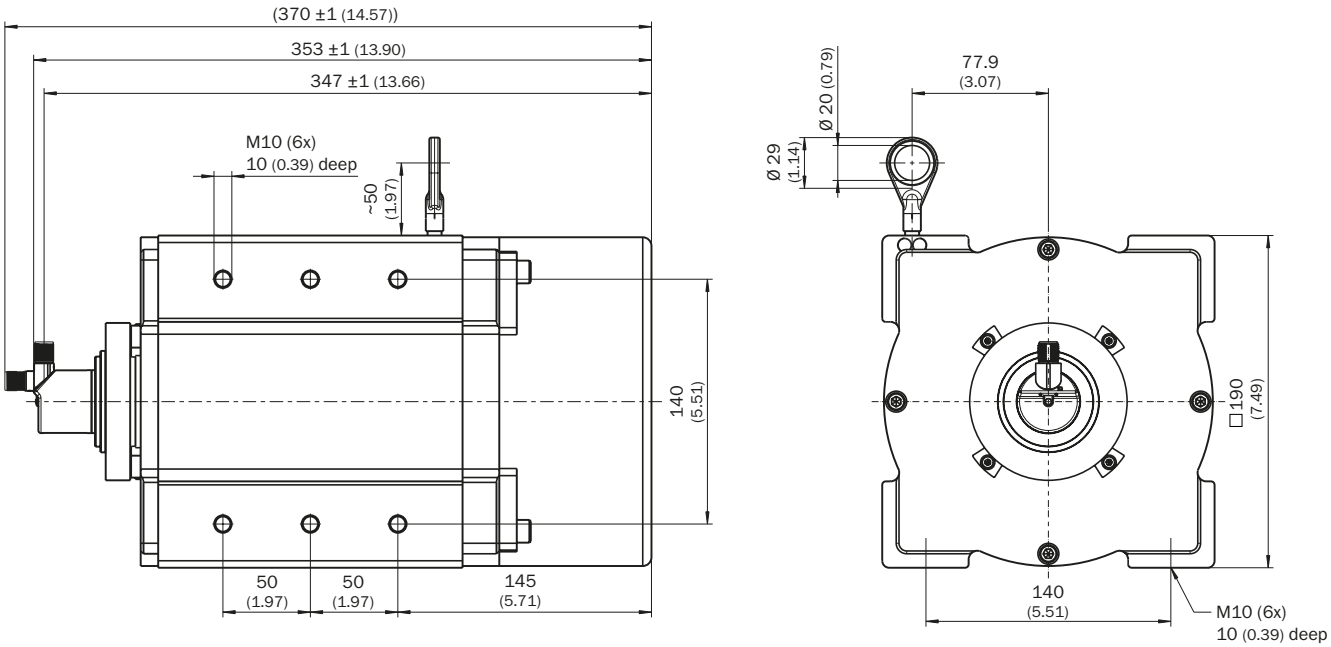


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Subject to change without notice

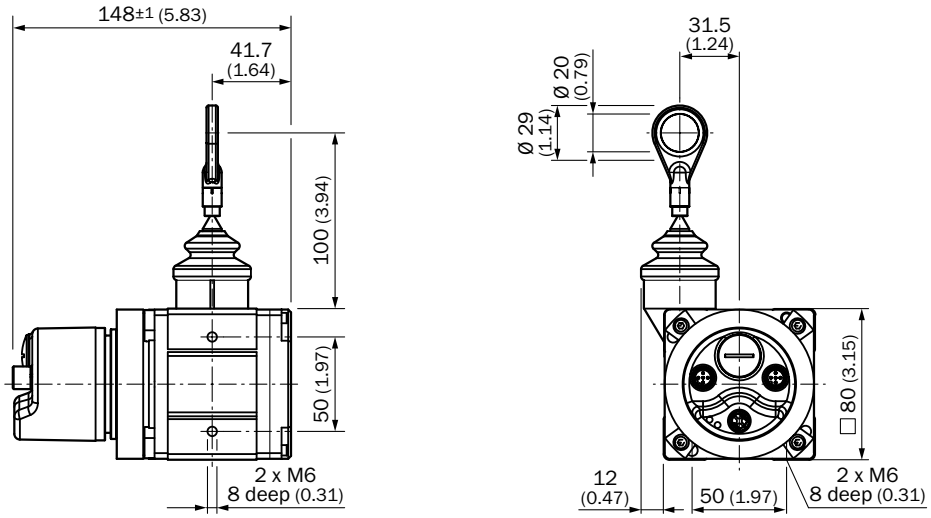
BTF13 up to 30 m
CANopen, SSI (AHM36)



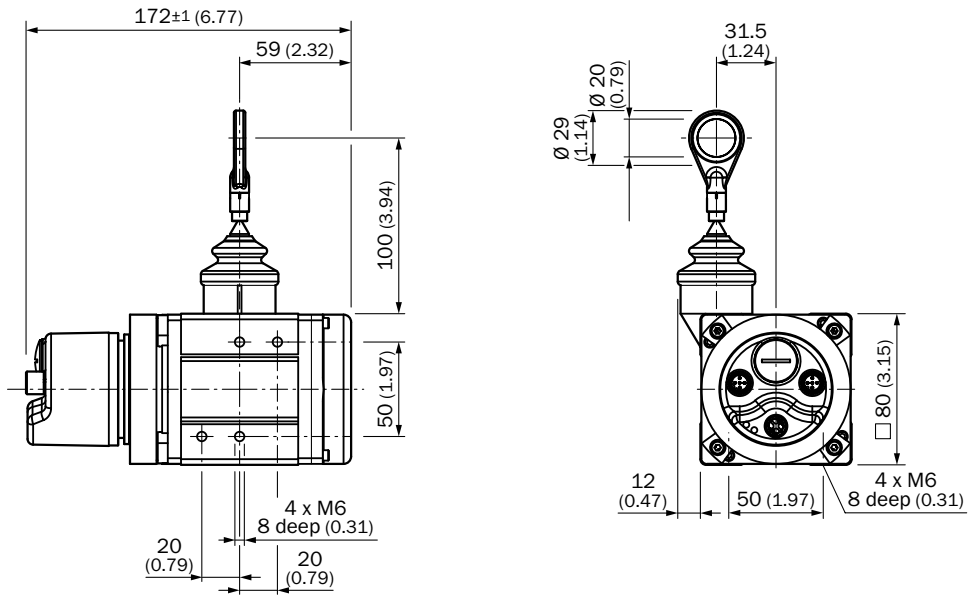
BTF19 up to 50 m
CANopen, SSI (AHM36)



BTF08 up to 2 m
PROFIBUS (A3M60)

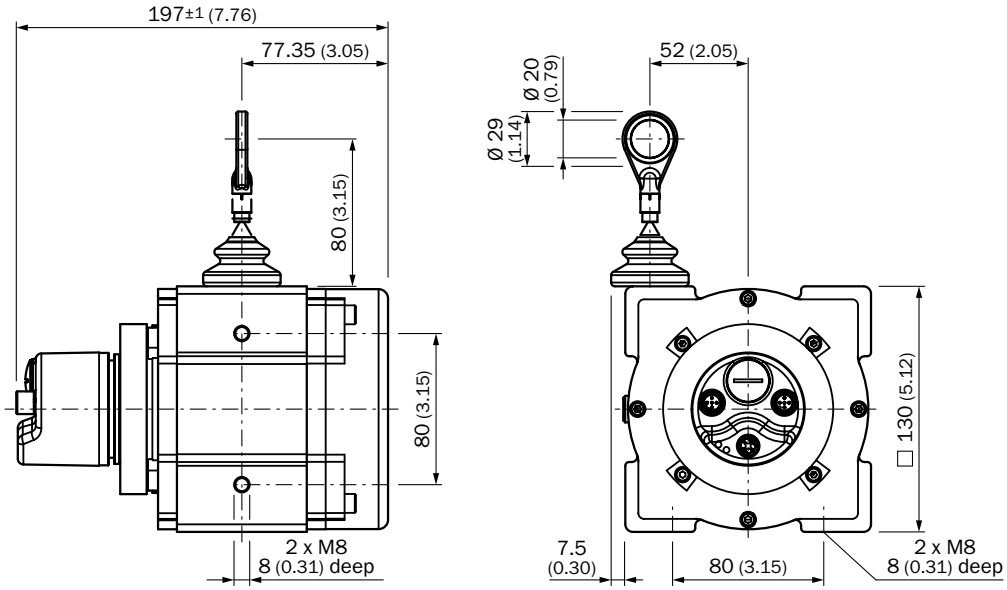


BTF08 up to 3 m
PROFIBUS (A3M60)

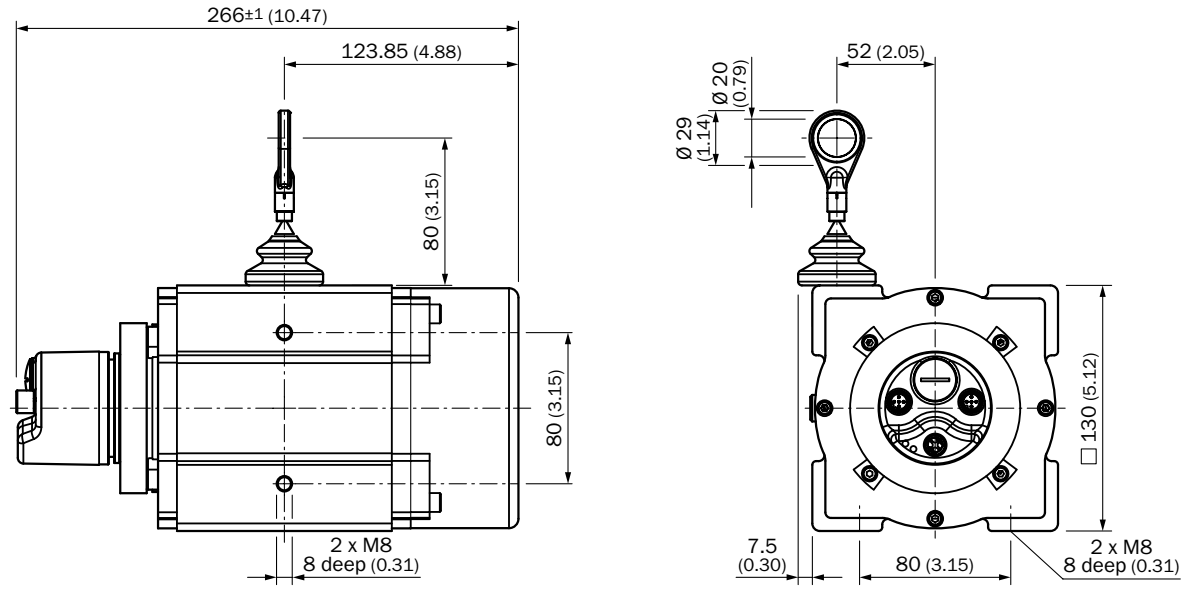


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Subject to change without notice

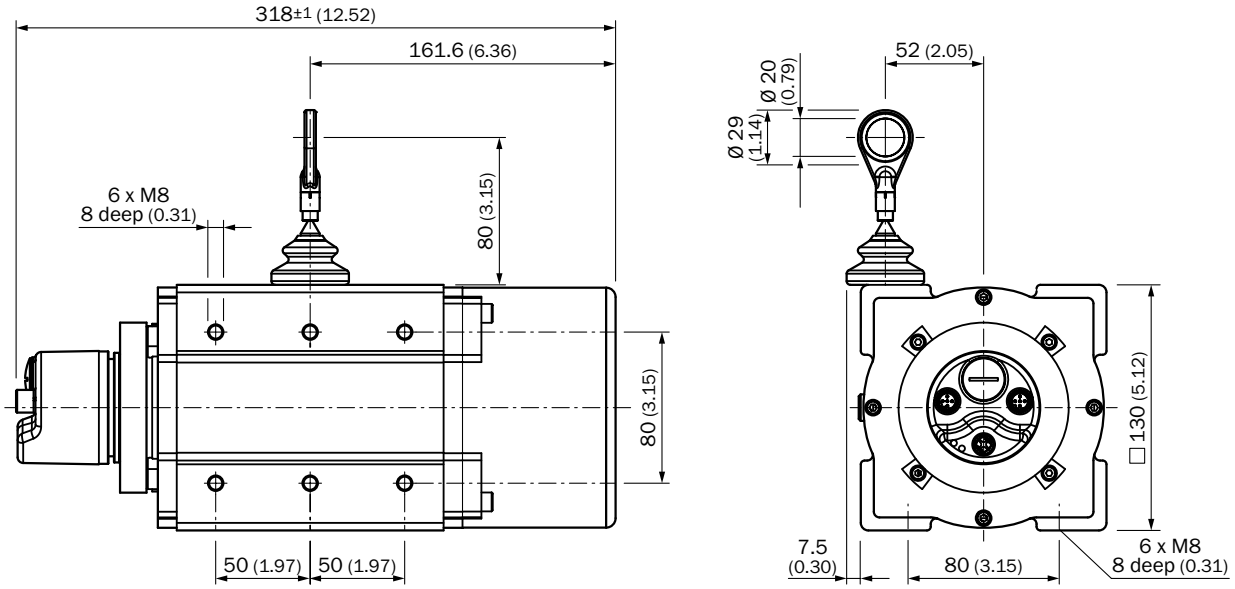
BTF13 up to 5 m
PROFIBUS (A3M60)



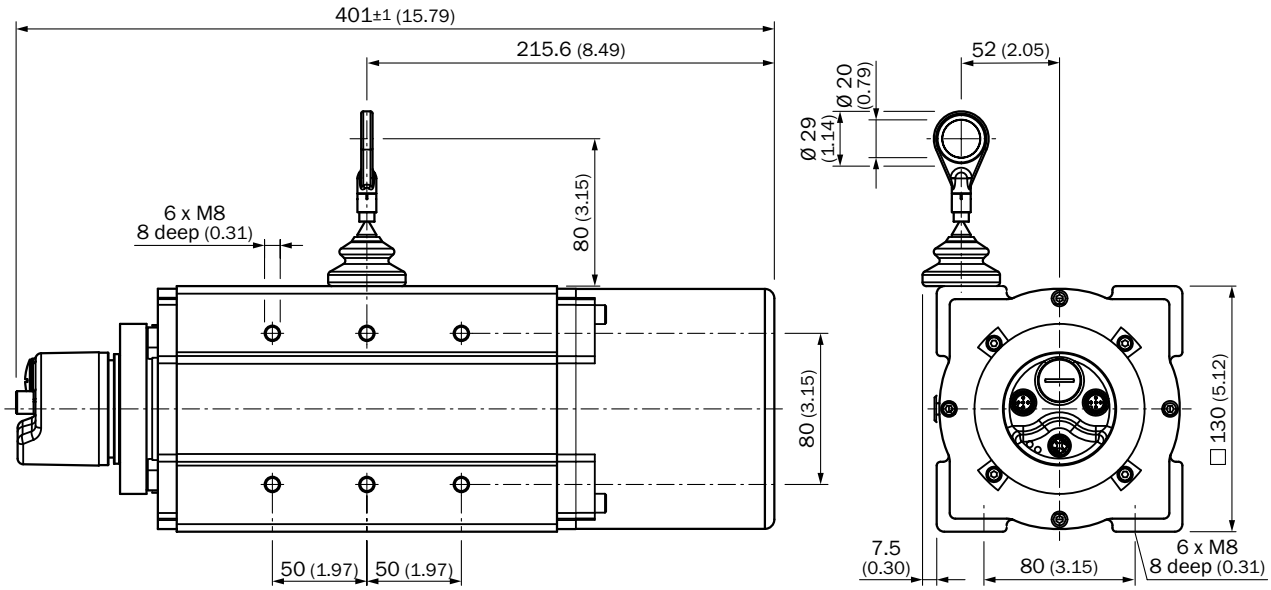
BTF13 up to 10 m
PROFIBUS (A3M60)



BTF13 up to 20 m
PROFIBUS (A3M60)

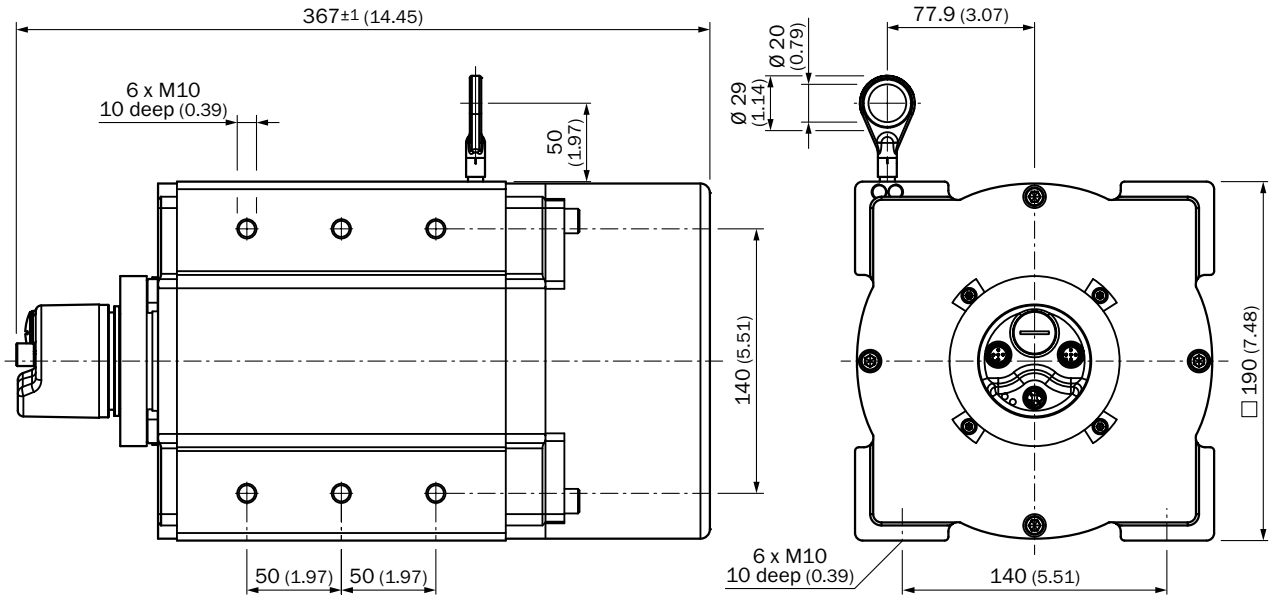


BTF13 up to 30 m
PROFIBUS (A3M60)

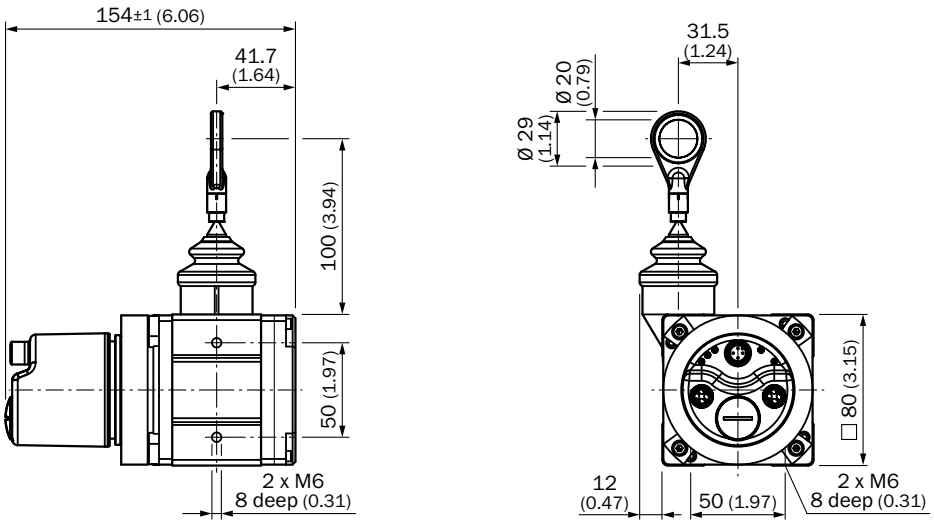


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Subject to change without notice

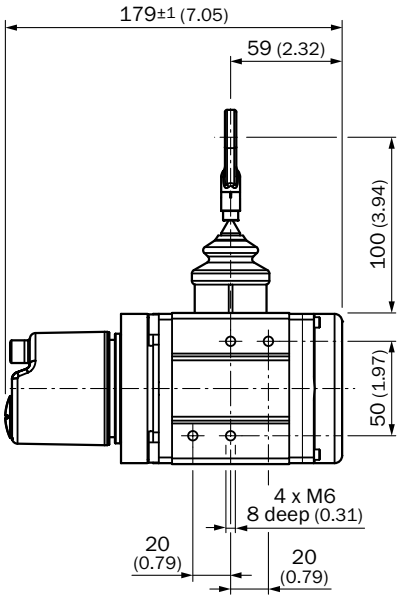
BTF19 up to 50 m
PROFIBUS (A3M60)

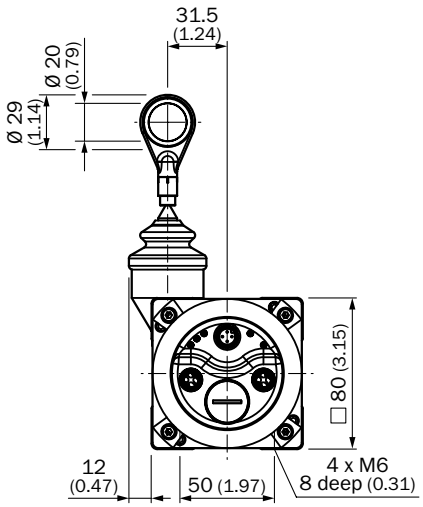


BTF08 up to 2 m
EtherNet/IP, EtherCAT®, PROFINET

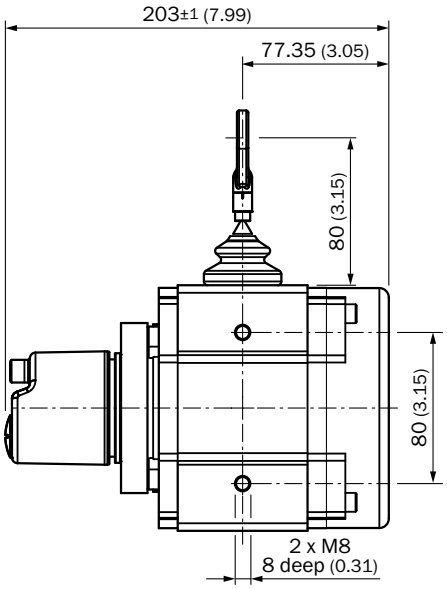


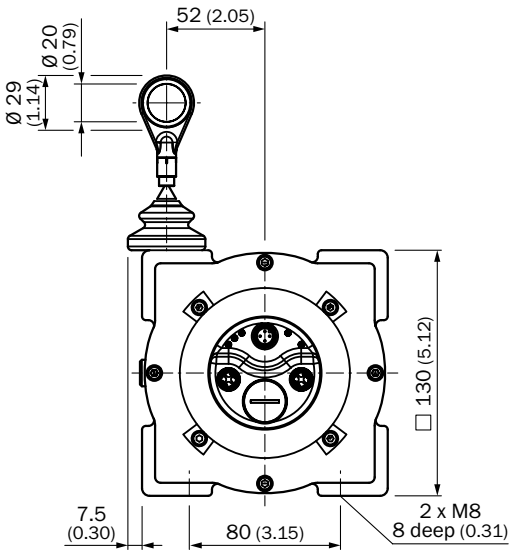
BTF08 up to 3 m
EtherNet/IP, EtherCAT®, PROFINET





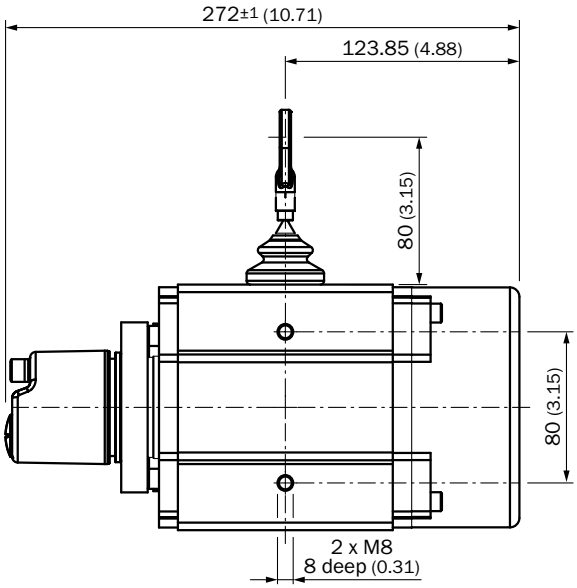
BTF13 up to 5 m
EtherNet/IP, EtherCAT®, PROFINET

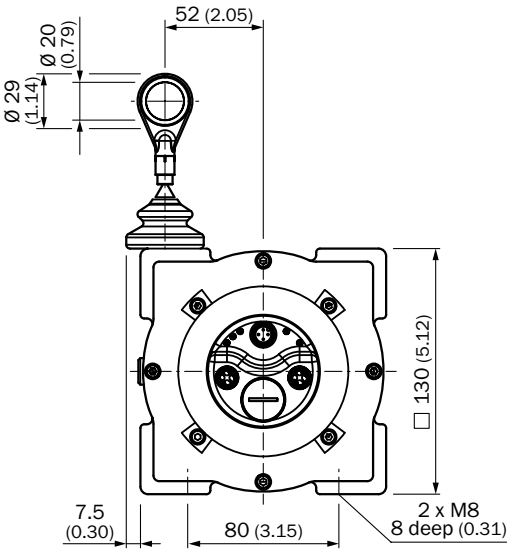




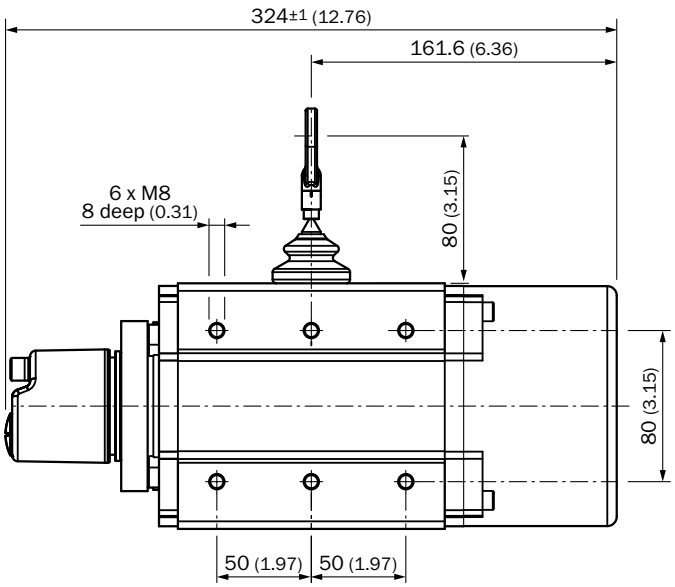
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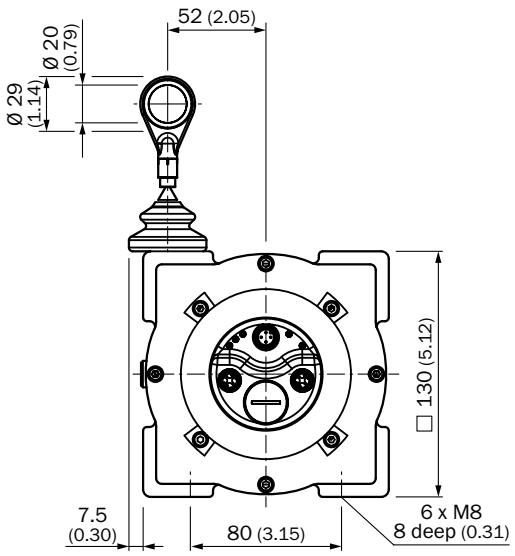
BTF13 up to 10 m
EtherNet/IP, EtherCAT®, PROFINET



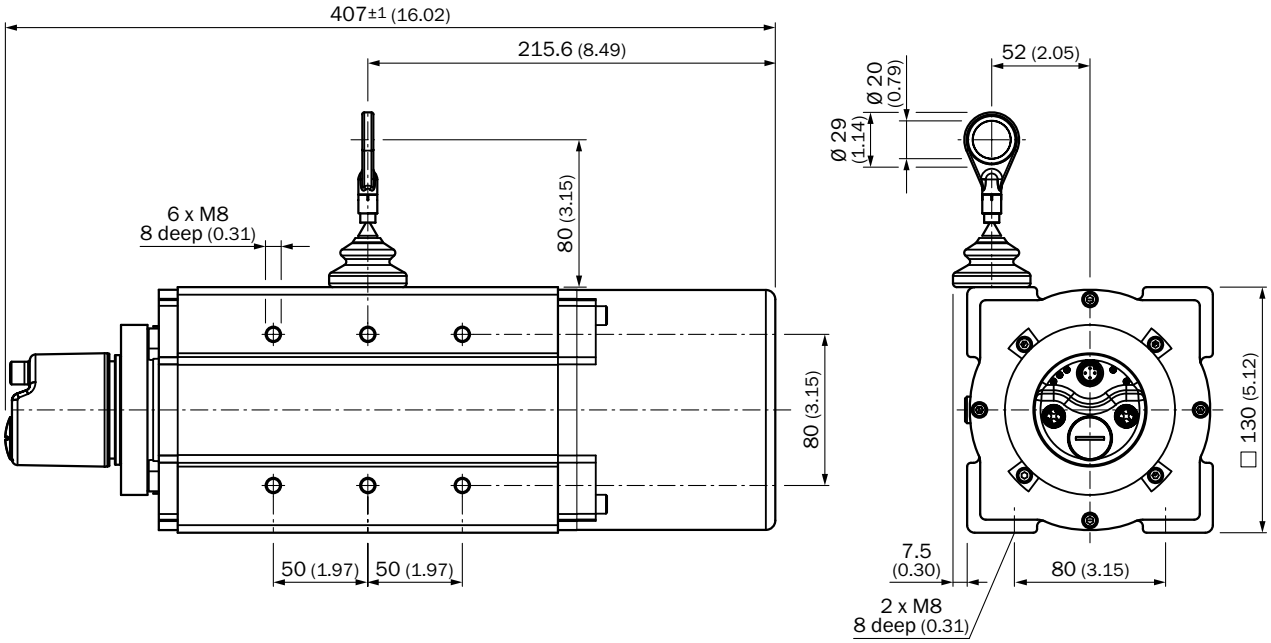


BTF13 up to 20 m
EtherNet/IP, EtherCAT®, PROFINET

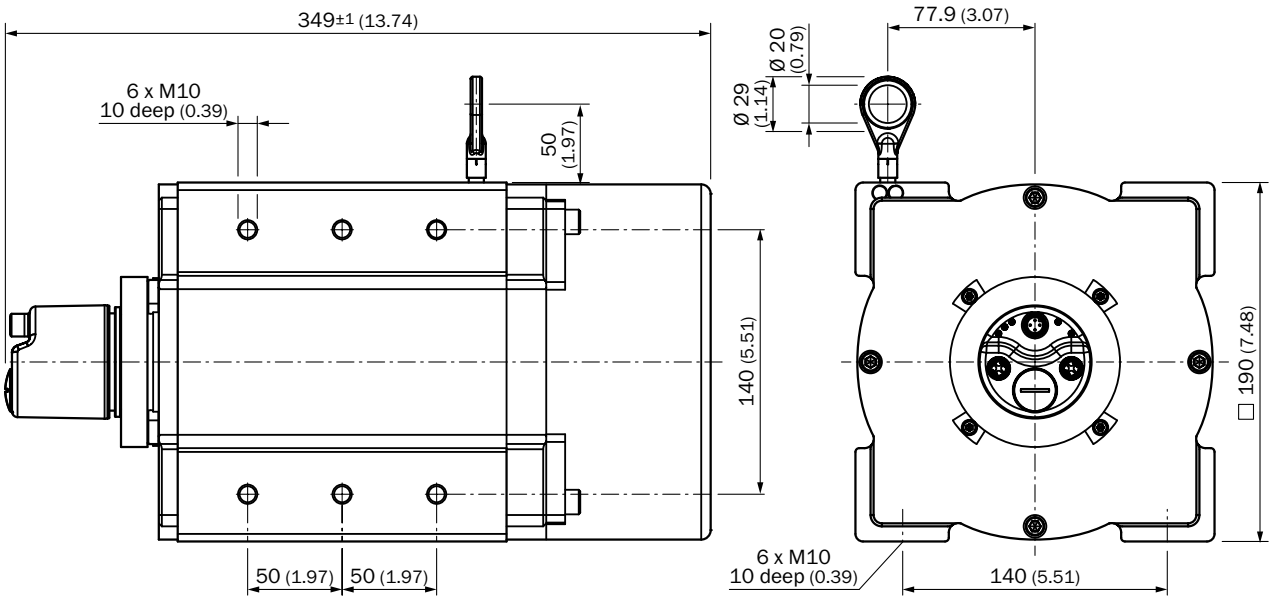




BTF13 up to 30 m
EtherNet/IP, EtherCAT®, PROFINET



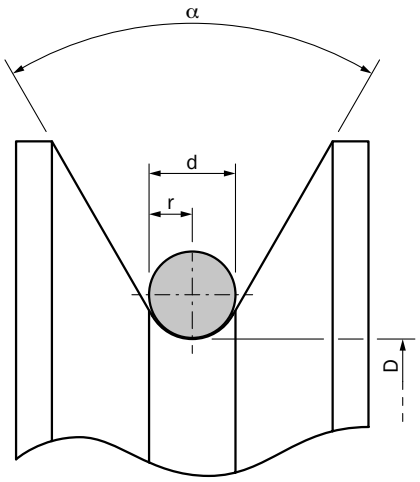
BTF19 up to 50 m
EtherNet/IP, EtherCAT®, PROFINET



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Deflection roller design

With the aid of deflection rollers, it is possible to guide the measuring wire of wire draw encoders over edges and around corners without significantly affecting the life time of the wire draw encoder. In this case, it must be considered that the designs of the deflection roller and of the measuring wire must be compatible in order to avoid damage to the system.



D = groove base diameter.
d = diameter of the wire incl. coating.
r = groove radius = 0.53 x d
a = groove opening angle = 60°

- The groove radius should not be too small – **recommendation: 0.53 x diameter of the wire cable**
- The groove opening angle should be neither too small nor too large – **recommendation: 60°**
- In order to ensure the longest possible system life, the deflection roller material should be neither too soft nor too hard – **recommended material: polyamide**
- The groove base diameter of the deflection roller should not be too small – **see table for recommendations**

EcoLine

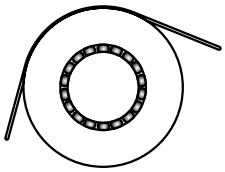
Length	Measuring wire, PA-sheathed	Diameter of the measuring wire	Structure of the measuring wire (strands x cords)	Min. groove base diameter
1.25 m	PA12	0.45 mm	7 x 7	25 mm
3 m	–	0.55 mm	1 x 19	40 mm
5 m	–	0.55 mm	1 x 19	40 mm
10 m	–	0.55 mm	1 x 19	40 mm

HighLine

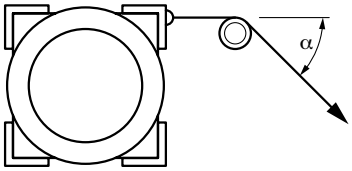
Length	Measuring wire, PA-sheathed	Diameter of the measuring wire	Structure of the measuring wire (strands x cords)	Min. groove base diameter
2 m	–	1.35 mm	7 x 19	35 mm
3 m	–	1.35 mm	7 x 19	35 mm
5 m	–	1.35 mm	7 x 19	35 mm
10 m	–	1.35 mm	7 x 19	35 mm
20 m		0.81 mm	7 x 7	35 mm
30 m		0.81 mm	7 x 7	35 mm
50 m		1.35 mm	7 x 19	35 mm

Installation of deflection rollers

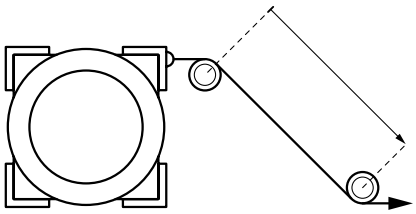
General notes on the installation of deflection rollers



The deflection roller should always be installed in a way which ensures that running is smooth. The deflection roller should ideally have an integrated ball bearing.



The smaller the deflection angle (α) achieved by a deflection roller, the less wear will appear on the measuring wire and therefore the longer the service life of the wire draw mechanism.



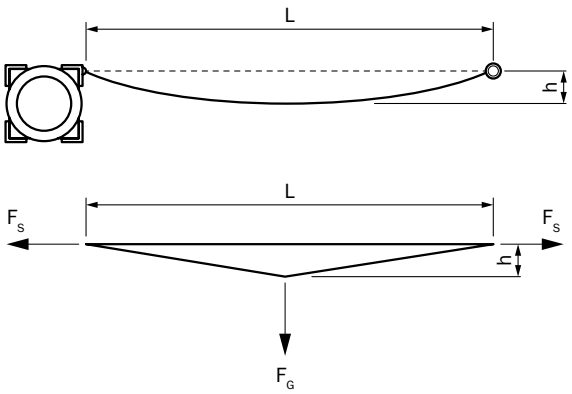
If two or more deflection rollers are needed, then the deflection rollers should always be installed at a distance from one another. The requisite distance between the deflection rollers must be accurately defined on site, accounting for specific customer requirements.

Wire sag

If the measuring wire is pulled out in a horizontal direction, this creates sag that becomes more pronounced as the wire length increases. This has particular implications for applications with obstacles that could get in the way of the moving measuring wire. However, the change in length that results from the sag, and the measurement error this leads to, are negligible.

Calculating the wire sag

The mass of the free-hanging measuring wire creates weight-related force, and this causes the wire to bend into a hyperbola-shaped line. The tension force in the measuring wire acts against the sag. As the measurement length increases, so too does the tension force as a result of the spring drive. We can imagine the hyperbola shape in a simplified format that looks approximately like a triangle.



The weight-related force of the measuring wire can be calculated using **Formula A**.
The spring rate of the spring drive is calculated using **Formula B**.
Formula C determines the sag of the measuring wire (the results of Formula A and Formula B are required in order to calculate the wire sag).
Formula D is used for calculating the measurement error.
The values found in real life will differ from the theoretical values that are calculated, as the measuring wire itself demonstrates a certain amount of resistance against the sag.

Formula A

$$F_G = 0.5 \times m_L \times g \times L$$

- F_G = weight-related force of the measuring wire [N]
- m_L = length-related mass of the measuring wire [Kg/m]
- g = gravitational acceleration 9.81 [m/s²]
- L = free length of the measuring wire [m]

Formula B

$$c = \frac{F_{S\,max} - F_{S\,min}}{L_{max}}$$

- c = spring rate of the spring drive [N/m]
- $F_{S\,max}$ = maximum tensile force in the wire [N]
- $F_{S\,min}$ = minimum tensile force in the wire [N]

Formula C

$$h = \frac{L^2 \times g \times m_L}{8 \times (c \times L + F_{min})}$$

- h = wire sag [mm]
- c = spring rate of the spring drive [N/m]
- $F_{S\,min}$ = minimum tensile force in the measuring wire [N]
- g = gravitational acceleration 9.81 [m/s²]
- m_L = length-related mass of the measuring wire [Kg/m]
- L = free length of the measuring wire [m]

Formula D

$$f = \sqrt{L^2 + 4h^2} - L$$

- f = measurement error [m]
- h = wire sag [m]
- L = free length of the measuring wire [m]

Recommended accessories

Mounting systems

Flanges

Flange plate

Figure	Brief description	Type	Part no.
	Flange adapter for HighLine wire draw mechanisms, adaption of face mount flange with centering hub 20 mm to 50 mm servo flange	BEF-FA-020-050WDE	2073776

Other mounting accessories

Figure	Brief description	Type	Part no.
	Joint ball for insertion in wire end ring with 20 mm diameter	Joint ball for BTF/ PRF/MRA wire draw	5318683
	Additional brush attachment for wire draw mechanism MRA-F080 (2 m and 3 m from the HighLine series)	MRA-F080-B	6045341
	Wire draw deflection pulley for wire draw mechanism MRA-F080 (2 m and 3 m from HighLine series)	MRA-F080-R	6028632
	Additional brush attachment for wire draw mechanism MRA-F130 (5 m, 10 m, 20 m and 30 m from HighLine series)	MRA-F130-B	6038562
	Wire draw deflection pulley for wire draw mechanism MRA-F130 (5 m, 10 m, 20 m and 30 m from HighLine series)	MRA-F130-R	6028631

Wire draw mechanism

Wire draw mechanism for face mount flange encoder

Figure	Brief description	Mea-suring length	Type	Part no.
	HighLine wire draw mechanism for 60 series face mount flange with 10 mm shaft	2.0 m	MRA-F080-402D2	6029788
		5.0 m	MRA-F130-405D2	6029789
		10.0 m	MRA-F130-410D2	6029790
		20.0 m	MRA-F130-420D1	6029791
		30.0 m	MRA-F130-430D1	6029792
		50.0 m	MRA-F190-450D2	6029793

Wire draw mechanism for servo flange encoder

Figure	Brief description	Mea-suring length	Type	Part no.
	HighLine wire draw mechanism for 60 series servo flange With 6 mm shaft	2.0 m	MRA-F080-102D2	6028625
		3.0 m	MRA-F080-103D2	6030125
		5.0 m	MRA-F130-105D2	6028626
		10.0 m	MRA-F130-110D2	6028627
		20.0 m	MRA-F130-120D1	6028628
		30.0 m	MRA-F130-130D1	6028629
		50.0 m	MRA-F190-150D2	6028630

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Connectivity

Adapters and distributors

T-piece

Figure	Brief description	Type	Part no.
	CANopen, T-piece	DSC-1205T000025KM0	6030664

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M12, 5-pin, angled Head B: cable Cable: for power supply, PUR, halogen-free, shielded, 3 x 0.34 mm², Ø 4.2 mm	5 m	DOL-1202-W05MC	6042067
		10 m	DOL-1202-W10MC	6042068
	Head A: female connector, M12, 4-pin, straight Head B: cable Cable: for power supply, suitable for drag chain, PUR, halogen-free, unshielded, 4 x 0.34 mm², Ø 4.7 mm	2 m	DOL-1204-G02MC	6025900
		5 m	DOL-1204-G05MC	6025901
		10 m	DOL-1204-G10MC	6025902
		25 m	DOL-1204-G25MC	6034751
	Head A: female connector, M12, 4-pin, straight Head B: cable Cable: for power supply, suitable for drag chain, PVC, unshielded, 4 x 0.25 mm², Ø 5.0 mm	5 m	DOL-1204-G05M	6009866
	Head A: female connector, M12, 4-pin, angled Head B: cable Cable: for power supply, suitable for drag chain, PUR, halogen-free, unshielded, 4 x 0.34 mm², Ø 4.7 mm	2 m	DOL-1204-W02MC	6025903
		5 m	DOL-1204-W05MC	6025904
		10 m	DOL-1204-W10MC	6025905
		25 m	DOL-1204-W25MC	6034754
	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: for power supply, suitable for drag chain, PUR, halogen-free, shielded, 5 x 0.34 mm², Ø 5.9 mm	5 m	DOL-1205-G05MAC	6036384
		10 m	DOL-1205-G10MAC	6036385
		20 m	DOL-1205-G20MAC	6036386
	Head A: female connector, M12, 5-pin, straight, A-coded Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 5 x 0.34 mm², Ø 5.9 mm	1.5 m	DOL-1205-G1M5ACSCO	6049451
		3 m	DOL-1205-G03MACSCO	6049452
		5 m	DOL-1205-G05MACSCO	6049453
		10 m	DOL-1205-G10MACSCO	6049454
	Head A: female connector, M12, 5-pin, angled, A-coded Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 5 x 0.34 mm², Ø 5.9 mm	1.5 m	DOL-1205-W1M5ACSCO	6049455
		3 m	DOL-1205-W03MACSCO	6049456
		5 m	DOL-1205-W05MACSCO	6049457
		10 m	DOL-1205-W10MACSCO	6049458

[1] Warning! Only in combination with electrical interfaces U, V, W and M.

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: SSI, suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm	1.5 m	DOL-2312-G1M5MA1	2029200
		3 m	DOL-2312-G03MMA1	2029201
		5 m	DOL-2312-G05MMA1	2029202
		10 m	DOL-2312-G10MMA1	2029203
		20 m	DOL-2312-G20MMA1	2029204
		30 m	DOL-2312-G30MMA1	2029205
	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: PROFIBUS, suitable for drag chain, PUR, halogen-free, shielded, 2 x 0.34 mm², Ø 8.0 mm	5 m	DOL-1205-G05MQ	6026006
		10 m	DOL-1205-G10MQ	6026008
		12 m	DOL-1205-G12MQ	6032636
		15 m	DOL-1205-G15MQ	6032637
		20 m	DOL-1205-G20MQ	6032638
		30 m	DOL-1205-G30MQ	6032639
		50 m	DOL-1205-G50MQ	6032861
	Head A: female connector, M12, 5-pin, angled, B-coded Head B: cable Cable: PROFIBUS, suitable for drag chain, PUR, shielded, 2 x 0.64 mm², Ø 7.8 mm	5 m	DOL-1205-W05MQ	6041423
		10 m	DOL-1205-W10MQ	6041425
	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: CANopen, suitable for drag chain, shielded, 2 x 0.34 mm² + 2 x 0.25 mm² + 1 x 0.34 mm², Ø 6.7 mm A-coded	2 m	DOL-1205-G02MY	6053041
		5 m	DOL-1205-G05MY	6053042
		10 m	DOL-1205-G10MY	6053043
	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: incremental, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	2 m	DOL-2312-G02MLD1	2062202
		7 m	DOL-2312-G07MLD1	2062203
		10 m	DOL-2312-G10MLD1	2062204
		15 m	DOL-2312-G15MLD1	2062205
		20 m	DOL-2312-G20MLD1	2062206
		25 m	DOL-2312-G25MLD1	2062207
		30 m	DOL-2312-G30MLD1	2062208
	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 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	1.5 m	DOL-2312-G1M5MD1	2062240
		3 m	DOL-2312-G03MMD1	2062243
		5 m	DOL-2312-G05MMD1	2062244
		10 m	DOL-2312-G10MMD1	2062245
		20 m	DOL-2312-G20MMD1	2062246
		30 m	DOL-2312-G30MMD1	2062247

[1] Warning! Only in combination with electrical interfaces U, V, W and M.

Connecting cables with male connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: male connector, M12, 5-pin, straight, B-coded Head B: cable Cable: PROFIBUS, suitable for drag chain, PUR, halogen-free, shielded, 2 x 0.34 mm², Ø 8.0 mm Wire shielding: AL-PT foil, total shield, tin-plated C shield	5 m	STL-1205-G05MQ	6026005
		10 m	STL-1205-G10MQ	6026007
		12 m	STL-1205-G12MQ	6032635
	Head A: male connector, M12, 5-pin, angled, B-coded Head B: cable Cable: PROFIBUS, suitable for drag chain, PUR, shielded, 2 x 0.64 mm², Ø 7.8 mm	5 m	STL-1205-W05MQ	6041426
		10 m	STL-1205-W10MQ	6041427
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: cable Cable: EtherNet/IP, PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	STL-1204-G02ME90	6045284
		5 m	STL-1204-G05ME90	6045285
		10 m	STL-1204-G10ME90	6045286
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: cable Cable: EtherNet/IP, PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	STL-1204-W02ME90	6047912
		5 m	STL-1204-W05ME90	6047913
		10 m	STL-1204-W10ME90	6047914
		25 m	STL-1204-W20ME90	6047915
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: cable Cable: PROFINET, EtherCAT, PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	STL-1204-G02MZ90	6048247
		5 m	STL-1204-G05MZ90	6048248
		10 m	STL-1204-G10MZ90	6048249
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: cable Cable: PROFINET, EtherCAT, PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	STL-1204-W02MZ90	6048256
		5 m	STL-1204-W05MZ90	6048257
		10 m	STL-1204-W10MZ90	6048258
		25 m	STL-1204-W25MZ90	6048259

Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 4-pin, straight, unshielded, for power supply, for cable diameter 4 mm ... 6 mm Head B: -	DOS-1204-G	6007302
	Head A: female connector, M12, 5-pin, straight, unshielded, for cable diameter 4 mm ... 6 mm Head B: -	DOS-1205-G	6009719
	Head A: female connector, M12, 4-pin, angled, unshielded, for power supply, for cable diameter 3 mm ... 6.5 mm Head B: -	DOS-1204-W	6007303
	Head A: female connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: –20 °C ... +130 °C	DOS-2312-G	6027538
	Head A: female connector, M23, 12-pin, 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: female connector, M23, 12-pin, angled, shielded, for cable diameter 4.2 mm ... 6.6 mm Head B: - Operating temperature: –20 °C ... +130 °C	DOS-2312-W01	2072580
	Head A: female connector, M12, 5-pin, straight, B-coded, shielded, PROFIBUS, for cable diameter 4 mm ... 9 mm Head B: -	DOS-1205-GQ	6021353
	Head A: female connector, M12, 5-pin, angled, B-coded, shielded, PROFIBUS, for cable diameter 4 mm ... 8 mm Head B: -	DOS-1205-WQ	6041429

Figure	Brief description	Type	Part no.
	Head A: female connector, M12, 5-pin, straight, shielded, CANopen, DeviceNet, for cable diameter 4.5 mm ... 7 mm Head B: -	DOS-1205-GA	6027534
	Head A: female connector, M12, 4-pin, straight, D-coded, shielded, EtherNet/IP, for cable diameter 4 mm ... 8 mm Head B: -	DOS-1204-GE	6048153
	Head A: female connector, M12, 4-pin, angled, D-coded, shielded, EtherNet/IP, for cable diameter 4 mm ... 8 mm Head B: -	DOS-1204-WE	6048154
	Head A: female connector, M12, 4-pin, straight, D-coded, shielded, PROFINET, EtherCAT, for cable diameter 4 mm ... 8 mm	DOS-1204-GZ	6048263
	Head A: female connector, M12, 4-pin, angled, D-coded, shielded, PROFINET, EtherCAT, for cable diameter 4 mm ... 8 mm	DOS-1204-WZ	6048264

Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, shielded, 2 x 0.25 mm², Ø 8.0 mm	By the meter	LTG-2102-MW	6021355
	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm		LTG-2308-MWENC	6027529
	Head A: cable Head B: cable Cable: PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm		LTG-2612-MW	6028516

Other plug connectors and cables

Figure	Brief description	Type	Part no.
	A3M60 accessories sales set comprising: Female cable connector supply voltage M12 angled (6007303) Female cable connector M12 angled (6041429) Male cable connector M12 angled (6041428)	DOS-3XM12-W	2058177
	Head A: female connector, M12, 4-pin, D-coded Head B: female connector, RJ45, 8-pin Cable: shielded Switch cabinet feedthrough	Feedthrough female connector Ethernet RJ45	6048180
	Head A: male connector, M12, 4-pin, straight, B-coded Cable: PROFIBUS terminator	STE-END-Q	6021156

Male connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: male connector, M12, 5-pin, straight, unshielded, for cable diametes 4 mm ... 6 mm Head B: -	STE-1205-G	6022083
	Head A: male connector, M12, 5-pin, straight, B-coded, shielded, for cable diameter 4 mm ... 9 mm Head B: -	STE-1205-GQ	6021354
	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
	Head A: male connector, M12, 5-pin, angled, B-coded, shielded, PROFIBUS, for cable diameter 4 mm ... 8 mm Head B: -	STE-1205-WQ	6041428
	Head A: male connector, M12, 5-pin, straight, A encoded, shielded, CANopen, DeviceNet, for cable diameter 4 mm ... 8 mm Head B: -	STE-1205-GA	6027533
	Head A: male connector, RJ45, 8-pin, straight, shielded, EtherNet/IP, for cable diameter 4.5 mm ... 8 mm Head B: -	STE-0J08-GE	6048150
	Head A: male connector, M12, 4-pin, straight, D-coded, shielded, EtherNet/IP, for cable diameter 4 mm ... 8 mm Head B: -	STE-1204-GE01	6048151
	Head A: male connector, M12, 4-pin, angled, D-coded, shielded, EtherNet/IP, for cable diameter 4 mm ... 8 mm Head B: -	STE-1204-WE	6048152
	Head A: male connector, RJ45, 4-pin, straight, shielded, PROFINET, EtherCAT, for cable diameter 4.5 mm ... 8 mm	STE-0J04-GZ	6048260
	Head A: male connector, M12, 4-pin, straight, D-coded, shielded, PROFINET, EtherCAT, for cable diameter 4 mm ... 8 mm	STE-1204-GZ	6048261
	Head A: male connector, M12, 4-pin, angled, D-coded, shielded, PROFINET, EtherCAT, for cable diameter 4 mm ... 8 mm	STE-1204-WZ	6048262

Connection cables with female and male connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: female connector, M23, 12-pin, straight Head B: male connector, D-Sub, 9-pin, straight Cable: shielded, 4 x 2 x 0.08 mm²	0.5 m	DSL-3D08-G0M5AC3	2046580
	Head A: female connector, M12, 5-pin, straight Head B: male connector, M12, 5-pin, straight Cable: CANopen, suitable for drag chain, PUR, halogen-free, shielded, 2 x 0.34 mm² + 2 x 0.25 mm² + 1 x 0.34 mm², Ø 6.7 mm, A-coded	2 m	DSL-1205-G02MY	6053044
		5 m	DSL-1205-G05MY	6053045
		10 m	DSL-1205-G10MY	6053046

Connection cables with male and male connector

Figure	Brief description		Type	Part no.
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, straight, D-coded Cable: EtherNet/IP, PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	SSL-1204-G02ME90	6045222
		5 m	SSL-1204-G05ME90	6045277
		10 m	SSL-1204-G10ME90	6045279
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, M12, 4-pin, straight, D-coded Cable: EtherNet/IP, PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	SSL-1204-H02ME90	6047908
		5 m	SSL-1204-H05ME90	6047909
		10 m	SSL-1204-H10ME90	6047910
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 8-pin, straight Cable: EtherNet/IP, PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	SSL-2J04-G02ME60	6047916
		5 m	SSL-2J04-G05ME60	6047917
		10 m	SSL-2J04-G10ME60	6047918
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, RJ45, 8-pin, straight Cable: EtherNet/IP, PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m	SSL-2J04-H02ME	6047911
		5 m	SSL-2J04-H05ME	6045287
		10 m	SSL-2J04-H10ME	6045288
	Head A: male connector, M12, 4-pin, angled, D-coded Head B: male connector, M12, 4-pin, straight Cable: PROFINET, EtherCAT, PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	SSL-1204-F02MZ90	6048250
		5 m	SSL-1204-F05MZ90	6048251
		10 m	SSL-1204-F10MZ90	6048252
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, straight Cable: PROFINET, EtherCAT, PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	SSL-1204-G02MZ90	6048241
		5 m	SSL-1204-G05MZ90	6048242
		10 m	SSL-1204-G10MZ90	6048243
	Head A: male connector, RJ45, 4-pin, straight, D-coded Head B: male connector, M12, 4-pin, angled Cable: PROFINET, EtherCAT, PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	SSL-2J04-F02MZ	6048253
		5 m	SSL-2J04-F05MZ	6048254
		10 m	SSL-2J04-F10MZ	6048255
	Head A: male connector, M12, 4-pin, straight, D-coded Head B: male connector, RJ45, 4-pin, straight Cable: PROFINET, EtherCAT, PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m	SSL-2J04-G02MZ60	6048244
		5 m	SSL-2J04-G05MZ60	6048245
		10 m	SSL-2J04-G10MZ60	6048246

Other accessories

Spare parts

Figure	Brief description	Type	Part no.
	Spare mounting set for HighLine wire draw mechanisms for fitting encoders with servo flange	MRA-F-K	6028633

Programming and configuration tools

Figure	Brief description	Type	Part no.
	Programming unit [1] USB, for programmable SICK encoders AFS60, AFM60, DFS60, VFS60, DFV60 and wire draw encoders with programmable encoders.	PGT-08-S	1036616
	Programming unit display for programmable SICK DFS60, VFS60, DFV60, AFS/AFM60, AHS/AHM36 encoders, and wire draw encoders with DFS60, AFS/AFM60, and AHS/AHM36. Compact dimensions, low weight, and intuitive operation.	PGT-10-Pro	1072254

[1] Can be used with programmable incremental and absolute encoders in conjunction with the corresponding adapter cables.

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

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LINEAR ENCODERS

Complete non-contact measurement – with SICK linear encoders

Linear encoders consist of a read head (sensor) and a reference scale (measuring element). The non-contact principle of operation means that the position is determined without wear. The sensor uses a unique code pattern to record the absolute position information along the reference scale, and sends this information directly to the evaluation electronics. As a result, there is no need for a reference run. Compact systems with high resolutions or rugged solutions with very long measured lengths (up to 1,700 m) cover a wide range of application areas.

Your benefits

- Excellent reliability – less product wear and maintenance
- Maximum precision – resolution of up to 1 µm
- Large selection of measuring lengths from < 0.5 m to 1,700 m is ideal for a broad range of application requirements
- TTK70: Small size, low weight and high traversing speed deliver excellent process dynamics
- KH53: Reliable position determination under harsh conditions (dirt, dust, fog, shock, vibration) reduces downtime due to environmental factors

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Applications **J-640**
Product family overview **J-643**



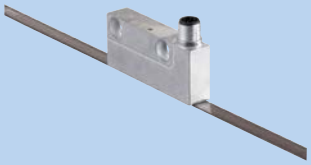
KH53 . . . . . **J-644**
For the harshest conditions -
the heavy-duty linear encoder



TTK70 . . . . . **J-660**
Compact linear encoder with high resolution

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PRODUCT FAMILY OVERVIEW

		
	KH53	**TTK70**
	For the harshest conditions - the heavy-duty linear encoder	Compact linear encoder with high resolution
Technical data overview		
Measuring length	0 m ... 1,700 m	≤ 4,000 mm
Resolution	0.1 mm	1 µm
Repeatability	0.3 mm, 1 mm	≤ ± 2 µm
Electrical interface	SSI, PROFIBUS DP	SSI
Connection type	Male connector/cable	Male connector
Enclosure rating	IP 65 (IEC 60529) IP 66 (IEC 60529) IP 67 (IEC 60529)	IP 67 (IEC 60529)
At a glance		
	• Non-contact length measurement – maintenance-free, rugged, long service life • High reproducibility (0.3 mm / 1 mm), high system resolution (0.1 mm) • SSI and PROFIBUS interfaces • Determination of absolute position • Measuring lengths of up to 1,700 m possible • Can be used in the harshest ambient conditions • High traversing speeds of up to 6.6 m/s • Distance tolerance between read head and measuring element: up to 55 mm ± 20 mm possible	• Non-contact absolute positioning • Small, compact read head • Standard SSI interface, combined with sin/cos output • Measuring lengths of up to 4 m possible • High level of accuracy (± 10 µm) • High resolution (1 µm) • High traversing speed of up to 10 m/s
Detailed information	➜ J-644	➜ J-660

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FOR THE HARSHEST CONDITIONS – THE HEAVY-DUTY LINEAR ENCODER



PROFIBUS SSI

CE POMUX®

Additional information

Detailed technical data J-645
Ordering information J-647
Dimensional drawings J-651
Pin assignment J-652
Implementation J-654
Switch settings J-655
General information J-655
Position tolerance J-655
Recommended accessories J-656

Product description

The POMUX KH53 non-contact linear encoder can measure absolute lengths up to 1,700 m. The encoder consists of two main components: The non-contact read head determines the absolute position using a series of measuring elements attached along the measurement path. Each measuring element consists of a number of permanent magnets. Since the distances between the magnets are unique, they can be used to develop an absolute measuring code. No reference run is required due to the absolute position being determined. The read head is passed parallel to these measuring elements at a distance of 25 mm or 55 mm. With a measuring length of up to 1,700 m, the KH53 is ideal for use in cranes, in storage and conveyor systems, and for railed vehicles. Due to the non-contact technology, this system works wear-free even in harsh ambient conditions,so that a long lifetime is ensured.

At a glance

- Non-contact length measurement – maintenance-free, rugged, long service life
- High reproducibility (0.3 mm / 1 mm), high system resolution (0.1 mm)
- SSI and PROFIBUS interfaces
- Determination of absolute position
- Measuring lengths of up to 1,700 m possible
- Can be used in the harshest ambient conditions
- High traversing speedds of up to 6.6 m/s
- Distance tolerance between read head and measuring element: up to 55 mm ± 20 mm possible

Your benefits

- After installation, the system is immediately available and completely maintenance-free, which leads to time and cost savings
- Reliable determination of position under harshest ambient conditions such as the effects of dirt, dust, fog, shock, and vibration
- High efficiency and productivity levels
- Time savings – no reference run necessary on initial commissioning due to absolute position measurement
- Accurate positioning even with high mounting tolerances

→ www.mysick.com/en/KH53

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Position determination for container cranes in container terminals
- Positioning of the trolley on cranes
- Positioning of automated guided vehicles in storage and conveyor systems

Detailed technical data

Performance

	KH53	KH53 Advanced
Measuring length	0 m ... 1,700 m	0 m ... 548 m
Measuring range	38 m, 107 m, 354 m, 1,700 m	54 m, 548 m
Interfaces	SSI and PROFIBUS	
Resolution	0.1 mm	
Reproducibility	0.3 mm	1 mm
Max. traversing speed [1]	6.6 m/s	
Measurement accuracy [2]	± 1000 + ME (Tu –25 °C) Tk µm	± 2000 + ME (Tu –25 °C) Tk µm

[1] An error message appears if the max. traversing speed is exceeded or the read head cannot detect a measuring element (with SSI FF FF FE hex).

[2] Related to the start of a measuring element if a position tolerance of ± 1 mm is maintained based on the nominal distance in the N and Y directions. ME = Length of the measuring element (see illustration on page J-652), Tu = ambient temperature in °C, Tk = coefficient of thermal expansion (see "Mechanical Data" table on page J-646).

Electrical data

Initialization time	2 s
Position forming time	
SSI	0.8 ms
PROFIBUS	1.1 ms
Supply voltage	10 ... 32 V
Electrical connection	
SSI	Cable M23 male connector
PROFIBUS	3 x M12 male connectors
SSI	
RS422 interface for parameterizing	Four wire transmission, asynchronous, full-duplex Data format: 1 start bit, 8 data bits, 1 stop bit, no parity Data protocol: ASCII, Baud rate 9,600
Interface digital, serial	SSI 24 bit, gray
Default setting SSI standard	RS 422 OFF
SSI power consumption	250 mA
PROFIBUS DP	
Electrical interface	RS485 (as per EN 50 170-2 (DIN 19245 Parts 1–3) electrically isolated by optocoupler
Address setting (node number)	0 ... 127 (hex switch or protocol)
Protocol	PROFIBUS DP basic functions (DP-V0)
Bus termination	Via external male connectors
SET (electronic adjustment)	Via protocol
Encoder profile	Profiles for encoders (07hex) – Class 2
Data transmission rate (baud rate)	9.6 kBaud ...12 Mbaud (autodetect)
Status information	Operation (LED green), bus activity (LED red)
PROFIBUS power consumption in operation	2.5 W

[1] According to ISO13849. 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 of 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

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MTTFd: mean time to dangerous failure		
SSI	Measuring range up to 38 m: 45 years [1)] Measuring range up to 107 m: 40 years [1)] Measuring range up to 354 m: 31 years [1)] Measuring range up to 1,700 m: 21 years [1)]	Measuring range up to 54 m: 34 years [1)] Measuring range up to 548 m: 22 years [1)]
PROFIBUS	Measuring range up to 38 m: 40 years [1)] Measuring range up to 107 m: 35 years [1)] Measuring range up to 354 m: 28 years [1)] Measuring range up to 1,700 m: 20 years [1)]	Measuring range up to 54 m: 30 years [1)] Measuring range up to 548 m: 20 years [1)]

[1)] According to ISO13849. 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 of 40 °C, frequency of use 8760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

Mechanical data

	KH53	KH53 Advanced
Mass		
Read head 38	2.4 kg	–
Read head 107	2.7 kg	–
Read head 354	3.6 kg	–
Read head 1,700	5.2 kg	–
Read head 54	–	4.4 kg
Read head 548	–	6.7 kg
Measuring element	0.5 kg/m	0.65 kg/m
Length of measuring element	See tables on Page J-647 and Page J-649	
Coefficient of thermal expansion	28 µm/ °C/m	
Position tolerance (see diagram on Page J-655)	± 10 mm	± 20 mm
Read head material	AlMgSiPbF28	
Measuring element material	AlMgSi0,5F22	

Ambient data

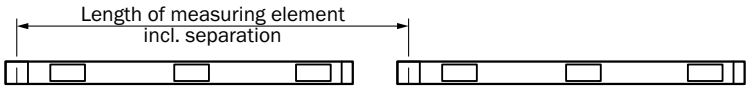
EMC [1)]	According to EN 61000-6-2 and EN 61000-6-4	
Enclosure rating		
SSI read head with cable	IP 66	
SSI read head with screw-in system	IP 65 (with mating connector fitted)	
Read head with PROFIBUS connectors	IP 67 (with mating connector fitted)	
Operating temperature range	–20 ... +60 °C	–30 ... +70 °C
Read head storage temperature range	–40 ... +85 °C	
Resistance to shocks	According to EN 61000-2-27	
Read head	30 g/10 ms	
Measuring element	50 g / 10 ms	
Resistance to vibrations	According to DIN EN 61000-2-6	
Read head	10 g/20 ... 250 Hz	
Measuring element	30 g / 20 ... 250 Hz	

[1)] The EMC according to the standards quoted is achieved if shielded connecting cables are used.

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SSI ordering information



Dimensions and calculation table - KH53

Measuring range up to	Read head length	Length of measuring element including distance	Mounting systems per measuring element (suggestion)
39.90 m	0.886 m	2.304 m Identification letters A1 ... ≤ A18	4 clamp holders or 8 mounting brackets
107.40 m	1.051 m	1.8688 m Identification letters B1 ... ≤ B58	3 clamp holders or 6 mounting brackets
351.20 m	1.376 m	2.5088 m Identification letters C1 ... ≤ C141	4 clamp holders or 8 mounting brackets
1676.40 m	2.026 m	1.9072 m Identification letters D1 ... ≤ D880	3 clamp holders or 6 mounting brackets

The dimensions given are slightly rounded.

Measurement and calculation table - KH53 Advanced

Measuring range up to	Read head length	Length of measuring element including distance	Mounting systems per measuring element (suggestion)
53.50 m	1.58 m	1.408 m Identification letters F1 ... ≤ F39	3 clamp holders or 6 mounting brackets
546.40 m	2.506 m	2.3552 m Identification letters G1 ... ≤ G233	4 clamp holders or 8 mounting brackets

The dimensions given are slightly rounded.

Calculation example for a measurement distance of 100 m

Selected system with measuring range up to 107 m

Number of measuring elements required = measurement path + length of the read head / length of measurement element (according to table above)
Number of measuring elements required = 101.051 m / 1.8688 m = 54.07
Ordering amount therefore **55 measuring elements** and **55 * 3 = 165 clamp holders**
If **two separate measurement paths** are to be implemented, then please order **2 x 55** measuring elements (**not 110** measuring elements)

Attention! For position determination, the read head must not travel beyond the last measuring element.

KH53 length measurement systems (absolute, linear)

Measuring range up to 38 meters

Description	Type	Part no.
Read head 38, SSI, cable 1.5 m	KHK53-AXR00038	1030048
Read head 38, SSI, cable 3.0 m	KHK53-AXS00038	1030049
Read head 38, SSI, cable 5.0 m	KHK53-AXT00038	1030050
Read head 38, SSI, cable 10.0 m	KHK53-AXU00038	1030051
Read head 38, SSI, M23 male, 12 pin	KHK53-AXB00038	1030052
Measuring element up to 38 m, coded [1]	KHT53-XXX00038	1030055
Measuring element up to 38 m, universally codeable [2]	KHU53-XXX00038	1030056
Assembly gauge 38	KHM53-XXX00038	1030057

[1] When ordering replacements for individual defective measuring elements, please enter the code for the measuring element in question .

[2] For the temporary replacement of defective, coded measuring elements.

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Measuring range up to 107 meters

Description	Type	Part no.
Read head 107, SSI, cable 1.5 m	KHK53-AXR00107	1030058
Read head 107, SSI, cable 3.0 m	KHK53-AXS00107	1030059
Read head 107, SSI, cable 5.0 m	KHK53-AXT00107	1030060
Read head 107, SSI, cable 10.0 m	KHK53-AXU00107	1030061
Read head 107, SSI, M23 male device connector, 12 pin	KHK53-AXB00107	1030062
Measuring element up to 107 m, coded [1]	KHT53-XXX00107	1030065
Measuring element up to 107 m, universally codeable [2]	KHU53-XXX00107	1030066
Assembly gauge 107	KHM53-XXX00107	1030067

[1] When ordering replacements for individual defective measuring elements, please enter the code for the measuring element in question .

[2] For the temporary replacement of defective, coded measuring elements.

Measuring range up to 354 meters

Description	Type	Part no.
Read head 354, SSI, cable 1.5 m	KHK53-AXR00107	1030068
Read head 354, SSI, cable 3.0 m	KHK53-AXS00354	1030069
Read head 354, SSI, cable 5.0 m	KHK53-AXT00354	1030070
Read head 354, SSI, cable 10.0 m	KHK53-AXU00354	1030071
Read head 354, SSI, M23 male device connector, 12 pin	KHK53-AXB00354	1030072
Measuring element up to 354 m, coded [1]	KHT53-XXX00354	1030075
Measuring element up to 354 m, universally codeable [2]	KHU53-XXX00354	1030076
Assembly gauge 354	KHM53-XXX00354	1030077

[1] When ordering replacements for individual defective measuring elements, please enter the code for the measuring element in question .

[2] For the temporary replacement of defective, coded measuring elements.

Measuring range up to 1,700 meters

Description	Type	Part no.
Read head 1700, SSI, cable 1.5 m	KHK53-AXR01700	1030078
Read head 1700, SSI, cable 3.0 m	KHK53-AXS01700	1030079
Read head 1700, SSI, cable 5.0 m	KHK53-AXT01700	1030080
Read head 1700, SSI, cable 10.0 m	KHK53-AXU01700	1030081
Read head 1700, SSI, M23 male device connector, 12 pin	KHK53-AXB01700	1030082
Measuring element up to 1,700 m, coded [1]	KHT53-XXX01700	1030085
Measuring element up to 1,700 m, universally codeable [2]	KHU53-XXX01700	1030086
Assembly gauge 1700	KHM53-XXX01700	1030087

[1] When ordering replacements for individual defective measuring elements, please enter the code for the measuring element in question .

[2] For the temporary replacement of defective, coded measuring elements.

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KH53 advanced length measurement systems (absolute, linear)

Measuring range up to 54 meters

Description	Type	Part no.
Read head 54, SSI, cable 5.0 m	KHK53-AXT00054	1035442
Read head 54, SSI, M23 male device connector, 12 pin	KHK53-AXB00054	1035443
Measuring element up to 54 m, coded [1]	KHT53-XXX00054	1035445
Measuring element up to 54 m, universally codeable [2]	KHU53-XXX00054	1035446
Assembly gauge 54	KHM53-XXX00054	1035447

[1] When ordering replacements for individual defective measuring elements, please enter the code for the measuring element in question .

[2] For the temporary replacement of defective, coded measuring elements.

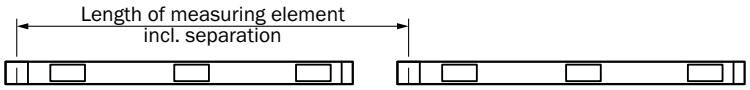
Measuring range up to 548 meters

Description	Type	Part no.
Read head 548, SSI, cable 5.0 m	KHK53-AXT00548	1035448
Read head 548, SSI, M23 male device connector, 12 pin	KHK53-AXB00548	1035449
Measuring element up to 548 m, coded [1]	KHT53-XXX00548	1035451
Measuring element up to 548 m, universally codeable [2]	KHU53-XXX00548	1035452
Assembly gauge 548	KHM53-XXX00548	1035453

[1] When ordering replacements for individual defective measuring elements, please enter the code for the measuring element in question .

[2] For the temporary replacement of defective, coded measuring elements.

PROFIBUS ordering information



Dimensions and calculation table - KH53

Measuring range up to	Read head length	Length of measuring element including distance	Mounting systems per measuring element (suggestion)
39.90 m	0.905 m	2.304 m Identification letters A1 ... ≤ A18	4 clamp holders or 8 mounting brackets
107.40 m	1.070 m	1.8688 m Identification letters B1 ... ≤ B58	3 clamp holders or 6 mounting brackets
351.20 m	1.395 m	2.5088 m Identification letters C1 ... ≤ C141	4 clamp holders or 8 mounting brackets
1676.40 m	2.045 m	1.9072 m Identification letters D1 ... ≤ D880	3 clamp holders or 6 mounting brackets

The dimensions given are slightly rounded.

Measurement and calculation table - KH53 Advanced

Measuring range up to	Read head length	Length of measuring element including distance	Mounting systems per measuring element (suggestion)
53.50 m	1.599 m	1.408 m Identification letters F1 ... ≤ F39	3 clamp holders or 6 mounting brackets
546.40 m	2.525 m	2.3552 m Identification letters G1 ... ≤ G233	4 clamp holders or 8 mounting brackets

The dimensions given are slightly rounded.

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Calculation example for a measurement distance of 100 m

Selected system with measuring range up to 107 m

Number of measuring elements required = measurement path + length of the read head / length of measurement element (according to table above)
Number of measuring elements required = 101.070 m / 1.8688 m = 54.08
Ordering amount therefore **55 measuring elements** and **55 * 3 = 165 clamp holders**
If **two separate measurement paths** are to be implemented, then please order **2 x 55** measuring elements (**not 110** measuring elements)

Attention! For position determination, the read head must not travel beyond the last measuring element.

KH53 length measurement systems (absolute, linear)

Measuring range up to 38 meters

Description	Type	Part no.
Read head 38, PROFIBUS DP	KHK53-PXF00038	1036163
Measuring element up to 38 m, coded [1]	KHT53-XXX00038	1030055
Measuring element up to 38 m, universally codeable [2]	KHU53-XXX00038	1030056
Assembly gauge 38	KHM53-XXX00038	1030057

[1] When ordering replacements for individual defective measuring elements, please enter the code for the measuring element in question .

[2] For the temporary replacement of defective, coded measuring elements.

Measuring range up to 107 meters

Description	Type	Part no.
Read head 107, PROFIBUS DP	KHK53-PXF00107	1036164
Measuring element up to 107 m, coded [1]	KHT53-XXX00107	1030065
Measuring element up to 107 m, universally codeable [2]	KHU53-XXX00107	1030066
Assembly gauge 107	KHM53-XXX00107	1030067

[1] When ordering replacements for individual defective measuring elements, please enter the code for the measuring element in question .

[2] For the temporary replacement of defective, coded measuring elements.

Measuring range up to 354 meters

Description	Type	Part no.
Read head 354, PROFIBUS DP	KHK53-PXF00354	1036165
Measuring element up to 354 m, coded [1]	KHT53-XXX00354	1030075
Measuring element up to 354 m, universally codeable [2]	KHU53-XXX00354	1030076
Assembly gauge 354	KHM53-XXX00354	1030077

[1] When ordering replacements for individual defective measuring elements, please enter the code for the measuring element in question .

[2] For the temporary replacement of defective, coded measuring elements.

Measuring range up to 1,700 meters

Description	Type	Part no.
Read head 1700, PROFIBUS DP	KHK53-PXF01700	1036166
Measuring element up to 1,700 m, coded [1]	KHT53-XXX01700	1030085
Measuring element up to 1,700 m, universally codeable [2]	KHU53-XXX01700	1030086
Assembly gauge 1700	KHM53-XXX01700	1030087

[1] When ordering replacements for individual defective measuring elements, please enter the code for the measuring element in question .

[2] For the temporary replacement of defective, coded measuring elements.

KH53 advanced length measurement systems (absolute, linear)

Measuring range up to 54 meters

Description	Type	Part no.
Read head 54, PROFIBUS DP	KHK53-PXF00054	1036167
Measuring element up to 54 m, coded [1]	KHT53-XXX00054	1035445
Measuring element up to 54 m, universally codeable [2]	KHU53-XXX00054	1035446
Assembly gauge 54	KHM53-XXX00054	1035447

[1] When ordering replacements for individual defective measuring elements, please enter the code for the measuring element in question .

[2] For the temporary replacement of defective, coded measuring elements.

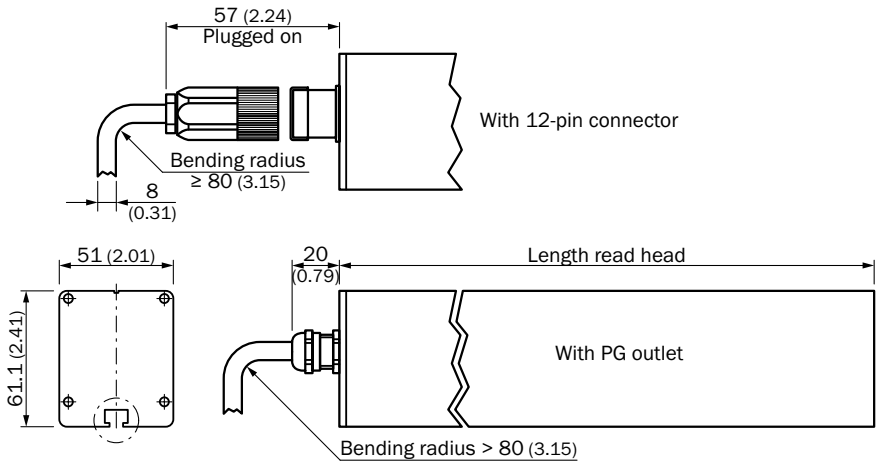
Measuring range up to 548 meters

Description	Type	Part no.
Read head 548, PROFIBUS DP	KHK53-PXF00548	1036168
Measuring element up to 548 m, coded [1]	KHT53-XXX00548	1035451
Measuring element up to 548 m, universally codeable [2]	KHU53-XXX00548	1035452
Assembly gauge 548	KHM53-XXX00548	1035453

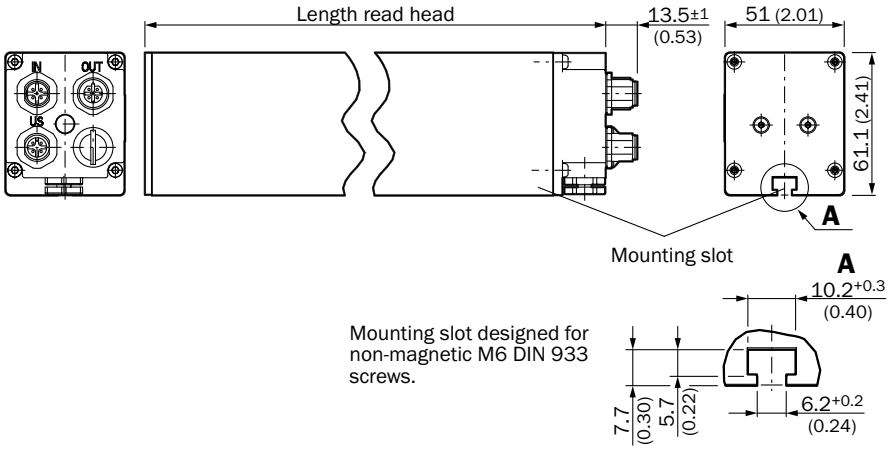
[1] When ordering replacements for individual defective measuring elements, please enter the code for the measuring element in question .

[2] For the temporary replacement of defective, coded measuring elements.

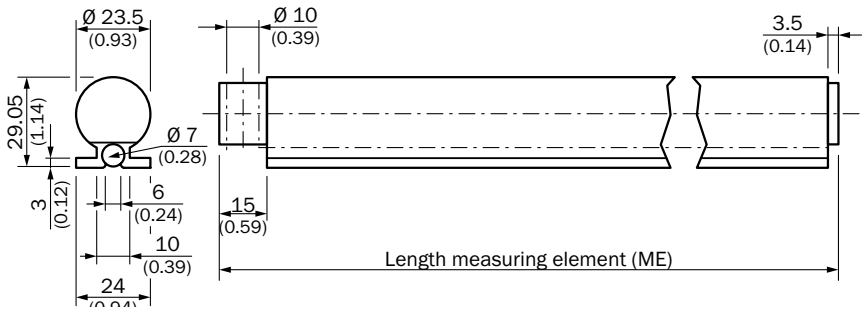
Dimensional drawing SSI read head (dimensions in mm)



Dimensional drawing PROFIBUS read head (dimensions in mm)

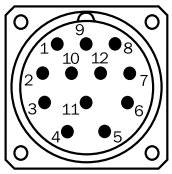


Dimensional drawing for measuring element



Pin assignment for SSI interface

View of M23 male device connector on SSI encoder



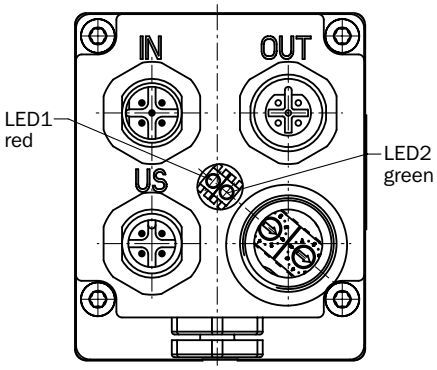
PIN	Signal	Wire colors (cable outlet)	Explanation
1	GND	Blue	Ground connection
2	Data +	White	Interface signals
3	Clock +	Yellow	Interface signals
4	R x D +	Gray	RS-422 programming cables
5	R x D –	Green	RS-422 programming cables
6	T x D +	Pink	RS-422 programming cables
7	T x D –	Black	RS-422 programming cables
8	+ U_S	Red	Operating voltage
9	N. C.	Orange	Not connected
10	Data –	Brown	Interface signals
11	Clock –	Violet	Interface signals
12	N. C.	–	Not connected

N. C. = Not Connected.
Other interfaces on request.

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Pin assignment for PROFIBUS interface



Male connector, 4 pin	Male connector, 5 pin	Female connector 5 pin	Signal	Explanation
1	–	–	U_S (24 V)	Operating voltage 10 ... 32 V
3	–	–	0 V (GND)	Ground (0 V)
–	–	4	B	B cable PROFIBUS DP (out)
–	–	2	A	A cable PROFIBUS DP (out)
–	4	–	B	B cable PROFIBUS DP (in)
–	2	–	A	A cable PROFIBUS DP (in)
–	–	1	2P5 [1]	+ 5 V (potential free)
–	–	3	2M [1]	0 V (potential free)
4	1	–	Not connected	–
2	3	–	Not connected	–
–	5	5	Screen	Housing potential

[1] Use for external bus termination.

Implementation

DP functionalities

according to PROFIBUS-DP basic functionalities.

DP services

- Data exchange (Write_Read_Data)
- Address allocation (Set_Slave_Address)
- Control commands (Global_Control)
- Reading inputs (Read_Inputs)
- Reading outputs (Read_Outputs)
- Reading diagnostic data (Slave_Diagnosis)
- Sending parameter data (Set_Param)
- Checking configuration data (Chk_Config)

Communication

- Cyclic master-slave data traffic.

Safety mechanisms

- Transfer of data with HD = 4.
- Time monitoring of data traffic.

Configuration

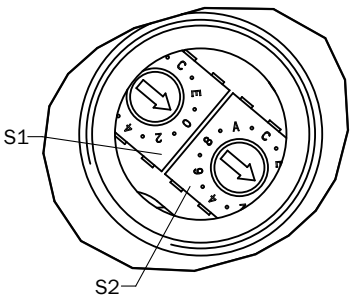
Settings according to encoder profile

- Counting direction (CW, CCW)
- Class 2 functionality (ON, OFF)
- Scaling function (ON, OFF)

- “Activation of SSA service” [2]
- Selection of the station address[2]

[1] In accordance with encoder profile.

[2] Manufacturer specific function.



Setting: – Counting direction

- Via hardware via hex switch S2
- Via software via telegram

Count direction increasing:

Movement of the encoder from profile item n in the direction of profile item n+1

Configuration

Setting the formats (IN/OUT) for the cyclic data exchange through a configuration byte (K-1).

2 words IN/OUT data (I-1/O-1) [1]

4 words IN/OUT data (I-1, I-2, I-3/O-1) [2]

Data exchange: – Input data (IN)

I-1 Position value [1] 4 bytes

I-2 Speed (0.1 m/min) [2] 2 bytes

I-3 Time stamp [2] 2 bytes

Data exchange: – Output data (out)

O-1 PRESET – Value [1] 4 bytes

Diagnostic information

- Station related diagnostic (63 bytes according to encoder profile Class 2)

Setting: – PRESET value

The PRESET function is used for commissioning and the allocation of a particular position value to current physical positioning.

The following settings are possible:

- Via software: – (see Output Data)

Setting: – Station address

- Via hardware via hex switch S1/S2
- Via software via telegram

Setting by software only occurs with prior activation of the “SSA service”.

Device specific file (*.GS_)

The *.GS_ file is designed for automatic commissioning of the encoder. Within it all the characteristic features of the device are defined.

STEG05F6.GSD German

STEG05F6.GSE English

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Switch settings

The following settings are possible via hex switches:
S1/S2 Address setting (0 ... 127)
S2 Counting direction (CW/CCW)
Access is via a screw connection on the side of the read head male connector.

Status information via LEDs

LED-1 Bus activity (red)
LED-2 Operating voltage (green)

General information

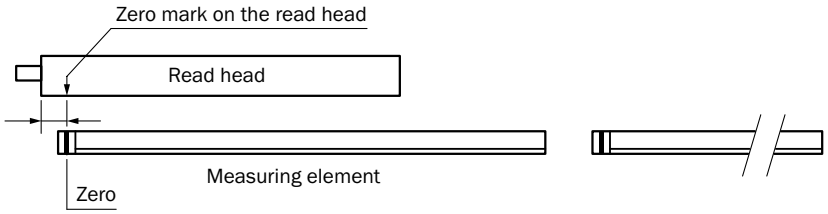
The KH53 PROFIBUS is an absolute length measurement system with a resolution of 100 µm. The bus coupling is inside the encoder and is an interface connection as PROFIBUS DP slave according to EN 50170 Vol. 2. Implementation is with the Siemens PROFIBUS ASIC SPC3.
The KH53 PROFIBUS contains all Class 2 functionalities according to the encoder profile (V1.1)
Implementation of the encoder is as a DP slave with the DP basic functions.

Conformity with PROFIBUS DP is ensured by a PNO certified test center.
The following options are available:

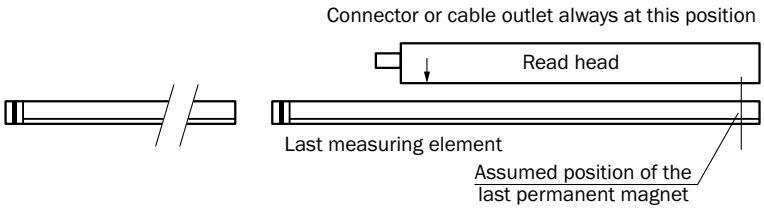
- M12 plug connector system

Position tolerances

Start of measurement path



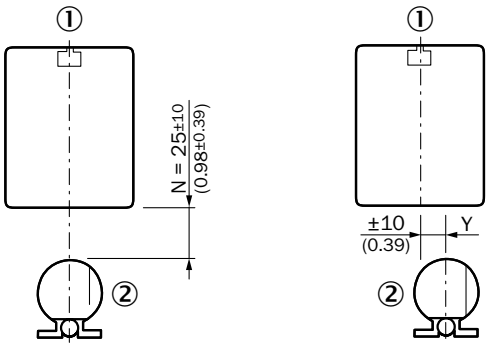
End of measurement path



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The operating reliability and accuracy of the measuring system depends on (amongst other things) compliance with the position tolerances. Magnetic or magnetizable materials are not permitted within 80 mm of the encoder or the measuring element.

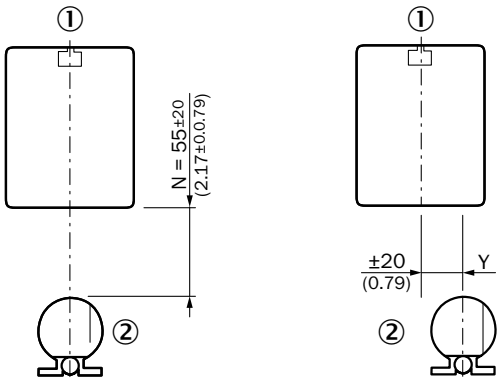
KH53



All dimensions in mm (inch)

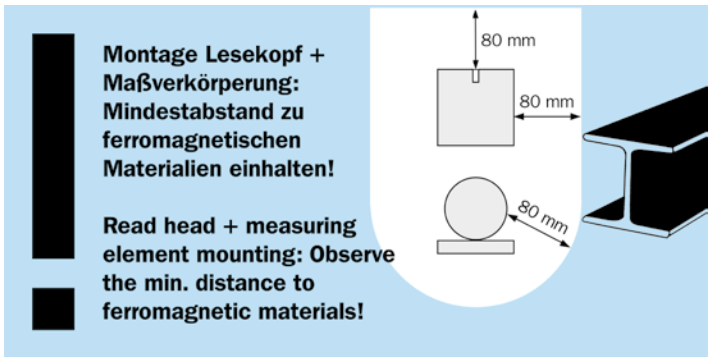
① Read head
② Measuring element

KH53 Advanced



All dimensions in mm (inch)

① Read head
② Measuring element



Only use non ferro-magnetic materials for the assembly base of the read head.
A separation distance of 80 mm must be observed for ferro-magnetic materials (e.g., iron).

Recommended accessories

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Brief description	Type	Part no.
	Mounting bracket for KH53 measuring elements, without mounting hardware for the base	BEF-WK-KHT53	2029159

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Clamp and alignment brackets

Terminal brackets

Figure	Brief description	Type	Part no.
	Spacer for KH53 measuring elements, without mounting hardware for the base	BEF-KHA-KHT53	2042468

Connectors

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: M12 female connector, 4-pin, straight Head B: cable Cable: for power supply, suitable for drag chain, PVC, unshielded, 4 x 0.25 mm², Ø 5.0 mm	5 m	DOL-1204-G05M	6009866
	Head A: M12 female connector, 5-pin, straight Head B: cable Cable: suitable for drag chain, PROFIBUS DP, PUR, halogen-free, shielded, 2 x 0.34 mm², Ø 8.0 mm	5 m	DOL-1205-G05MQ	6026006
		10 m	DOL-1205-G10MQ	6026008
	Head A: M23 female connector, 12-pin, straight Head B: cable Cable: SSI, RS-422, suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm	1.5 m	DOL-2312-G1M5MA1	2029200
		3 m	DOL-2312-G03MMA1	2029201
		5 m	DOL-2312-G05MMA1	2029202
		10 m	DOL-2312-G10MMA1	2029203
		20 m	DOL-2312-G20MMA1	2029204
		30 m	DOL-2312-G30MMA1	2029205

Connecting cables with male connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: M12 male connector, 5-pin, straight, B-coded Head B: cable Cable: PROFIBUS DP, suitable for drag chain, PUR, halogen-free, shielded, 2 x 0.34 mm², Ø 8.0 mm Wire shielding: AL-PT foil, total shield, tin-plated C shield	5 m	STL-1205-G05MQ	6026005
		10 m	STL-1205-G10MQ	6026007
		12 m	STL-1205-G12MQ	6032635

Female connectors (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: M12 female connector, 4-pin, straight, unshielded, for power supply, for cable diameter 4 mm ... 6 mm Head B: -	DOS-1204-G	6007302
	Head A: M12 female connector, 5-pin, straight, B-coded, PROFIBUS DP, shielded, for cable diameter 4 mm ... 9 mm Head B: -	DOS-1205-GQ	6021353
	Head A: M23 female connector, 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

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Cables (ready to assemble)

Figure	Brief description	Length of cable	Type	Part no.
	Head A: cable Head B: cable Cable: PROFIBUS DP, suitable for drag chain, PUR, shielded, 2 x 0.25 mm², Ø 8.0 mm	By the meter	LTG-2102-MW	6021355
	Head A: cable Head B: cable Cable: SSI, suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm		LTG-2612-MW	6028516

Other plug connectors and cables

Figure	Brief description	Type	Part no.
	Head A: M12 male connector, 4-pin, straight, B-coded Cable: PROFIBUS DP, terminator	STE-END-Q	6021156

Male connector (ready to assemble)

Figure	Brief description	Type	Part no.
	Head A: M12 male connector, 5-pin, straight, B-coded, PROFIBUS DP, shielded, for cable diameter 4 mm ... 9 mm Head B: -	STE-1205-GQ	6021354
	Head A: M23 male connector, 12-pin, straight, HIPERFACE®, SSI, incremental, RS-422, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: Operating temperature: –20 °C ... +130 °C	STE-2312-G	6027537

Additional accessories

Programming and configuration tools

Figure	Brief description	Type	Part no.
	Programming tool for ATM60, ATM90 and KH53 SSI	PGT-01-S	1030111

➜ For additional accessories, please see page K-668 onwardsw

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COMPACT ABSOLUTE LINEAR ENCODER WITH HIGH RESOLUTION





Product description

The TTK70 non-contact linear encoder consists of a compact read head and a magnetic tape. The magnetic tape is equipped with a magnetic partition and forms the measurement scale. The partition consists of an incremental and an absolute track (two-track tape). To calculate the absolute position value, the read head detects both the absolute and incremental components. The position value is directly output for further processing.
The TTK70 has an SSI output for absolute positioning and an incremental Sin/Cos output for recording speed in real time.

At a glance

- Non-contact absolute positioning
- Small, compact read head
- Standard SSI interface, combined with sin/cos output
- Measuring lengths of up to 4 m possible
- High level of accuracy (± 10 µm)
- High resolution (1 µm)
- High traversing speed of up to 10 m/s

Your benefits

- Easy integration into existing systems
- Small size, low weight and high traversing speed deliver excellent process dynamics
- After installation, the system is immediately available and completely maintenance-free, which leads to time and cost savings
- Immune to environmental factors such as contamination and condensation, ensuring increased reliability
- Real-time speed determination plus absolute positioning due to Sin/Cos and SSI output

Additional information

Detailed technical data J-661
Ordering information J-662
Dimensional drawings J-663
Position tolerance. J-663
PIN and wire allocation J-664
Interfaces J-665
Recommended accessories J-666

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→ www.mysick.com/en/TTK70
For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Fields of application

- Extremely wide range of positioning tasks in mounting and handling systems, robotics, automation, machine tool and production systems, metal and steel processing, electronics and solar industry, packaging industry, wood processing industry

Detailed technical data

Performance

Measuring length	Max. 4,000 mm
Magnetic tape length	Measurement length + 80 mm
Resolution	1 µm
Period length	1 mm
Traversing speed	
Static operation (SSI)	< 2 m/s
Dynamic operation (Sin/Cos)	< 10 m/s
Repeatability	Max. ± 2 µm
System accuracy	± 10 µm
Electrical interface	SSI + Sin/Cos
Connection type	Male connector, M12, 12-pin

Mechanical data

Dimensions	See dimensional drawing
Mass	
Read head	0.08 kg
Magnetic tape	0.18 kg/m
Material	
Read head	Zinc die cast
Magnetic tape	17410 Hard ferrite 9/28 P
Substrate tape	Stainless steel

Electrical data

Electrical interfaces	
SSI	24 bit, gray
Sin/Cos	1 V_{SS}
Supply voltage	4.5 ... 30 V
Max. power consumption	Max. 1.2 W
Operating current (no load)	55 mA
MTTFd: mean time to dangerous failure [1]	65 years (EN ISO 13849)

[1] This product is a standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of devices, average ambient temperature 40 °C, frequency of use 8,760 h/a. All electronic failures are considered hazardous. For more information, see document no. 8015532.

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Ambient data

Operating temperature range	
Read head	–30 °C ... +85 °C
Magnetic tape	–20 °C ... +70 °C
Storage temperature range	
Read head	–40 °C ... +85 °C
Magnetic tape	–30 °C ... +80 °C
Relative humidity / condensation	100%, condensation permitted
Resistance to shocks	30 g / 6 ms (EN 60068-2-27)
Resistance to vibrations	20 g / 10 Hz ... 2,000 Hz (EN 60068-2-6)
EMC	EN 61000-6-2, EN 61000-6-3
Enclosure rating	IP 67, with mating connector fitted
Temperature coefficient of magnetic tape	(11 ± 1) µm/K/m
Maximum permitted ambient field strength [1]	< 3 kA/m to 4 kA/m (3.8 mT ... 5 mT); to ensure accuracy values are maintained
Maximum permitted field strength	< 150 kA/m (< 190 mT); to ensure the magnetic tape is not irreparably damaged

[1] The maximum permitted external field influence is reached when the position value deviates from the original value (without external field influence) by more than 5 µm. This value is reached when, at the sensor location, a field strength of 3 kA/m to 4 kA/m (3.8 mT ... 5 mT) occurs in addition to the field strength of the magnetic tape.

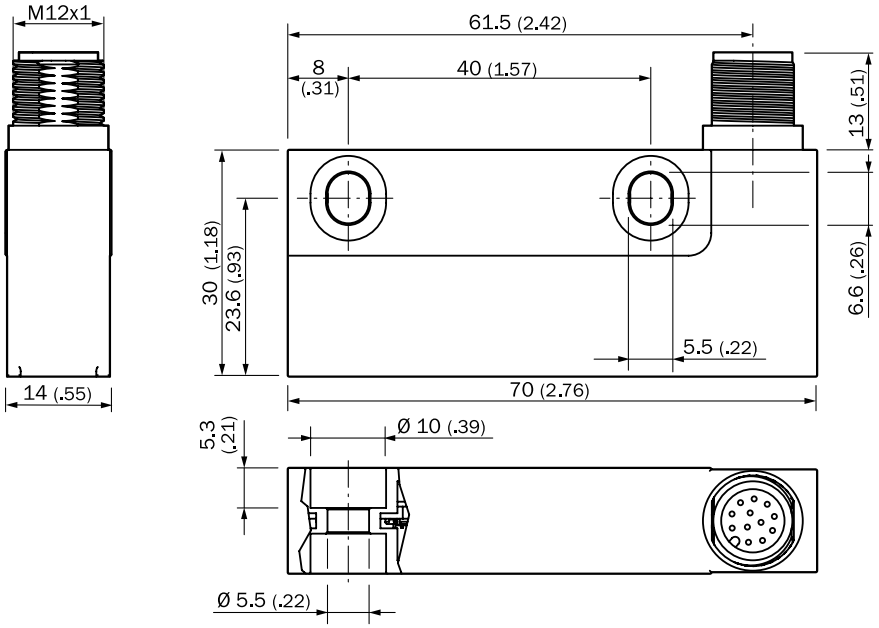
Ordering information

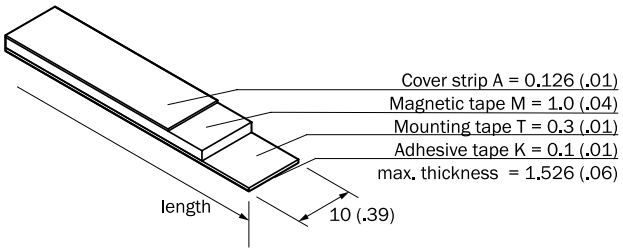
System part	Magnetic tape length	Type	Part no.
Read head	–	TTK70-AXA0-K02	1038033
Magnetic tape	0.5 m	MVM-0M5-2MC-MKLB	6037415
	1 m	MVM-01M-2MC-MKLB	6037417
	1.5 m	MVM-1M5-2MC-MKLB	6037418
	2 m	MVM-02M-2MC-MKLB	6037419
	2.5 m	MVM-2M5-2MC-MKLB	6037420
	3 m	MVM-03M-2MC-MKLB	6037421
	3.5 m	MVM-3M5-2MC-MKLB	6037422
	4 m	MVM-04M-2MC-MKLB	6037423

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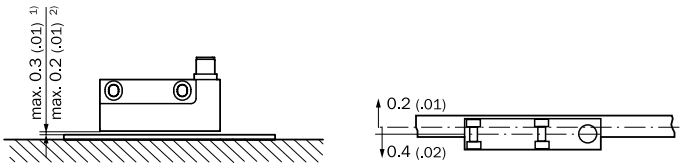
Dimensional drawings (dimensions in mm)



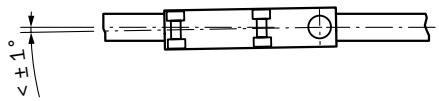


Position tolerance

General tolerances according to ISO 2768-mk



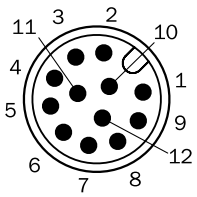
① Without covering tape
② With covering tape



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PIN and wire allocation

M12 male connector, 12-pin
SSI + Sin/Cos



PIN	Color	Signal	Explanation
1	Orange-black	Reconciliation	For internal purposes only / connect to GND
2	White	SSI data +	Signal wire
3	Brown	SSI data -	Signal wire
4	Violet	SSI clock -	Signal wire
5	Red	$+U_S$	Operating voltage
6	Gray	/Sin	Signal wire
7	Green	Sin	Signal wire
8	Pink	/Cos	Signal wire
9	Black	Cos	Signal wire
10	Orange	SET [1)]	Electronic adjustment
11	Yellow	SSI clock +	Signal wire
12	Blue	GND	Ground connection

[1)] SET This input activates the electronic zero set. If the SET wire is connected to U_S for more than 1.2 seconds after it had previously been unassigned or connected to GND, the position of the encoder above the magnetic tape corresponds to the value 0.
Attention! The SET input must be connected to GND or not be connected when the encoder is switched on. If electronic zeroing is performed using the SET input, the synchronization between the SSI and Sin/Cos signals is lost.

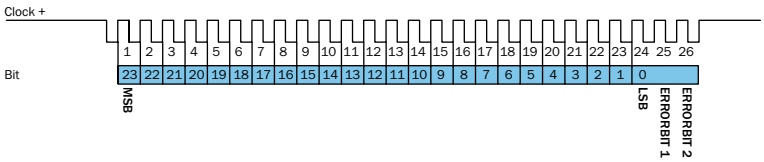
Shield connected to housing on encoder side. Connected to ground on control side.

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Interfaces

SSI interface

Data format



Bit 1–24: Position bits

- LSB: Least significant bit
- MSB: Most significant bit

Bit 25-26: Errorbits

- ERRORBIT 1: Error message concerning distance between read head and magnetic tape. This bit is set in the SSI data stream if the maximum permitted distance between the read head and the magnetic tape is exceeded. The output position value is invalid.
- ERRORBIT 2: Error message concerning working temperature. This bit is set in the SSI data stream if the sensor is operating above its maximum permitted working temperature.

Errorbits must evaluated in the PLC.

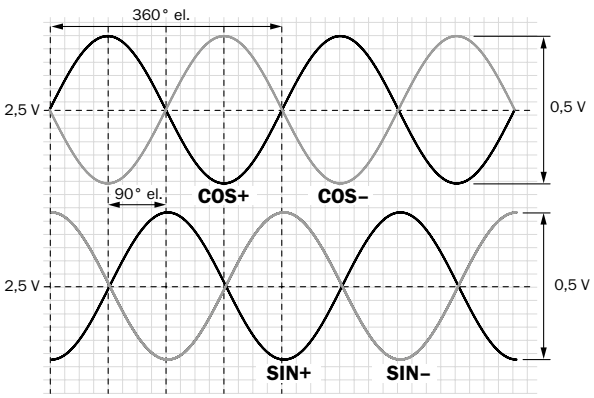
The errorbits do not have to be used by the PLC. To be able to evaluate the errorbits, the PLC must send at least 26 clock pulses per clock pulse train. A maximum of 31 clock pulses must not be exceeded. If more than 26 pulses are sent, the additional bits are output with "0".
If the errorbits cannot be evaluated in the PLC, the control unit must be set to an encoder resolution of 24 bits.

Sin/Cos interface 1 V_{SS}

Supply voltage	Output
4.5 ... 30 V	Sine 0.5 V_{SS}

Signals **before** difference at 120 Ω load at U_S = 5 V

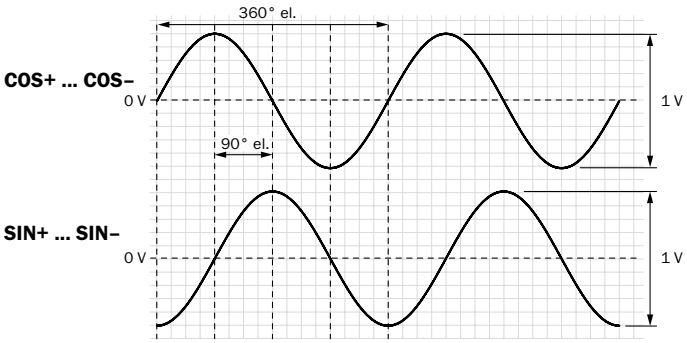
Signal diagram with read head moving in direction of arrow



Interface signals sin, $\overline{sin}$, cos, $\overline{cos}$	Signals before difference at 120 Ω load	Signal offset
Differential analog	0.5 V_{SS} ± 10%	2.5 V ± 5%

Signals **after** difference at 120 Ω load at U_S = 5 V

Signal diagram with read head moving in direction of arrow



Recommended accessories

Connectors

Plug connectors and cables

Connecting cables with female connector

Figure	Brief description	Length of cable	Type	Part no.
	Head A: M12 female connector, 12-pin, straight Head B: cable Cable: SSI, PUR, shielded, 12 x 0.14 mm², Ø 8.5 mm Suitable for use with drag chains	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 Head B: cable Cable: SSI, PUR, shielded, 12 x 0.14 mm², Ø 8.5 mm Suitable for use with drag chains	2 m	DOL-1212-W02MAC1	6039824
		5 m	DOL-1212-W05MAC1	6039825
		10 m	DOL-1212-W10MAC1	6039826
		20 m	DOL-1212-W20MAC1	6039827

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

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ACCESSORIES

SICK connects – Original connection and mounting system for encoders

A perfectly configured connection and mounting system is essential for the optimal integration of encoders. Only reliable mechanical installation and signal transmission guarantee the best possible measurement results. Furthermore, high-quality components with a long service life help to reduce costs in the long term.

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Incremental encoders K-670

Absolute encoders K-686

Safety encoders. K-716

Wire draw encoders K-720

Linear encoders. K-722

Dimensional drawings K-725

Incremental encoders

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	→ K-748	Mounting bracket for encoder with centering hub 20 mm, including mounting kit for face mount flange	BEF-WF-20	2066393	●	–	–	–	–	–	–	–	–
	→ K-749	Mounting bracket for encoder with centering hub 25 mm, including mounting kit for face mount flange	BEF-WF-25	2032621	–	–	●	–	–	–	–	–	–
	→ K-749	Mounting bracket for encoder with centering hub 30 mm, including mounting kit for face mount flange	BEF-WF-30	2066391	–	●	–	–	–	–	–	–	–
	→ K-750	Mounting bracket for encoder with centering hub 36 mm, including mounting kit for face mount flange	BEF-WF-36	2029164	–	–	–	●	●	–	–	–	–

Flanges

Flange plate

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	→ K-738	Two-sided stator coupling, screw hole circle diameter 63 mm, slot width 3.2 mm	BEF-DS-09	2076214	–	–	–	●	–	–	–	–	–
	→ K-739	Two-sided stator coupling, slot, slot radius 63 mm to 83 mm, slot width 3.2 mm	BEF-DS-10	2076215	–	–	–	●	–	–	–	–	–
	→ K-739	One-sided stator coupling, slots, slot radius 32.75 mm to 142.65 mm, slot width 4.5 mm	BEF-DS-11	2076216	–	–	–	●	–	–	–	–	–
	→ K-740	One-sided stator coupling, slot, slot radius 33 mm to 48.5 mm, slot width 5.1 mm	BEF-DS-12	2076217				●					
	→ K-740	Flange adapter (for hollow shaft) for locating pin assembly (PIN 4 mm)	BEF-DS-13	2076218	–	–	–	●	–	–	–	–	–
	→ K-740	One-sided stator coupling, slot, slot radius 32.1 mm to 37.6 mm, slot width 4.5 mm	BEF-DS-14	2076678	–	–	–	●	–	–	–	–	–

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Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	→ K-752	Standard two-sided stator coupling, with screw hole circle diameter 63 mm, slot width 3.2 mm, 10.4 mm high	BEF-DS00XFX	2056812	–	–	–	–	●	–	–	–	–
	→ K-753	One-sided stator coupling, slot, slot radius 33 mm to 48.5 mm, slot width 5.1 mm	BEF-DS01DFS/VFS	2047428	–	–	–	–	●	–	–	–	–
	→ K-741	One-sided stator coupling, slot, slot radius 32.25 mm to 141.75 mm, slot width 5.1 mm	BEF-DS02DFS/VFS	2047430	–	–	–	–	●	–	–	–	–
	→ K-742	One-sided stator coupling, slot, slot radius 33 mm to 211.9 mm, slot width 5.1 mm	BEF-DS03DFS/VFS	2047431	–	–	–	–	●	–	–	–	–
	→ K-742	Two-sided stator coupling, with screw hole circle diameter 72 mm, slot width 3.2 mm, 16.5 mm high	BEF-DS05XFX	2057423	–	–	–	–	●	–	–	–	–
	→ K-743	Two-sided stator coupling, with screw hole circle diameter 72 mm, slot width 3.2 mm, 10.4 mm high	BEF-DS07XFX	2059368	–	–	–	–	●	–	–	–	–
	→ K-743	Two-sided stator coupling, screw hole diameter 42 to 46 mm, slot width 3.2 mm	BEF-DS-DBS36	2066301	●	–	–	–	–	–	–	–	–
	→ K-744	Flange adapter, adaption of face mount flange with centering hub 20 mm to 33 mm servo flange, aluminum	BEF-FA-020-033	2066312	●	–	–	–	–	–	–	–	–
	→ K-744	Flange adapter, adaption of face mount flange with 25 mm centering hub to size 60 face mount flange with 36 mm centering hub, aluminum	BEF-FA-025-036	2034226	–	–	●	–	–	–	–	–	–
	→ K-744	Flange adapter, adaption of face mount flange with centering hub 25 mm to 50 mm servo flange, aluminum	BEF-FA-025-050	2032622	–	–	●	–	–	–	–	–	–
	→ K-744	Flange adapter, adaption of face mount flange with 25 mm centering hub to 60 mm square mounting plate, aluminum	BEF-FA-025-060RCA	2032623	–	–	●	–	–	–	–	–	–
	→ K-744	Flange adapter, adaptation of face mount flange with 25 mm centering hub to 60 mm square mounting plate with shock absorbers, aluminum	BEF-FA-025-060RSA	2032624	–	–	●	–	–	–	–	–	–
	→ K-744	Flange adapter, adaption of face mount flange with 25 mm centering hub to 63 mm square mounting plate, aluminum	BEF-FA-025-063-REC	2033631	–	–	●	–	–	–	–	–	–
	→ K-753	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	BEF-FA-036-050	2029160	–	–	–	●	●	–	–	–	–

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Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	→ K-754	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 10	BEF-FA-036-060REC	2029162	–	–	–	●	●	–	–	–	–
	→ K-754	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 58 mm square mounting plate with shock absorbers, aluminum	BEF-FA-036-060RSA	2029163	–	–	–	●	●	–	–	–	–
	→ K-754	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	BEF-FA-036-063REC	2034225	–	–	–	●	●	–	–	–	–
	→ K-753	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 100 mm servo flange with 60 mm centering hub, aluminum	BEF-FA-036-100	2029161	–	–	–	●	●	–	–	–	–

Other mounting accessories

Measuring wheels and measuring wheel systems

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	→ K-746	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020	5312988	–	–	–	●	●	–	–	–	–
	→ K-746	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm	BEF-MR-010020G	5318678	–	–	–	●	●	–	–	–	–
	→ K-746	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm	BEF-MR-010050	5312989	–	–	–	●	●	–	–	–	–

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	→ K-747	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm	BEF-MR006020R	2055222	●	–	–	●	●	–	–	–	–
	→ K-747	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm	BEF-MR006030R	2055634	●	–	–	●	●	–	–	–	–
	→ K-747	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 500 mm	BEF-MR006050R	2055225	●	–	–	●	●	–	–	–	–
	→ K-747	Measuring wheel with O-ring (NBR70) for 8 mm solid shaft, circumference 200 mm	BEF-MR008020R	2055223	–	●	–	–	–	–	–	–	–
	→ K-747	Measuring wheel with O-ring (NBR70) for 8 mm solid shaft, circumference 300 mm	BEF-MR008030R	2055635	–	●	–	–	–	–	–	–	–
	→ K-747	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 200 mm	BEF-MR010020R	2055224	–	–	–	●	●	–	–	–	–
	→ K-747	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm	BEF-MR010030R	2049278	–	–	–	●	●	–	–	–	●
	→ K-747	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 500 mm	BEF-MR010050R	2055227	–	–	–	●	●	–	–	–	–
	–	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	●	●	–	●	●	–	–	–	●
	–	O-ring for measuring wheels (circumference 500 mm)	BEF-OR-145-050	2064074	●	●	–	●	●	–	–	–	–
	–	O-ring set for DKV60 encoder	O-RING SET DKV60	6032709	–	–	–	–	–	–	–	●	–

Modular measuring wheel system

Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
→ K-747	Measuring wheel system, desired mounting position: left, for DBS50E-S5	BEF-MRS-08-1	2071956	–	●	–	–	–	–	–	–	–
→ K-748	Measuring wheel system, desired mounting position: right, for DBS50E-S5	BEF-MRS-08-2	2071953	–	●	–	–	–	–	–	–	–
→ K-769	Measuring wheel system, desired mounting position: left, for DBS60-S4, DFS60-S4, AFS60-S4, and AFM60-S4	BEF-MRS-10-1	2071958	–	–	–	●	●	–	–	–	–
→ K-769	Measuring wheel system, desired mounting position: right, for DBS60-S4, DFS60-S4, AFS60-S4, and AFM60-S4	BEF-MRS-10-2	2071957	–	–	–	●	●	–	–	–	–

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Mounting bells

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	→ K-746	Mounting bell for encoders with a servo flange, centering hub 50 mm, including mounting kit	BEF-MG-50	5312987	–	–	–	●	●	–	–	–	–

Servo clamps

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	→ K-755	Half-shell servo clamps (2 pcs.) for servo flanges with a 50 mm centering hub	BEF-WG-SF050	2029165	–	–	–	●	●	–	–	–	–
	→ K-756	Servo clamps, small, for servo flanges (clamps, eccentric fastener), 3 pcs., without mounting material	BEF-WK-RESOL	2039082	●	●	–	–	–	–	–	–	–
	→ K-755	Servo clamps, large, for servo flanges (clamps, eccentric fastener), 3 pcs., without mounting material	BEF-WK-SF	2029166	–	–	–	●	●	–	–	–	–

Miscellaneous

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	–	Clamping ring for metal hollow shaft, metal	BEF-KR-M	2064709	–	–	–	–	●	–	–	–	–
	→ K-745	Bearing block for hollow shaft encoder, including fixing screws	BEF-FA-B12-010	2042728	–	–	–	●	●	–	–	–	–
	→ K-745	Bearing block for servo and face mount flange encoder	BEF-FA-LB1210	2044591	–	–	–	●	●	–	–	–	–

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Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	–	Mounting kit for servo flange encoder on the bearing block, 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	–	–	–	●	●	–	–	–	–
	→ K-754	Flange adapter (adapts size 60 face mount flange encoder to bearing block with part number 2044591)	BEF-FA-036-050-019	2063378	–	–	–	●	●	–	–	–	–
	–	Spring arm / mounting arm for DFV60	DFV60 sprung arm	2056155	–	–	–	–	–	–	–	–	●

Shaft adaptation

Collets and clamping rings

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	→ K-757	PEEK conductor insulation (shaft diameter 8 mm, outer diameter 10 mm)	PEEK CONDUCTOR INSULATION	2065642	–	–	–	–	●	–	–	–	–
	→ K-758	PEEK conductor insulation (shaft diameter 10 mm, outer diameter 12 mm)	PEEK CONDUCTOR INSULATION	2064571	–	–	–	–	●	–	–	–	–
	→ K-757	PEEK conductor insulation (shaft diameter 11 mm, outer diameter 12.7 mm)	PEEK CONDUCTOR INSULATION	2077319	–	–	–	–	●	–	–	–	–
	→ K-757	PEEK conductor insulation (shaft diameter 12 mm, outer diameter 14 mm)	PEEK CONDUCTOR INSULATION	2064573	–	–	–	–	●	–	–	–	–
	→ K-757	PEEK conductor insulation (shaft diameter 1/2"(12.7 mm), outer diameter 15 mm)	PEEK CONDUCTOR INSULATION	2064572	–	–	–	–	●	–	–	–	–
	→ K-758	Collet for blind hollow shaft, shaft diameter 5 mm, outer diameter 8 mm	SPZ-005-AD-A	2066991	●	–	–	–	–	–	–	–	–
	→ K-758	Collet for blind hollow shaft, shaft diameter 6 mm, outer diameter 8 mm	SPZ-006-DD36-A	2056390	●	–	–	–	–	–	–	–	–

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	→ K-751	Metal collet for hollow shaft, shaft diameter 8 mm, outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-008-M	2076219	–	–	–	●	●	–	–	–	–
	→ K-751	Metal collet for hollow shaft, shaft diameter 3/8" (9.525 mm), outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-38Z-M	2076224	–	–	–	●	●	–	–	–	–
	→ K-751	Metal collet for hollow shaft, shaft diameter 10 mm, outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-010-M	2076220	–	–	–	●	●	–	–	–	–
	→ K-751	Metal collet for hollow shaft, shaft diameter 12 mm, outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-012-M	2076221	–	–	–	●	●	–	–	–	–
	→ K-751	Metal collet for hollow shaft, shaft diameter 1/2" (12.7 mm), outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-12Z-M	2076225	–	–	–	●	●	–	–	–	–
	→ K-751	Metal collet for hollow shaft, shaft diameter 14 mm, outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-014-M	2076222	–	–	–	●	●	–	–	–	–
	→ K-752	Metal collet for hollow shaft, shaft diameter 15 mm, outer diameter 5/8" (15.875 mm), metal	SPZ-58Z-015-M	2076223	–	–	–	●	●	–	–	–	–
	→ K-750	Plastic isolated collet for hollow shaft, shaft diameter 6 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-006-P	2076228	–	–	–	●	●	–	–	–	–
	→ K-750	Plastic isolated collet for hollow shaft, shaft diameter 8 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-008-P	2076229	–	–	–	●	●	–	–	–	–
	→ K-750	Plastic isolated collet for hollow shaft, shaft diameter 3/8" (9.525 mm), outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-38Z-P	2076226	–	–	–	●	●	–	–	–	–
	→ K-750	Plastic isolated collet for hollow shaft, shaft diameter 10 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-010-P	2076230	–	–	–	●	●	–	–	–	–
	→ K-750	Plastic isolated collet for hollow shaft, shaft diameter 12 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-012-P	2076231	–	–	–	●	●	–	–	–	–
	→ K-750	Plastic isolated collet for hollow shaft, shaft diameter 1/2" (12.7 mm), outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-12Z-P	2076227	–	–	–	●	●	–	–	–	–
	→ K-751	Plastic isolated collet for hollow shaft, shaft diameter 14 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-014-P	2076232	–	–	–	●	●	–	–	–	–
	→ K-751	Plastic isolated collet for hollow shaft, shaft diameter 15 mm, outer diameter 5/8" (15.875 mm), plastic	SPZ-58Z-015-P	2076233	–	–	–	●	●	–	–	–	–

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Shaft couplings

Figure	Dimen-sional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	➜ K-756	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	KUP-0606-B	5312981	●	–	–	●	●	–	–	–	–
	➜ K-756	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 °C to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub	KUP-0610-B	5312982	●	–	–	●	●	–	–	–	–
	➜ K-756	Bellows coupling, shaft diameter 10 mm/10 mm; maximum shaft offset: radial +/- 0.25 mm, axial +/- 0.4 mm, angular +/- 4°; max. revolutions 10,000 rpm, –30° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	KUP-1010-B	5312983	–	–	–	●	●	–	–	–	–
	➜ K-756	Bellows coupling, shaft diameter 10 mm / 12 mm; maximum shaft offset: radial +/- 0.25 mm, axial +/- 0.4 mm, angular +/- 4°; max. revolutions 10,000 rpm, –30° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs	KUP-1012-B	5312984	–	–	–	●	●	–	–	–	–

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	→ K-756	Bar coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle ± 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	●	–	–	●	●	–	–	–	–
	→ K-756	Bar coupling, shaft diameter 6 mm / 8 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°, max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0608-S	5314179	●	●	●	●	●	–	–	–	–
	→ K-756	Bar coupling, shaft diameter 6 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 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	●	–	–	●	●	–	–	–	–
	→ K-756	Bar coupling, shaft diameter 8 mm / 8 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0808-S	5314177	–	●	●	–	–	–	–	–	–
	→ K-756	Bar coupling, shaft diameter 8 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-0810-S	5314178	–	●	●	●	●	–	–	–	–
	→ K-756	Bar coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub	KUP-1010-S	2056408	–	–	–	●	●	–	–	–	–

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	→ K-757	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	●	–	–	●	●	–	–	–	–
	→ K-757	Spring washer coupling, shaft diameter 10 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-1010-F	5312986	–	–	–	●	●	–	–	–	–
	→ K-756	Double-loop coupling, shaft diameter 6 mm / 10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C to +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0610-D	5326697	●	–	–	●	●	–	–	–	–
	→ K-756	Double-loop coupling, shaft diameter 8 mm / 10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C to +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-0810-D	5326704	–	●	●	●	●	–	–	–	–
	→ K-756	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 °C to +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-1010-D	5326703	–	–	–	●	●	–	–	–	–
	→ K-756	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 °C to +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange	KUP-1012-D	5326702	–	–	–	●	●	–	–	–	–

K

Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Dimensional drawing, see page	Brief description	Length of cable	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	→ K-725	Head A: female connector, JST, 8-pin, straight Head B: cable Cable: incremental, suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	0.5 m	DOL-0J08-G0M5AA3	2046873	–	–	–	–	●	–	–	–	●
			1.5 m	DOL-0J08-G1M5AA3	2046874	–	–	–	–	●	–	–	–	●
			3 m	DOL-0J08-G03MAA3	2046875	–	–	–	–	●	–	–	–	●
			5 m	DOL-0J08-G05MAA3	2046876	–	–	–	–	●	–	–	–	●
			10 m	DOL-0J08-G10MAA3	2046877	–	–	–	–	●	–	–	–	●
	→ K-725	Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm², 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	●	●	●	●	●	–	–	●	●
	→ K-725	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: incremental, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	2 m	DOL-2312-G02MLA3	2030682	●	●	●	●	●	–	–	●	●
			7 m	DOL-2312-G07MLA3	2030685	●	●	●	●	●	–	–	●	●
			10 m	DOL-2312-G10MLA3	2030688	●	●	●	●	●	–	–	●	●
			15 m	DOL-2312-G15MLA3	2030692	●	●	●	●	●	–	–	●	●
			20 m	DOL-2312-G20MLA3	2030695	●	●	●	●	●	–	–	●	●
			25 m	DOL-2312-G25MLA3	2030699	●	●	●	●	●	–	–	●	●
			30 m	DOL-2312-G30MLA3	2030702	●	●	●	●	●	–	–	●	●
	→ K-725	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 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	1.5 m	DOL-2312-G1M5MA3	2029212	●	●	●	●	●	–	–	●	●
			3 m	DOL-2312-G03MMA3	2029213	●	●	●	●	●	–	–	●	●
			5 m	DOL-2312-G05MMA3	2029214	●	●	●	●	●	–	–	●	●
			10 m	DOL-2312-G10MMA3	2029215	●	●	●	●	●	–	–	●	●
			20 m	DOL-2312-G20MMA3	2029216	●	●	●	●	●	–	–	●	●
			30 m	DOL-2312-G30MMA3	2029217	●	●	●	●	●	–	–	●	●
	→ K-725	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: incremental, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [2]	2 m	DOL-2312-G02MLD1	2062202	–	–	–	–	●	–	–	–	–
			7 m	DOL-2312-G07MLD1	2062203	–	–	–	–	●	–	–	–	–
			10 m	DOL-2312-G10MLD1	2062204	–	–	–	–	●	–	–	–	–
			15 m	DOL-2312-G15MLD1	2062205	–	–	–	–	●	–	–	–	–
			20 m	DOL-2312-G20MLD1	2062206	–	–	–	–	●	–	–	–	–
			25 m	DOL-2312-G25MLD1	2062207	–	–	–	–	●	–	–	–	–
			30 m	DOL-2312-G30MLD1	2062208	–	–	–	–	●	–	–	–	–

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

[2] Warning! Only in combination with electrical interfaces U, V, W and M.

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Figure	Dimensional drawing, see page	Brief description	Length of cable	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	→ K-726	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 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [2]	1.5 m	DOL-2312-G1M5MD1	2062240	–	–	–	–	●	–	–	–	–
			3 m	DOL-2312-G03MMD1	2062243	–	–	–	–	●	–	–	–	–
			5 m	DOL-2312-G05MMD1	2062244	–	–	–	–	●	–	–	–	–
			10 m	DOL-2312-G10MMD1	2062245	–	–	–	–	●	–	–	–	–
			20 m	DOL-2312-G20MMD1	2062246	–	–	–	–	●	–	–	–	–
			30 m	DOL-2312-G30MMD1	2062247	–	–	–	–	●	–	–	–	–

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

[2] Warning! Only in combination with electrical interfaces U, V, W and M.

Female connectors (ready to assemble)

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	→ K-726	Head A: female connector, M12, 8-pin, straight, A coded, shielded, for cable diameter 4 mm ... 8 mm Head B: - Operating temperature: –40 °C ... +85 °C	DOS-1208-GA01	6045001	●	●	●	●	●	–	–	●	●
	→ K-726	Head A: female connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: –20 °C ... +130 °C	DOS-2312-G	6027538	●	●	●	●	●	–	–	●	●
	→ K-727	Head A: female connector, M23, 12-pin, angled, shielded, for cable diameter 4.2 mm ... 6.6 mm Head B: - Operating temperature: –20 °C ... +130 °C	DOS-2312-W01	2072580	●	●	●	●	●	–	–	●	●
	→ K-726	Head A: female connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: - Operating temperature: –40 °C ... +125 °C	DOS-2312-G02	2077057	●	●	–	●	●	–	–	–	●

Cables (ready to assemble)

Figure	Dimensional drawing, see page	Brief description	Length of cable	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	–	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	By the meter	LTG-2308-MWENC	6027529	●	●	●	●	●	–	–	●	●
		Head A: cable Head B: cable Cable: PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm		LTG-2612-MW	6028516	●	●	●	●	●	–	–	●	●

Male connector (ready to assemble)

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	➜ K-727	Head A: male connector, M12, 8-pin, straight, A coded, shielded, for cable diameter 4 mm ... 8 mm Head B: - Operating temperature: –40 °C ... +85 °C	STE-1208-GA01	6044892	●	●	●	●	●	–	–	●	●

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	→ K-727	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	●	●	●	●	●	–	–	●	●
	→ K-727	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	●	●	●	●	●	–	–	●	●

Connection cables with female and male connector

Figure	Dimensional drawing, see page	Brief description	Length of cable	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	→ K-727	Head A: female connector, JST, 8-pin, straight Head B: male connector, M23, 12-pin, straight Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	0.35 m	STL-2312-GM35AA3	2061621	–	–	–	–	●	–	–	–	●
			1 m	STL-2312-G01MAA3	2061622	–	–	–	–	●	–	–	–	●
			2 m	STL-2312-G02MAA3	2061504	–	–	–	–	●	–	–	–	●
	–	Head A: female connector, connector system, 8-pin, straight Head B: male connector, D-Sub, 9-pin, straight Cable: PVC, shielded, can be used for encoders with cable outlet in conjunction with PGT-10-Pro	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: shielded, 4 x 2 x 0.08 mm²	0.5 m	DSL-2D08-G0M5AC3	2046579	–	–	–	–	●	–	–	–	●
	–	Head A: female connector, M23, 12-pin, straight Head B: male connector, D-Sub, 9-pin, straight Cable: shielded, 4 x 2 x 0.08 mm²	0.5 m	DSL-3D08-G0M5AC3	2046580	–	–	–	–	●	–	–	–	●

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Additional accessories

Programming and configuration tools

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DBS36 Core	DBS50 Core	DKS40	DBS60 Core	DFS60	DGS34	DGS35	DKV60 measuring wheel encoder	DFV60 measuring wheel encoder
	–	Programming unit USB, for programmable SICK encoders AFS60, AFM60, DFS60, VFS60, DFV60 and wire draw encoders with programmable encoders.	PGT-08-S	1036616	–	–	–	–	●	–	–	–	●
	–	Programming unit display for programmable SICK DFS60, VFS60, DFV60, AFS/AFM60, AHS/AHM36 encoders, and wire draw encoders with DFS60, AFS/AFM60, and AHS/AHM36. Compact dimensions, low weight, and intuitive operation.	PGT-10-Pro	1072254	–	–	–	–	●	–	–	–	●

Absolute encoders

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Dimen-sional drawing, see page	Brief description
	➜ K-748	Mounting bracket for encoder with centering hub 20 mm, including mounting kit for face mount flange
	➜ K-750	Mounting bracket for encoder with centering hub 36 mm, including mounting kit for face mount flange

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Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
BEF-WF-20	2066393	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
BEF-WF-36	2029164	–	–	●	●	●	●	●	●	●	●	●	–	–	●	–	–

Flanges

Flange plate

Figure	Dimen-sional drawing, see page	Brief description
	→ K-752	Standard stator coupling
	→ K-753	Stator coupling, one-sided, 81 mm long with slot
	→ K-741	Stator coupling, one-sided, 179 mm long with slot
	→ K-742	Stator coupling, one-sided, 248 mm long with slots
	→ K-742	Stator coupling, 16.5 mm high
	→ K-743	Stator coupling with 63 mm hole circle diameter
	→ K-770	Stator coupling with 63 mm slot radius
	→ K-770	Flange adapter centering hub D20 to D24
	→ K-771	Flange adapter centering hub D20 to D30
	→ K-771	Flange adapter centering hub D20 to D36
	→ K-772	Flange adapter centering hub D20 to D36, 2 mm high
	→ K-772	Flange adapter centering hub D20 to D50
	→ K-753	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
	→ K-754	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 10
	→ K-754	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 58 mm square mounting plate with shock absorbers, aluminum
	→ K-754	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

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Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
BEF-DS00XFX	2056812	–	–	●	●	●	●	–	–	–	–	–	–	–	–	–	–
BEF-DS01DFS/VFS	2047428	–	–	●	●	●	●	–	–	–	–	–	–	–	–	–	–
BEF-DS02DFS/VFS	2047430	–	–	●	●	●	●	–	–	–	–	–	–	–	–	–	–
BEF-DS03DFS/VFS	2047431	–	–	●	●	●	●	–	–	–	–	–	–	–	–	–	–
BEF-DS05XFX	2057423	–	–	●	●	●	●	–	–	–	–	–	–	–	–	–	–
BEF-DS07XFX	2059368	–	–	●	●	●	●	–	–	–	–	–	–	–	–	–	–
BEF-DS08	2072206	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
BEF-FA-020-024	2072294	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
BEF-FA-020-030	2072295	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
BEF-FA-020-036	2072298	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
BEF-FA-020-036-002	2072296	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
BEF-FA-020-050	2072297	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
BEF-FA-036-050	2029160	–	–	●	●	●	●	●	●	●	●	●	–	–	●	–	–
BEF-FA-036-060REC	2029162	–	–	●	●	●	●	●	●	●	●	●	–	–	●	–	–
BEF-FA-036-060RSA	2029163	–	–	●	●	●	●	●	●	●	●	●	–	–	●	–	–
BEF-FA-036-063REC	2034225	–	–	●	●	●	●	●	●	●	●	●	–	–	●	–	–

Figure	Dimensional drawing, see page	Brief description
	→ K-753	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 100 mm servo flange with 60 mm centering hub, aluminum

Other mounting accessories

Measuring wheels and measuring wheel systems

Figure	Dimensional drawing, see page	Brief description
	→ K-746	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm
	→ K-746	Measuring wheel with ridged plastic surface (Hytrel) for 10 mm solid shaft, circumference 200 mm
	→ K-746	Measuring wheel with smooth plastic surface (Hytrel) for 10 mm solid shaft, circumference 500 mm
	→ K-747	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 200 mm
	→ K-747	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 300 mm
	→ K-747	Measuring wheel with O-ring (NBR70) for 6 mm solid shaft, circumference 500 mm
	→ K-747	Measuring wheel with O-ring (NBR70) for 8 mm solid shaft, circumference 200 mm
	→ K-747	Measuring wheel with O-ring (NBR70) for 8 mm solid shaft, circumference 300 mm
	→ K-747	Measuring wheel with O-ring (NBR70) for 8 mm solid shaft, circumference 500 mm
	→ K-747	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 200 mm
	→ K-747	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 300 mm
	→ K-747	Measuring wheel with O-ring (NBR70) for 10 mm solid shaft, circumference 500 mm
	–	O-ring for measuring wheels (circumference 200 mm)
	–	O-ring for measuring wheels (circumference 300 mm)
	–	O-ring for measuring wheels (circumference 500 mm)

Modular measuring wheel system

Dimensional drawing, see page	Brief description
→ K-769	Measuring wheel system, desired mounting position: left, for DBS60-S4, DFS60-S4, AFS60-S4, and AFM60-S4
→ K-769	Measuring wheel system, desired mounting position: right, for DBS60-S4, DFS60-S4, AFS60-S4, and AFM60-S4

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Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
BEF-FA-036-100	2029161	–	–	●	●	●	●	●	●	●	●	●	–	–	●	–	–

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
BEF-MR-010020	5312988	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	–
BEF-MR-010020G	5318678	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	–
BEF-MR-010050	5312989	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	–
BEF-MR006020R	2055222	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	●
BEF-MR006030R	2055634	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	●
BEF-MR006050R	2055225	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	●
BEF-MR008020R	2055223	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
BEF-MR008030R	2055635	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
BEF-MR008050R	2055226	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
BEF-MR010020R	2055224	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	–
BEF-MR010030R	2049278	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	–
BEF-MR010050R	2055227	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	–
BEF-OR-053-040	2064061	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	●
BEF-OR-083-050	2064076	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	●
BEF-OR-145-050	2064074	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	●

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
BEF-MRS-10-1	2071958	–	–	●	●	●	●	–	–	–	–	–	–	–	–	–	–
BEF-MRS-10-2	2071957	–	–	●	●	●	●	–	–	–	–	–	–	–	–	–	–

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Mounting bells

Figure	Dimensional drawing, see page	Brief description
	→ K-746	Mounting bell for encoders with a servo flange, centering hub 50 mm, including mounting kit

Servo clamps

Figure	Dimensional drawing, see page	Brief description
	→ K-755	Half-shell servo clamps (2 pcs.) for servo flanges with a 50 mm centering hub
	→ K-756	Servo clamps, small, for servo flanges (clamps, eccentric fastener), 3 pcs., without mounting material
	→ K-755	Servo clamps, large, for servo flanges (clamps, eccentric fastener), 3 pcs., without mounting material

Miscellaneous

Figure	Dimensional drawing, see page	Brief description
	–	Clamping ring for metal hollow shaft, metal
	→ K-745	Bearing block for hollow shaft encoder, including fixing screws
	→ K-745	Bearing block for servo and face mount flange encoder
	–	Mounting kit for servo flange encoder on the bearing block, 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

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8015560/2015-09-01
Subject to change without notice

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
BEF-MG-50	5312987	–	–	●	●	●	●	●	●	●	●	●	–	–	●	–	–

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
BEF-WG-SF050	2029165	–	–	●	●	●	●	●	●	●	●	●	–	–	●	–	–
BEF-WK-RESOL	2039082	●	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
BEF-WK-SF	2029166	–	–	●	●	●	●	●	●	●	●	●	–	–	●	–	●

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
BEF-KR-M	2064709	–	–	●	●	●	●	●	–	–	–	–	–	–	–	–	–
BEF-FA-B12-010	2042728	–	–	●	●	●	●	●	●	●	●	●	–	–	●	–	–
BEF-FA-LB1210	2044591	–	–	●	●	●	●	●	●	●	●	●	–	–	●	–	–
BEF-MK-LB	5320872	–	–	●	●	●	●	●	●	●	●	●	–	–	●	–	●

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Figure	Dimen-sional drawing, see page	Brief description
	➜ K-754	Flange adapter (adapts size 60 face mount flange encoder to bearing block with part number 2044591)

Shaft adaptation

Collets and clamping rings

Figure	Dimen-sional drawing, see page	Brief description
	➜ K-773	Collet for blind hollow shaft, shaft diameter 6 mm, outer diameter 15 mm
		Collet for blind hollow shaft, shaft diameter 8 mm, outer diameter 15 mm
		Collet for blind hollow shaft, shaft diameter 10 mm, outer diameter 15 mm
		Collet for blind hollow shaft, shaft diameter 12 mm, outer diameter 15 mm
		Collet for blind hollow shaft, shaft diameter 14 mm, outer diameter 15 mm
		Collet for blind hollow shaft, shaft diameter 1/2" (12.7 mm), outer diameter 15 mm
		Collet for blind hollow shaft, shaft diameter 1/4" (6.35 mm), outer diameter 15 mm
		Collet for blind hollow shaft, shaft diameter 3/8" (9.525 mm), outer diameter 15 mm
	➜ K-773	Collet for through hollow shaft, shaft diameter 6 mm, outer diameter 14 mm
		Collet for through hollow shaft, shaft diameter 8 mm, outer diameter 14 mm
		Collet for through hollow shaft, shaft diameter 10 mm, outer diameter 14 mm
		Collet for through hollow shaft, shaft diameter 12 mm, outer diameter 14 mm
		Collet for through hollow shaft, shaft diameter 1/2" (12.7 mm), outer diameter 14 mm
		Collet for through hollow shaft, shaft diameter 1/4" (6.35 mm), outer diameter 14 mm
		Collet for through hollow shaft, shaft diameter 3/8" (9.525 mm), outer diameter 14 mm

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
BEF-FA-036-050-019	2063378	–	–	●	●	●	●	●	●	●	●	●	–	–	●	–	–

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
SPZ-006-AD-A	2029174	–	–	–	–	–	–	–	●	●	●	●	–	–	●	–	–
SPZ-008-AD-A	2029176	–	–	–	–	–	–	–	●	●	●	●	–	–	●	–	–
SPZ-010-AD-A	2029178	–	–	–	–	–	–	–	●	●	●	●	–	–	●	–	–
SPZ-012-AD-A	2029179	–	–	–	–	–	–	–	●	●	●	●	–	–	●	–	–
SPZ-014-AD-A	2048863	–	–	–	–	–	–	–	●	●	●	●	–	–	●	–	–
SPZ-1E2-AD-A	2029180	–	–	–	–	–	–	–	●	●	●	●	–	–	●	–	–
SPZ-1E4-AD-A	2029175	–	–	–	–	–	–	–	●	●	●	●	–	–	●	–	–
SPZ-3E8-AD-A	2029177	–	–	–	–	–	–	–	●	●	●	●	–	–	●	–	–
SPZ-006-AD-D	2029192	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–
SPZ-008-AD-D	2029194	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–
SPZ-010-AD-D	2029196	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–
SPZ-012-AD-D	2029197	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–
SPZ-1E2-AD-D	2029198	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–
SPZ-1E4-AD-D	2029193	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–
SPZ-3E8-AD-D	2029195	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–

Shaft couplings

Figure	Dimen-sional drawing, see page	Brief description
	→ K-756	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
	→ K-756	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 °C to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub
	→ K-756	Bellows coupling, shaft diameter 10 mm / 10 mm; maximum shaft offset: radial +/- 0.25 mm, axial +/- 0.4 mm, angular +/- 4°; max. revolutions 10,000 rpm, –30° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs
	→ K-756	Bellows coupling, shaft diameter 10 mm / 12 mm; maximum shaft offset: radial +/- 0.25 mm, axial +/- 0.4 mm, angular +/- 4°; max. revolutions 10,000 rpm, –30° to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum clamping hubs
	→ K-756	Bar coupling, shaft diameter 6 mm / 6 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, –10° to +80 °C, max. torque 80 Ncm; material: fiber-glass reinforced polyamide, aluminum hub
	→ K-756	Bar coupling, shaft diameter 6 mm / 8 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°, max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub
	→ K-756	Bar coupling, shaft diameter 6 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; max. speed 10,000 rpm, –10° to +80 °C, max. torque 80 Ncm; material: fiber-glass reinforced polyamide, aluminum hub
	→ K-756	Bar coupling, shaft diameter 8 mm / 10 mm, maximum shaft offset: radial ± 0.3 mm, axial ± 0.2 mm, angular ± 3°; torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub
	→ K-756	Bar coupling, shaft diameter 10 mm / 10 mm, maximum shaft offset radial ± 0.3 mm, axial ± 0.2 mm, angle ± 3°; max. speed 10,000 rpm, torsion spring rigidity 38 Nm/wheel; material: fiber-glass reinforced polyamide, aluminum hub
	→ K-756	Double-loop coupling, shaft diameter 6 mm / 10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C to +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange
	→ K-756	Double-loop coupling, shaft diameter 8 mm / 10 mm, maximum shaft offset: radial ± 2.5 mm, axial ± 3 mm, angular ± 10°; max. speed 3,000 rpm, –30 °C to +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange
	→ K-756	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 °C to +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange
	→ K-756	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 °C to +80 °C, max. torque 1.5 Nm; material: polyurethane, galvanized steel flange
	→ K-757	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
	→ K-757	Spring washer coupling, shaft diameter 10 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

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
KUP-0606-B	5312981	●	●	●	●	●	●	●	●	●	●	●	–	–	●	●	●
KUP-0610-B	5312982	●	●	●	●	●	●	●	●	●	●	●	–	–	●	●	●
KUP-1010-B	5312983	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	–
KUP-1012-B	5312984	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	–
KUP-0606-S	2056406	●	●	●	●	●	●	●	●	●	●	●	–	–	●	●	●
KUP-0608-S	5314179	●	●	●	●	●	●	●	●	●	●	●	–	–	●	●	●
KUP-0610-S	2056407	●	●	●	●	●	●	●	●	●	●	●	–	–	●	●	●
KUP-0810-S	5314178	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	–
KUP-1010-S	2056408	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	–
KUP-0610-D	5326697	●	●	●	●	●	●	●	●	●	●	●	–	–	●	●	●
KUP-0810-D	5326704	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	–
KUP-1010-D	5326703	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	–
KUP-1012-D	5326702	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	–
KUP-0610-F	5312985	●	●	●	●	●	●	●	●	●	●	●	–	–	●	●	●
KUP-1010-F	5312986	●	●	●	●	●	●	●	●	●	●	●	–	–	●	–	–

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Connectivity

Adapters and distributors

Bus adapters

Figure	Dimensional drawing, see page	Brief description
	➜ K-728	PROFIBUS DP, connection adapter KR3, 3 x PG
	➜ K-728	PROFIBUS DP, connection adapter SR3, 3 x M12, 5-pin
	➜ K-728	CANopen, connection adapter KR1, 1 x PG
		CANopen, connection adapter KR2, 2 x PG
		CANopen, connection adapter KR3, 3 x PG
	➜ K-728	CANopen, connection adapter SR1, 1 x M12, 5-pin
	➜ K-728	CANopen, connection adapter SR2, 2 x M12, 5-pin
	➜ K-728	DeviceNet, connection adapter KR1, 1 x PG
		DeviceNet, connection adapter KR2, 2 x PG
	➜ K-728	DeviceNet, connection adapter SR1, 1 x M12, 5-pin
		DeviceNet, connection adapter SR2, 2 x M12, 5-pin

T-piece

Figure	Dimensional drawing, see page	Brief description
	–	CANopen, T-piece

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
AD-ATM60-KA3PR	2029225	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–
AD-ATM60-SR3PR	2031985	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–
AD-ATM60-KR1C0	2029230	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–
AD-ATM60-KR2C0	2029231	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–
AD-ATM60-KR3C0	2029232	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–
AD-ATM60-SR1C0	2031686	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–
AD-ATM60-SR2C0	2020935	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–	–
AD-ATM60-KR1DN	2029228	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–
AD-ATM60-KR2DN	2029229	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–
AD-ATM60-SR1DN	2029226	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–
AD-ATM60-SR2DN	2029227	–	–	–	–	–	–	–	–	–	–	●	–	–	–	–	–

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
DSC-1205T000025KM0	6030664	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–

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Plug connectors and cables

Connecting cables with female connector

Figure	Dimen-sional drawing, see page	Brief description	Length of cable
	→ K-729	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: suitable for drag chain, shielded, 2 x 0.34 mm² + 2 x 0.25 mm² + 1 x 0.34 mm², Ø 6.7 mm A-coded	2 m 5 m 10 m
	→ K-725	Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm², Ø 7.0 mm	2 m 5 m 10 m 20 m
	→ K-725	Head A: female connector, JST, 8-pin, straight Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	0.5 m 1.5 m 3 m 5 m 10 m
	→ K-730	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	0.5 m 1.5 m 3 m 5 m 10 m
	→ K-730	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm	1.5 m 3 m 5 m 10 m 20 m 30 m
	→ K-728	Head A: M12 female connector, 4-pin, straight Head B: cable Cable: for power supply, suitable for drag chain, PUR, halogen-free, unshielded, 4 x 0.34 mm², Ø 4.7 mm	2 m 5 m 10 m 25 m
	→ K-728	Head A: M12 female connector, 4-pin, angled Head B: cable Cable: for power supply, suitable for drag chain, PUR, halogen-free, unshielded, 4 x 0.34 mm², Ø 4.7 mm	2 m 5 m 10 m 25 m
	→ K-728	Head A: female connector, M12, 5-pin, angled Head B: cable Cable: for power supply, PUR, halogen-free, shielded, 3 x 0.34 mm², Ø 4.2 mm	5 m 10 m

[1] Suitable for SSI interfaces, not suitable for SSI + Incremental or SSI + Sin/Cos interfaces.

[2] Suitable for SSI + Incremental and SSI + Sin/Cos interfaces.

[3] For ARS60 SSI.

[4] For ARS60 Parallel.

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
DOL-1205-G02MY	6053041	–	●	–	–	–	–	–	–	–	●	–	–	–	–	–	–
DOL-1205-G05MY	6053042	–	●	–	–	–	–	–	–	–	●	–	–	–	–	–	–
DOL-1205-G10MY	6053043	–	●	–	–	–	–	–	–	–	●	–	–	–	–	–	–
DOL-1208-G02MAC1	6032866	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-1208-G05MAC1	6032867	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-1208-G10MAC1	6032868	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-1208-G20MAC1	6032869	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-0J08-G0M5AA6	2048589	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-0J08-G1M5AA6	2048590	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-0J08-G3M0AA6	2048591	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-0J08-G5M0AA6	2048593	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-0J08-G10MAA6	2048594	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-2308-G0M5AA6	2048595	–	–	●[1]	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-2308-G1M5AA6	2048596	–	–	●[1]	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-2308-G03MAA6	2048597	–	–	●[1]	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-2308-G05MAA6	2048598	–	–	●[1]	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-2308-G10MAA6	2048599	–	–	●[1]	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-2312-G1M5MD2	2062284	–	–	●[2]	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-2312-G03MMD2	2062300	–	–	●[2]	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-2312-G05MMD2	2062301	–	–	●[2]	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-2312-G10MMD2	2062302	–	–	●[2]	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-2312-G20MMD2	2062303	–	–	●[2]	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-2312-G30MMD2	2062304	–	–	●[2]	–	–	–	–	–	–	–	–	–	–	–	–	–
DOL-1204-G02MC	6025900	–	–	–	●	●	●	–	–	–	–	–	–	–	–	–	–
DOL-1204-G05MC	6025901	–	–	–	●	●	●	–	–	–	–	–	–	–	–	–	–
DOL-1204-G10MC	6025902	–	–	–	●	●	●	–	–	–	–	–	–	–	–	–	–
DOL-1204-G25MC	6034751	–	–	–	●	●	●	–	–	–	–	–	–	–	–	–	–
DOL-1204-W02MC	6025903	–	–	–	●	●	●	–	–	–	–	–	–	–	–	–	–
DOL-1204-W05MC	6025904	–	–	–	●	●	●	–	–	–	–	–	–	–	–	–	–
DOL-1204-W10MC	6025905	–	–	–	●	●	●	–	–	–	–	–	–	–	–	–	–
DOL-1204-W25MC	6034754	–	–	–	●	●	●	–	–	–	–	–	–	–	–	–	–
DOL-1202-W05MC	6042067	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
DOL-1202-W10MC	6042068	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–

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Figure	Dimen-sional drawing, see page	Brief description	Length of cable
	→ K-729	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: for power supply, suitable for drag chain, PUR, halogen-free, shielded, 5 x 0.34 mm², Ø 5.9 mm	5 m 10 m 20 m
	→ K-729	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 2 x 0.34 mm², Ø 8.0 mm	5 m 10 m 12 m 15 m 20 m 30 m 50 m
	→ K-729	Head A: female connector, M12, 5-pin, angled, B-coded Head B: cable Cable: suitable for drag chain, PUR, shielded, 2 x 0.64 mm², Ø 7.8 mm	5 m 10 m
	→ K-728	Head A: M12 female connector, 4-pin, straight Head B: cable Cable: for power supply, suitable for drag chain, PVC, unshielded, 4 x 0.25 mm², Ø 5.0 mm	5 m
	→ K-730	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm	1.5 m 3 m 5 m 10 m 20 m 30 m
	→ K-730	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm	1.5 m 3 m 5 m 10 m 20 m 30 m
	→ K-732	Head A: M23 female connector, 21-pin, straight Head B: cable Cable: PUR, halogen-free, shielded, 20 x 0.14 mm², 2 x 0.25 mm², Ø 7.8 mm	1.5 m 3 m 5 m 10 m 20 m
	→ K-729	Head A: female connector, M12, 5-pin, straight, A-coded Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 5 x 0.34 mm², Ø 5.9 mm	1.5 m 3 m 5 m 10 m
	→ K-729	Head A: female connector, M12, 5-pin, angled, A-coded Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 5 x 0.34 mm², Ø 5.9 mm	1.5 m 3 m 5 m 10 m

[1] Suitable for SSI interfaces, not suitable for SSI + Incremental or SSI + Sin/Cos interfaces.

[2] Suitable for SSI + Incremental and SSI + Sin/Cos interfaces.

[3] For ARS60 SSI.

[4] For ARS60 Parallel.

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
DOL-1205-G05MAC	6036384	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
DOL-1205-G10MAC	6036385	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
DOL-1205-G20MAC	6036386	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
DOL-1205-G05MQ	6026006	–	–	–	–	–	–	●	●	–	–	–	–	●	–	–	–
DOL-1205-G10MQ	6026008	–	–	–	–	–	–	●	●	–	–	–	–	●	–	–	–
DOL-1205-G12MQ	6032636	–	–	–	–	–	–	●	●	–	–	–	–	●	–	–	–
DOL-1205-G15MQ	6032637	–	–	–	–	–	–	●	●	–	–	–	–	●	–	–	–
DOL-1205-G20MQ	6032638	–	–	–	–	–	–	●	●	–	–	–	–	●	–	–	–
DOL-1205-G30MQ	6032639	–	–	–	–	–	–	●	●	–	–	–	–	●	–	–	–
DOL-1205-G50MQ	6032861	–	–	–	–	–	–	●	●	–	–	–	–	●	–	–	–
DOL-1205-W05MQ	6041423	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
DOL-1205-W10MQ	6041425	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
DOL-1204-G05M	6009866	–	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–
DOL-2312-G1M5MA1	2029200	–	–	–	–	–	–	–	–	●	–	–	●	–	–	–	–
DOL-2312-G03MMA1	2029201	–	–	–	–	–	–	–	–	●	–	–	●	–	–	–	–
DOL-2312-G05MMA1	2029202	–	–	–	–	–	–	–	–	●	–	–	●	–	–	–	–
DOL-2312-G10MMA1	2029203	–	–	–	–	–	–	–	–	●	–	–	●	–	–	–	–
DOL-2312-G20MMA1	2029204	–	–	–	–	–	–	–	–	●	–	–	●	–	–	–	–
DOL-2312-G30MMA1	2029205	–	–	–	–	–	–	–	–	●	–	–	●	–	–	–	–
DOL-2312-G1M5MA2	2029206	–	–	–	–	–	–	–	–	–	–	–	–	–	●[3]	–	–
DOL-2312-G03MMA2	2029207	–	–	–	–	–	–	–	–	–	–	–	–	–	●[3]	–	–
DOL-2312-G05MMA2	2029208	–	–	–	–	–	–	–	–	–	–	–	–	–	●[3]	–	–
DOL-2312-G10MMA2	2029209	–	–	–	–	–	–	–	–	–	–	–	–	–	●[3]	–	–
DOL-2312-G20MMA2	2029210	–	–	–	–	–	–	–	–	–	–	–	–	–	●[3]	–	–
DOL-2312-G30MMA2	2029211	–	–	–	–	–	–	–	–	–	–	–	–	–	●[3]	–	–
DOL-2321-G1M5PA4	2029218	–	–	–	–	–	–	–	–	–	–	–	–	–	●[4]	–	–
DOL-2321-G03MPA4	2029219	–	–	–	–	–	–	–	–	–	–	–	–	–	●[4]	–	–
DOL-2321-G05MPA4	2029220	–	–	–	–	–	–	–	–	–	–	–	–	–	●[4]	–	–
DOL-2321-G10MPA4	2029221	–	–	–	–	–	–	–	–	–	–	–	–	–	●[4]	–	–
DOL-2321-G20MPA4	2029222	–	–	–	–	–	–	–	–	–	–	–	–	–	●[4]	–	–
DOL-1205-G1M5ACSC0	6049451	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●
DOL-1205-G03MACSC0	6049452	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●
DOL-1205-G05MACSC0	6049453	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●
DOL-1205-G10MACSC0	6049454	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●
DOL-1205-W1M5ACSC0	6049455	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●
DOL-1205-W03MACSC0	6049456	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●
DOL-1205-W05MACSC0	6049457	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●
DOL-1205-W10MACSC0	6049458	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●

K

Connecting cables with male connector

Figure	Dimen-sional drawing, see page	Brief description	Length of cable
	→ K-735	Head A: male connector, M12, 4-pin, straight, D coded Head B: cable Cable: PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m 5 m 10 m
	→ K-735	Head A: male connector, M12, 4-pin, angled, D coded Head B: cable Cable: PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m 5 m 10 m 25 m
	→ K-735	Head A: male connector, M12, 4-pin, straight, D coded Head B: cable Cable: PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m 5 m 10 m
	→ K-735	Head A: male connector, M12, 4-pin, angled, D coded Head B: cable Cable: PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m 5 m 10 m 25 m
	→ K-736	Head A: M12 male connector, 5-pin, straight, B coded Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 2 x 0.34 mm², Ø 8.0 mm Wire shielding: AL-PT foil, total shield, tin-plated C shield	5 m 10 m 12 m
	→ K-736	Head A: male connector, M12, 5-pin, angled, B-coded Head B: cable Cable: suitable for drag chain, PUR, shielded, 2 x 0.64 mm², Ø 7.8 mm	5 m 10 m

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
STL-1204-G02ME90	6045284	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
STL-1204-G05ME90	6045285	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
STL-1204-G10ME90	6045286	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
STL-1204-W02ME90	6047912	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
STL-1204-W05ME90	6047913	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
STL-1204-W10ME90	6047914	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
STL-1204-W20ME90	6047915	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
STL-1204-G02MZ90	6048247	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
STL-1204-G05MZ90	6048248	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
STL-1204-G10MZ90	6048249	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
STL-1204-W02MZ90	6048256	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
STL-1204-W05MZ90	6048257	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
STL-1204-W10MZ90	6048258	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
STL-1204-W25MZ90	6048259	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
STL-1205-G05MQ	6026005	–	–	–	–	–	–	●	●	–	–	–	–	●	–	–	–
STL-1205-G10MQ	6026007	–	–	–	–	–	–	●	●	–	–	–	–	●	–	–	–
STL-1205-G12MQ	6032635	–	–	–	–	–	–	●	●	–	–	–	–	●	–	–	–
STL-1205-W05MQ	6041426	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
STL-1205-W10MQ	6041427	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–

Female connectors (ready to assemble)

Figure	Dimen-sional drawing, see page	Brief description
	→ K-731	Head A: female connector, M12, 4-pin, straight, unshielded, for power supply, for cable diameter 4 mm ... 6 mm Head B: -
	→ K-731	Head A: female connector, M12, 5-pin, straight, unshielded, for cable diameter 4 mm ... 6 mm Head B: -
	→ K-731	Head A: female connector, M12, 4-pin, straight, D-coded, shielded, for cable diameter 4 mm ... 8 mm Head B: -
		Head A: female connector, M12, 4-pin, straight, D-coded, shielded, for cable diameter 4 mm ... 8 mm
	→ K-731	Head A: female connector, M12, 4-pin, angled, unshielded, for power supply, for cable diameter 3 mm ... 6.5 mm Head B: -
	→ K-731	Head A: female connector, M12, 4-pin, angled, D-coded, shielded, for cable diameter 4 mm ... 8 mm Head B: -
		Head A: female connector, M12, 4-pin, angled, D-coded, shielded, for cable diameter 4 mm ... 8 mm
	→ K-731	Head A: female connector, M12, 5-pin, straight, shielded, for cable diameter 4.5 mm ... 7 mm Head B: -
	→ K-731	Head A: female connector, M12, 5-pin, straight, B-coded, shielded, for cable diameter 4 mm ... 9 mm Head B: -
	→ K-731	Head A: female connector, M12, 5-pin, angled, B-coded, shielded, for cable diameter 4 mm ... 8 mm Head B: -
	→ K-726	Head A: female connector, M12, 8-pin, straight, A coded, shielded, for cable diameter 4 mm ... 8 mm Head B: - Operating temperature: –40 °C ... +85 °C
	→ K-731	Head A: female connector, M14, 7-pin, straight, shielded, for cable diameter 4 mm ... 8 mm Head B: -
	→ K-726	Head A: female connector, M23, 12-pin, straight, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: Operating temperature: –20 °C ... +130 °C
	→ K-726	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
	→ K-727	Head A: female connector, M23, 12-pin, angled, shielded, for cable diameter 4.2 mm ... 6.6 mm Head B: Operating temperature: –20 °C ... +130 °C
	→ K-732	Head A: female connector, M23, 21-pin, straight, shielded, for cable diameter 5.5 mm ... 12 mm Head B: -
	→ K-730	Head A: female connector, D-Sub, 37-pin, straight, shielded Head B: -

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
DOS-1204-G	6007302	–	–	–	–	–	–	●	●	–	–	–	–	●	–	–	–
DOS-1205-G	6009719	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●
DOS-1204-GE	6048153	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
DOS-1204-GZ	6048263	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
DOS-1204-W	6007303	–	–	–	●	●	●	●	–	–	–	–	–	–	–	–	–
DOS-1204-WE	6048154	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
DOS-1204-WZ	6048264	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
DOS-1205-GA	6027534	–	●	–	–	–	–	–	–	–	●	●	–	–	–	–	–
DOS-1205-GQ	6021353	–	–	–	–	–	–	●	●	–	–	–	–	●	–	–	–
DOS-1205-WQ	6041429	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
DOS-1208-GA01	6045001	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
DOS-1507-G	6027536	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–
DOS-2312-G	6027538	–	–	●	–	–	–	–	–	●	–	–	●	–	●	–	–
DOS-2312-G02	2077057	–	–	●	–	–	–	–	–	●	–	–	●	–	●	–	–
DOS-2312-W01	2072580	–	–	●	–	–	–	–	–	●	–	–	●	–	●	–	–
DOS-2321-G	6027539	–	–	●	–	–	–	–	–	●	–	–	●	–	●	–	–
DOS-0D37-G	2029224	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–

K

Cables (ready to assemble)

Figure	Dimen-sional drawing, see page	Brief description	Length of cable	
	–	Head A: cable Head B: cable Cable: suitable for drag chain, PUR, shielded, 2 x 0.25 mm², Ø 8.0 mm	By the meter	
		Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm		
		Head A: cable Head B: cable Cable: PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.5 mm		
		Head A: cable Head B: cable Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm		
		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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm		
		Head A: cable Head B: cable Cable: PUR, halogen-free, shielded, 20 x 0.14 mm², 2 x 0.25 mm², Ø 7.8 mm		
		Head A: cable Head B: cable Cable: suitable for drag chain, shielded, 2 x 0.34 mm² + 2 x 0.25 mm² Wire shielding: AL-PT foil, total shield, tin-plated C shield		

Other plug connectors and cables

Figure	Dimen-sional drawing, see page	Brief description	
	–	A3M60 accessories sales set comprising: Female cable connector, supply voltage, M12, angled (6007303) female cable connector, M12, angled (6041429), male cable connector, M12, angled (6041428)	
	➜ K-731	Sales kit consisting of: 2 x M14 male cable connectors, 7-pin (6027535) 1 x M14 female cable connector, 7-pin (6027535)	
	➜ K-733	Head A: female connector, M12, 4-pin, D-coded Head B: female connector, RJ45, 8-pin Cable: shielded Switch cabinet feedthrough	
	➜ K-735	Head A: M12 male connector, 4-pin, straight, B coded Cable: terminator	
	➜ K-734	Head A: male connector, M12, 5-pin, straight, shielded Cable: terminator	

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
LTG-2102-MW	6021355	–	–	–	–	–	–	●	●	–	–	–	–	●	–	–	–
LTG-2308-MWENC	6027529	●	–	●	–	–	–	–	–	●	–	–	●	–	●	–	–
LTG-2411-MW	6027530	–	–	–	–	–	–	–	–	●	–	–	●	–	●	–	–
LTG-2512-MW	6027531	–	–	–	–	–	–	–	–	●	–	–	●	–	●	–	–
LTG-2612-MW	6028516	●	–	●	–	–	–	–	–	●	–	–	●	–	●	–	–
LTG-2622-MW	6027532	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–
LTG-2804-MW	6028328	–	●	–	–	–	–	–	–	–	●	●	–	–	–	–	–

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
DOS-3XM12-W	2058177	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
DSC-1507-G	2029199	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–
Feedthrough female connector Ethernet RJ45	6048180	–	–	–	●	●	●	–	–	–	–	–	–	–	–	–	–
STE-END-Q	6021156	–	–	–	–	–	–	●	●	–	–	–	–	●	–	–	–
STE-1205-GKEND	6037193	–	●	–	–	–	–	–	–	–	●	–	–	–	–	–	–

K

Male connector (ready to assemble)

Figure	Dimensional drawing, see page	Brief description
	→ K-730	Head A: male connector, D-Sub, 15-pin, straight, shielded Head B: -
	→ K-734	Head A: male connector, RJ45, 4-pin, straight, shielded, for cable diameter 4.5 mm ... 8 mm
	→ K-734	Head A: male connector, RJ45, 8-pin, straight, shielded, for cable diameter 4.5 mm ... 8 mm Head B: -
	→ K-734	Head A: male connector, M12, 4-pin, straight, D coded, shielded, for cable diameter 4 mm ... 8 mm Head B: -
	→ K-734	Head A: male connector, M12, 4-pin, straight, D coded, shielded, for cable diameter 4 mm ... 8 mm
	→ K-734	Head A: male connector, M12, 4-pin, angled, D coded, shielded, for cable diameter 4 mm ... 8 mm Head B: -
	→ K-734	Head A: male connector, M12, 4-pin, angled, D coded, shielded, for cable diameter 4 mm ... 8 mm
	→ K-734	Head A: male connector, M12, 5-pin, straight, unshielded, for cable diameter 4 mm ... 6 mm Head B: -
	→ K-734	Head A: male connector, M12, 5-pin, straight, A coded, shielded, for cable diameter 4 mm ... 8 mm Head B: -
	→ K-734	Head A: male connector, M12, 5-pin, straight, B coded, shielded, for cable diameter 4 mm ... 9 mm Head B: -
	→ K-735	Head A: male connector, M12, 5-pin, angled, B coded, shielded, for cable diameter 4 mm ... 8 mm Head B: -
	→ K-727	Head A: male connector, M12, 8-pin, straight, A coded, shielded, for cable diameter 4 mm ... 8 mm Head B: - Operating temperature: –40 °C ... +85 °C
	→ K-731	Head A: male connector, M14, 7-pin, straight, D coded, shielded, for cable diameter 4 mm ... 8 mm Head B: -
	→ K-727	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
	→ K-727	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

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
STE-0D15-G	2029223	–	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–
STE-0J04-GZ	6048260	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
STE-0J08-GE	6048150	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
STE-1204-GE01	6048151	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
STE-1204-GZ	6048261	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
STE-1204-WE	6048152	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
STE-1204-WZ	6048262	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
STE-1205-G	6022083	–	–	–	–	–	–	–	–	–	–	–	–	–	–	●	●
STE-1205-GA	6027533	–	●	–	–	–	–	–	–	–	●	●	–	–	–	–	–
STE-1205-GQ	6021354	–	–	–	–	–	–	●	●	–	–	–	–	●	–	–	–
STE-1205-WQ	6041428	–	–	–	–	–	–	●	–	–	–	–	–	–	–	–	–
STE-1208-GA01	6044892	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
STE-1507-G	6027535	–	–	–	–	–	–	–	–	–	–	–	–	●	–	–	–
STE-2312-G	6027537	–	–	●	–	–	–	–	–	●	–	–	●	–	●	–	–
STE-2312-G01	2077273	–	–	●	–	–	–	–	–	●	–	–	●	–	●	–	–

K

Connection cables with male and male connector

Figure	Dimen-sional drawing, see page	Brief description	Length of cable
	→ K-733	Head A: male connector, M12, 4-pin, straight, D coded Head B: male connector, M12, 4-pin, straight, D coded Cable: PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m 5 m 10 m
	→ K-733	Head A: male connector, M12, 4-pin, angled, D coded Head B: male connector, M12, 4-pin, straight, D coded Cable: PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m 5 m 10 m
	–	Head A: male connector, M12, 4-pin, angled, D coded Head B: male connector, M12, 4-pin, angled, D coded Cable: PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m 5 m 10 m
	→ K-733	Head A: male connector, M12, 4-pin, straight, D coded Head B: male connector, RJ45, 8-pin, straight Cable: PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m 5 m 10 m
	→ K-734	Head A: male connector, M12, 4-pin, angled, D coded Head B: male connector, RJ45, 8-pin, straight Cable: PUR, halogen-free, shielded, 2 x 2 x 0.14 mm², Ø 6.4 mm	2 m 5 m 10 m
	→ K-733	Head A: male connector, M12, 4-pin, angled, D coded Head B: male connector, M12, 4-pin, straight Cable: PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m 5 m 10 m
	→ K-733	Head A: male connector, M12, 4-pin, straight, D coded Head B: male connector, M12, 4-pin, straight Cable: PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m 5 m 10 m
	–	Head A: male connector, M12, 4-pin, angled, D coded Head B: male connector, M12, 4-pin, angled, D coded Cable: PUR, halogen-free, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m 5 m 10 m
	→ K-733	Head A: male connector, RJ45, 4-pin, straight, D coded Head B: male connector, M12, 4-pin, angled Cable: PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m 5 m 10 m
	–	Head A: male connector, M12, 4-pin, straight, D coded Head B: male connector, RJ45, 4-pin, straight Cable: PVC, shielded, 4 x 0.34 mm², Ø 6.5 mm	2 m 5 m 10 m

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
SSL-1204-G02ME90	6045222	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
SSL-1204-G05ME90	6045277	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
SSL-1204-G10ME90	6045279	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
SSL-1204-H02ME90	6047908	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
SSL-1204-H05ME90	6047909	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
SSL-1204-H10ME90	6047910	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
SSL-1204-W02ME	6050632	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
SSL-1204-W05ME	6050633	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
SSL-1204-W10ME	6050634	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
SSL-2J04-G02ME60	6047916	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
SSL-2J04-G05ME60	6047917	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
SSL-2J04-G10ME60	6047918	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
SSL-2J04-H02ME	6047911	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
SSL-2J04-H05ME	6045287	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
SSL-2J04-H10ME	6045288	–	–	–	●	–	–	–	–	–	–	–	–	–	–	–	–
SSL-1204-F02MZ90	6048250	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
SSL-1204-F05MZ90	6048251	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
SSL-1204-F10MZ90	6048252	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
SSL-1204-G02MZ90	6048241	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
SSL-1204-G05MZ90	6048242	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
SSL-1204-G10MZ90	6048243	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
SSL-1204-W02MZ	6050635	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
SSL-1204-W05MZ	6050636	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
SSL-1204-W10MZ	6050637	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
SSL-2J04-F02MZ	6048253	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
SSL-2J04-F05MZ	6048254	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
SSL-2J04-F10MZ	6048255	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
SSL-2J04-G02MZ60	6048244	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
SSL-2J04-G05MZ60	6048245	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–
SSL-2J04-G10MZ60	6048246	–	–	–	–	●	●	–	–	–	–	–	–	–	–	–	–

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Connection cables with female and male connector

Figure	Dimen-sional drawing, see page	Brief description	Length of cable
	➜ K-732	Head A: female connector, M12, 5-pin, straight Head B: male connector, M12, 5-pin, straight Cable: suitable for drag chain, PUR, halogen-free, shielded, 2 x 0.34 mm² + 2 x 0.25 mm² + 1 x 0.34 mm², Ø 6.7 mm, A coded	2 m 5 m 10 m
	➜ K-732	Head A: female connector, M12, 5-pin, straight Head B: male connector, M12, 5-pin, straight Cable: drop cable, PUR, halogen-free, unshielded, 2 x 0.34 mm², Ø 6.9 mm	6 m
	–	Head A: female connector, M12, 8-pin, straight Head B: male connector, D-Sub, 9-pin, straight Cable: PUR, halogen-free, shielded, 4 x 2 x 0.15 mm²	0.5 m
	–	Head A: female connector, M23, 12-pin, straight Head B: male connector, D-Sub, 9-pin, straight Cable: suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm²	0.5 m
	–	Head A: female connector, M23, 12-pin, straight Head B: male connector, D-Sub, 9-pin, straight, 8-wire	0.5 m

[1] Suitable for use with SSI interfaces, not suitable for use with SSI + Incremental interface or SSI + Sin/Cos.

[2] Suitable for use with SSI + Incremental or SSI + Sin/Cos interfaces.

Additional accessories

Programming and configuration tools

Figure	Dimen-sional drawing, see page	Brief description
	–	Programming tool for ATM60, ATM90 and KH53 SSI
	–	Programming unit USB, for programmable SICK encoders AFS60, AFM60, DFS60, VFS60, DFV60 and wire draw encoders with programmable encoders.
	–	Programming unit display for programmable SICK DFS60, VFS60, DFV60, AFS/AFM60, AHS/AHM36 encoders, and wire draw encoders with DFS60, AFS/AFM60, and AHS/AHM36. Compact dimensions, low weight, and intuitive operation.

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
DSL-1205-G02MY	6053044	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
DSL-1205-G05MY	6053045	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
DSL-1205-G10MY	6053046	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–	–
DSL-1205-G06MK	6028327	–	–	–	–	–	–	–	–	–	●	●	–	–	–	–	–
DSL-2D08-G0M5AC2	2048439	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
DSL-3D08-G0M5AC2	2048440	–	–	● [1]	–	–	–	–	–	–	–	–	–	–	–	–	–
DSL-3D08-G0M5AC4	2059270	–	–	● [2]	–	–	–	–	–	–	–	–	–	–	–	–	–

Type	Part no.	AHS/AHM36 SSI	AHS/AHM36 CANopen	AFS/AFM60 SSI	AFS/AFM60 EtherNet/IP	AFS/AFM60 PROFINET	AFS/AFM60 EtherCAT®	A3M60 PROFIBUS	ATM60 PROFIBUS	ATM60 SSI	ATM60 CANopen	ATM60 DeviceNet	ATM90 SSI	ATM90 PROFIBUS	ARS60 SSI/Parallel	ACS/ACM36	ACM60
PGT-01-S	1030111	–	–	–	–	–	–	–	–	●	–	–	●	–	–	–	–
PGT-08-S	1036616	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–
PGT-10-Pro	1072254	●	–	●	–	–	–	–	–	–	–	–	–	–	–	–	–

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Safety encoders

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.

Mounting systems

Flanges

Flange plate

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DFS60S Pro
	→ K-753	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	BEF-FA-036-050	2029160	●
	→ K-754	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 10	BEF-FA-036-060REC	2029162	●
	→ K-754	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 58 mm square mounting plate with shock absorbers, aluminum	BEF-FA-036-060RSA	2029163	●
	→ K-754	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	BEF-FA-036-063REC	2034225	●
	→ K-753	Flange adapter, adaptation of face mount flange with 36 mm centering hub to 100 mm servo flange with 60 mm centering hub, aluminum	BEF-FA-036-100	2029161	●
	→ K-741	Stator coupling, one-sided, 179 mm long with slot	On request	On request [1]	●

[1] For more detailed information, please consult your local SICK subsidiary. The stator coupling is mounted ex works. The customer is not permitted to replace the stator coupling

Other mounting accessories

Servo clamps

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DFS60S Pro
	→ K-755	Half-shell servo clamps (2 pcs.) for servo flanges with a 50 mm centering hub	BEF-WG-SF050	2029165	●
	→ K-755	Servo clamps, large, for servo flanges (clamps, eccentric fastener), 3 pcs., without mounting material	BEF-WK-SF	2029166	●

Miscellaneous

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DFS60S Pro
	–	1 M4x16 cylinder head screw and 1 2x2x6 feather key acc. to DIN 6885	BEF-MK-SE01	2073617	●

Shaft adaptation

Shaft couplings

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DFS60S Pro
	→ K-755	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	●
	→ K-755	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 °C to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub, for use with feather key	KUP-0610-BP	2075375	●
	→ K-756	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 °C to +120 °C, max. torque 80 Ncm; material: stainless steel bellows, aluminum hub, for use with feather key	KUP-1010-BP	2075373	●
	→ K-755	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 80 Ncm; material: stainless steel bellows, fixed with two setscrews each	KUP-0606-BS	2075378	●
	→ K-755	Bellows coupling, shaft diameter 6 mm / 10 mm, 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 80 Ncm; material: stainless steel bellows, fixed with two setscrews each	KUP-0610-BS	2075377	●
	→ K-756	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 80 Ncm; material: stainless steel bellows, fixed with two setscrews each	KUP-1010-BS	2075376	●

Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Dimensional drawing, see page	Brief description	Length of cable	Type	Part no.	DFS60S Pro
	➜ K-725	Head A: female connector, M12, 8-pin, straight Head B: cable Cable: suitable for drag chain, PVC, shielded, 4 x 2 x 0.25 mm², 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	●
	➜ K-725	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: incremental, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	2 m	DOL-2312-G02MLA3	2030682	●
			7 m	DOL-2312-G07MLA3	2030685	●
			10 m	DOL-2312-G10MLA3	2030688	●
			15 m	DOL-2312-G15MLA3	2030692	●
			20 m	DOL-2312-G20MLA3	2030695	●
			25 m	DOL-2312-G25MLA3	2030699	●
			30 m	DOL-2312-G30MLA3	2030702	●
	➜ K-725	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 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.8 mm [1]	1.5 m	DOL-2312-G1M5MA3	2029212	●
			3 m	DOL-2312-G03MMA3	2029213	●
			5 m	DOL-2312-G05MMA3	2029214	●
			10 m	DOL-2312-G10MMA3	2029215	●
			20 m	DOL-2312-G20MMA3	2029216	●
			30 m	DOL-2312-G30MMA3	2029217	●

Female connectors (ready to assemble)

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DFS60S Pro
	➜ K-726	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	●
	➜ K-726	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	●

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Cables (ready to assemble)

Figure	Dimensional drawing, see page	Brief description	Length of cable	Type	Part no.	DFS60S Pro
	–	Head A: cable Head B: cable Cable: SSI, suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.15 mm², Ø 5.6 mm	By the meter	LTG-2308-MWENC	6027529	●
		Head A: cable Head B: cable Cable: SSI, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 1 x 0.14 mm², Ø 7.5 mm		LTG-2411-MW	6027530	●
		Head A: cable Head B: cable Cable: SSI, suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm		LTG-2612-MW	6028516	●

Male connector (ready to assemble)

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	DFS60S Pro
	➜ K-727	Head A: male connector, M12, 8-pin, straight, A coded, incremental, shielded, for cable diameter 4 mm ... 8 mm Head B: - Operating temperature: –40 °C ... +85 °C	STE-1208-GA01	6044892	●
	➜ K-727	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	●

Wire draw encoders

Mounting systems

Flanges

Flange plate

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	EcoLine	Compact	HighLine
	➜ K-758	Flange adapter for EcoLine wire draw mechanisms, adaption of face mount flange with centering hub 20 mm to 50 mm servo flange	BEF-FA-020-050-007	2073774	●	–	–
	➜ K-759	Flange adapter for HighLine wire draw mechanisms, adaption of face mount flange with centering hub 20 mm to 50 mm servo flange	BEF-FA-020-050WDE	2073776	–	–	●

Other mounting accessories

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	EcoLine	Compact	HighLine
	–	Joint ball for insertion in wire end ring with 20 mm diameter	Joint ball for BTF/ PRF/MRA wire draw	5318683	●	–	●
	–	Additional brush attachment for wire draw mechanism MRA-F080 (2 m and 3 m from the HighLine series)	MRA-F080-B	6045341	–	–	●
	–	Wire draw deflection pulley for wire draw mechanism MRA-F080 (2 m and 3 m from HighLine series)	MRA-F080-R	6028632	–	–	●
	–	Additional brush attachment for wire draw mechanism MRA-F130 (5 m, 10 m, 20 m and 30 m from HighLine series)	MRA-F130-B	6038562	–	–	●
	–	Wire draw deflection pulley for wire draw mechanism MRA-F130 (5 m, 10 m, 20 m and 30 m from HighLine series)	MRA-F130-R	6028631	–	–	●

Wire draw mechanism

Wire draw mechanism for face mount flange encoder

Figure	Dimensional drawing, see page	Brief description	Measuring length	Type	Part no.	EcoLine	Compact	HighLine
	➜ K-761	HighLine wire draw mechanism for 60 series face mount flange with 10 mm shaft	2.0 m	MRA-F080-402D2	6029788	–	–	●
	➜ K-763		5.0 m	MRA-F130-405D2	6029789	–	–	●
	➜ K-763		10.0 m	MRA-F130-410D2	6029790	–	–	●
	➜ K-764		20.0 m	MRA-F130-420D1	6029791	–	–	●
	➜ K-764		30.0 m	MRA-F130-430D1	6029792	–	–	●
	➜ K-765		50.0 m	MRA-F190-450D2	6029793	–	–	●

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Wire draw mechanism for servo flange encoder

Figure	Dimensional drawing, see page	Brief description	Measuring length	Type	Part no.	EcoLine	Compact	HighLine
	→ K-760	HighLine wire draw mechanism for 60 series servo flange With 6 mm shaft	2.0 m	MRA-F080-102D2	6028625	–	–	●
	→ K-760		3.0 m	MRA-F080-103D2	6030125	–	–	●
	→ K-761		5.0 m	MRA-F130-105D2	6028626	–	–	●
	→ K-762		10.0 m	MRA-F130-110D2	6028627	–	–	●
	→ K-762		20.0 m	MRA-F130-120D1	6028628	–	–	●
	→ K-763		30.0 m	MRA-F130-130D1	6028629	–	–	●
	→ K-765		50.0 m	MRA-F190-150D2	6028630	–	–	●
	→ K-766	Ecoline wire draw mechanism for 36 series servo flange With 6 mm shaft	1.25 m	MRA-G055-101D4	5324019	●	–	–
	→ K-766		3.0 m	MRA-G080-103D3	5322778	●	–	–
	→ K-767	Ecoline wire draw mechanism for 60 series servo flange With 6 mm shaft	5.0 m	MRA-G130-105D3	5322779	●	–	–
	→ K-768		10.0 m	MRA-G190-110D3	5326242	●	–	–

Connectivity

Please check the accessories for the encoder in question for information on compatible connectors.

Additional accessories

Spare parts

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	EcoLine	Compact	HighLine
	–	Spare mounting set for MRA-G190 (10 m EcoLine)	BEF-MK-MRA-G01	5326294	●	–	–
	–	Spare mounting set for HighLine wire draw mechanisms for fitting encoders with servo flange	MRA-F-K	6028633	–	–	●
	–	Spare mounting set for HighLine wire draw mechanisms for attaching encoders with a face mount flange	MRA-F-L	6030124	–	–	●

Programming and configuration tools

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	EcoLine	Compact	HighLine
	–	Programming unit USB, for programmable SICK encoders AFS60, AFM60, DFS60, VFS60, DFV60 and wire draw encoders with programmable encoders.	PGT-08-S	1036616	● [1]	–	● [1]
	–	Programming unit display for programmable SICK DFS60, VFS60, DFV60, AFS/AFM60, AHS/AHM36 encoders, and wire draw encoders with DFS60, AFS/AFM60, and AHS/AHM36. Compact dimensions, low weight, and intuitive operation.	PGT-10-Pro	1072254	●	–	●

[1] Can be used with programmable incremental and absolute encoders in conjunction with the corresponding adapter cables.

K

Linear encoders

Mounting systems

Mounting brackets and plates

Mounting bracket

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	KH53	TTK70
	→ K-737	Mounting bracket for KH53 measuring elements, without mounting hardware for the base	BEF-WK-KHT53	2029159	●	–

Clamp and alignment brackets

Clamping brackets

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	KH53	TTK70
	→ K-737	Spacer for KH53 measuring elements, without mounting hardware for the base	BEF-KHA-KHT53	2042468	●	–

Connectivity

Plug connectors and cables

Connecting cables with female connector

Figure	Dimensional drawing, see page	Brief description	Length of cable	Type	Part no.	KH53	TTK70
	→ K-728	Head A: M12 female connector, 4-pin, straight Head B: cable Cable: for power supply, suitable for drag chain, PVC, unshielded, 4 x 0.25 mm², Ø 5.0 mm	5 m	DOL-1204-G05M	6009866	●	–
	→ K-729	Head A: female connector, M12, 5-pin, straight Head B: cable Cable: suitable for drag chain, PROFIBUS DP, PUR, halogen-free, shielded, 2 x 0.34 mm², Ø 8.0 mm	5 m	DOL-1205-G05MQ	6026006	●	–
			10 m	DOL-1205-G10MQ	6026008	●	–
			12 m	DOL-1205-G12MQ	6032636	●	–
			15 m	DOL-1205-G15MQ	6032637	●	–
			20 m	DOL-1205-G20MQ	6032638	●	–
			30 m	DOL-1205-G30MQ	6032639	●	–
			50 m	DOL-1205-G50MQ	6032861	●	–
	→ K-730	Head A: female connector, M23, 12-pin, straight Head B: cable Cable: SSI, RS-422, suitable for drag chain, PUR, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm	1.5 m	DOL-2312-G1M5MA1	2029200	●	–
			3 m	DOL-2312-G03MMA1	2029201	●	–
			5 m	DOL-2312-G05MMA1	2029202	●	–
			10 m	DOL-2312-G10MMA1	2029203	●	–
			20 m	DOL-2312-G20MMA1	2029204	●	–
			30 m	DOL-2312-G30MMA1	2029205	●	–
	–	Head A: female connector, M12, 12-pin, straight Head B: cable Cable: SSI, PUR, shielded, 12 x 0.14 mm², Ø 8.5 mm Suitable for use with drag chains	2 m	DOL-1212-G02MAC1	6053273	–	●
			5 m	DOL-1212-G05MAC1	6053274	–	●
			10 m	DOL-1212-G10MAC1	6053275	–	●
			20 m	DOL-1212-G20MAC1	6053276	–	●

K

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Subject to change without notice

Figure	Dimensional drawing, see page	Brief description	Length of cable	Type	Part no.	KH53	TTK70
	→ K-736	Head A: female connector, M12, 12-pin, angled Head B: cable Cable: SSI, PUR, shielded, 12 x 0.14 mm², Ø 8.5 mm Suitable for use with drag chains	2 m	DOL-1212-W02MAC1	6039824	–	●
			5 m	DOL-1212-W05MAC1	6039825	–	●
			10 m	DOL-1212-W10MAC1	6039826	–	●
			20 m	DOL-1212-W20MAC1	6039827	–	●

Connecting cables with male connector

Figure	Dimensional drawing, see page	Brief description	Length of cable	Type	Part no.	KH53	TTK70
	→ K-736	Head A: M12 male connector, 5-pin, straight, B coded Head B: cable Cable: PROFIBUS DP, suitable for drag chain, PUR, halogen-free, shielded, 2 x 0.34 mm², Ø 8.0 mm Wire shielding: AL-PT foil, total shield, tin-plated C shield	5 m	STL-1205-G05MQ	6026005	●	–
			10 m	STL-1205-G10MQ	6026007	●	–
			12 m	STL-1205-G12MQ	6032635	●	–

Female connectors (ready to assemble)

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	KH53	TTK70
	→ K-731	Head A: M12 female connector, 4-pin, straight, unshielded, for power supply, for cable diameter 4 mm ... 6 mm Head B: -	DOS-1204-G	6007302	●	–
	→ K-731	Head A: M12 female connector, 5-pin, straight, B coded, PROFIBUS DP, shielded, for cable diameter 4 mm ... 9 mm Head B: -	DOS-1205-GQ	6021353	●	–
	→ K-726	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	●	–
	→ K-726	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	●	–
	→ K-727	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	Dimensional drawing, see page	Brief description	Length of cable	Type	Part no.	KH53	TTK70
	–	Head A: cable Head B: cable Cable: PROFIBUS DP, suitable for drag chain, PUR, shielded, 2 x 0.25 mm², Ø 8.0 mm	By the meter	LTG-2102-MW	6021355	●	–
		Head A: cable Head B: cable Cable: SSI, suitable for drag chain, PUR, halogen-free, shielded, 4 x 2 x 0.25 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², 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 mm² + 2 x 0.5 mm² + 2 x 0.14 mm², Ø 7.8 mm		LTG-2612-MW	6028516	●	–

Other plug connectors and cables

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	KH53	TTK70
	➜ K-735	Head A: M12 male connector, 4-pin, straight, B coded Cable: PROFIBUS DP, terminator	STE-END-Q	6021156	●	–

Male connector (ready to assemble)

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	KH53	TTK70
	➜ K-734	Head A: M12 male connector, 5-pin, straight, B coded, PROFIBUS DP, shielded, for cable diameter 4 mm ... 9 mm Head B: -	STE-1205-GQ	6021354	●	–
	➜ K-727	Head A: M23 male connector, 12-pin, straight, HIPERFACE®, SSI, incremental, RS-422, shielded, for cable diameter 5.5 mm ... 10.5 mm Head B: Operating temperature: –20 °C ... +130 °C	STE-2312-G	6027537	●	–
	➜ K-727	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	●	–

Additional accessories

Programming and configuration tools

Figure	Dimensional drawing, see page	Brief description	Type	Part no.	KH53	TTK70
	–	Programming tool for ATM60, ATM90 and KH53 SSI	PGT-01-S	1030111	●	–

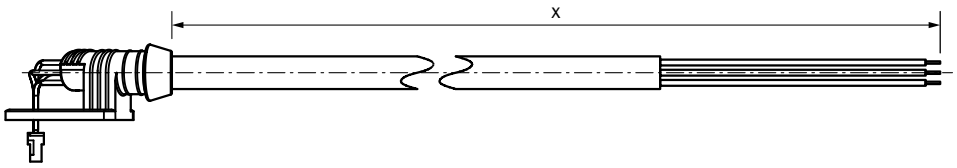
K

8015560/2015-09-01
Subject to change without notice

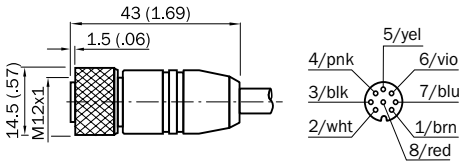
Dimensional drawings (dimensions in mm)

Dimensional drawings for connection systems

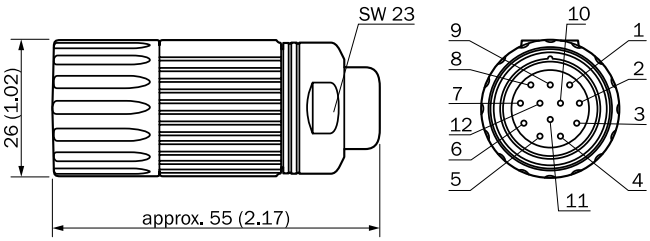
DOL-0J08-GxxxAAx



DOL-1208-GxxMAC1

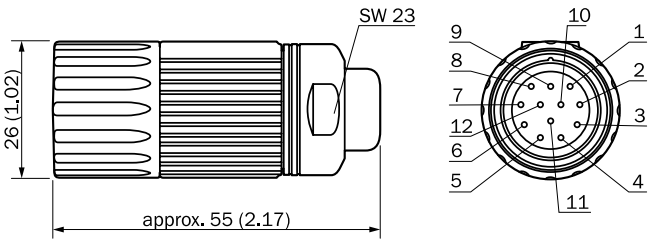


DOL-2312-GxxMLA3



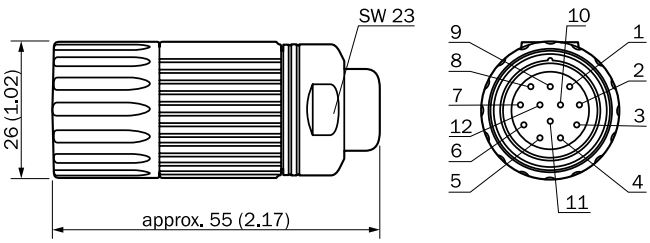
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② Gray
③ Purple
④ Yellow
⑤ White
⑥ Brown
⑧ Pink
⑨ Shield
⑩ Blue
⑪ Green
⑫ Red

DOL-2312-GxxMLD1



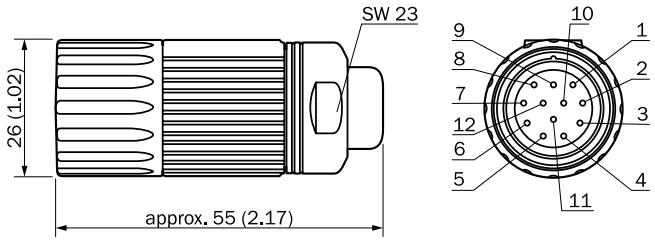
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⑦ Orange
⑧ Pink
⑨ Shield
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⑪ Green
⑫ Red

DOL-2312-GxxxMA3



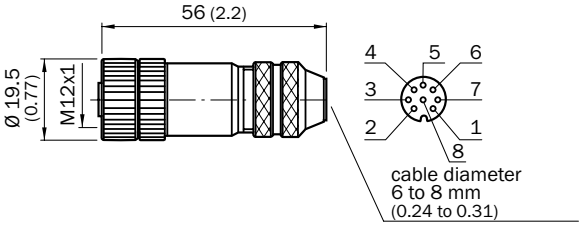
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⑪ Green
⑫ Red

DOL-2312-GxxxMD1

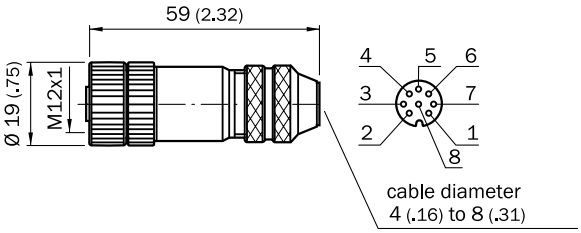


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⑫ Red

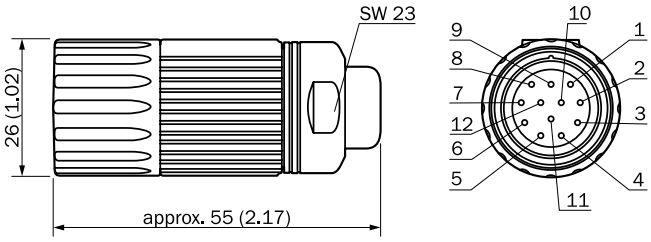
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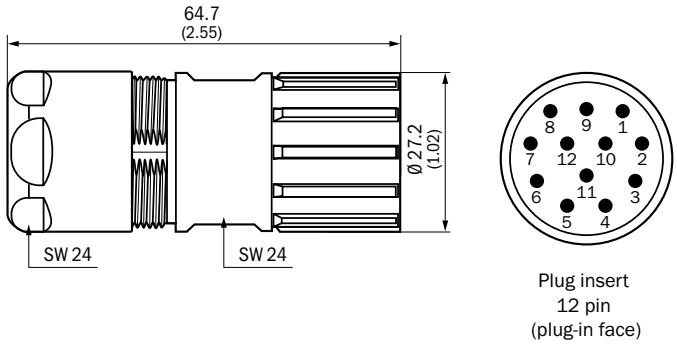
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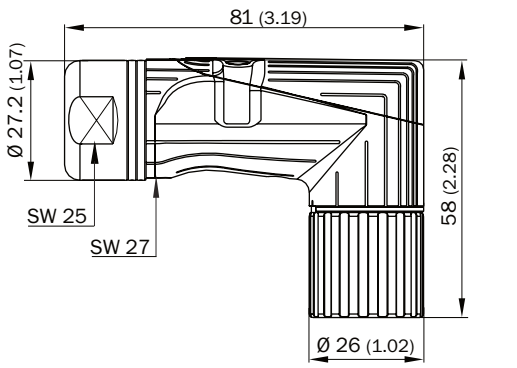


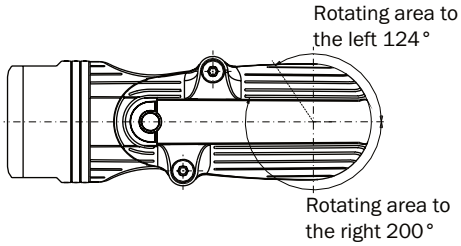
DOS-2312-G02



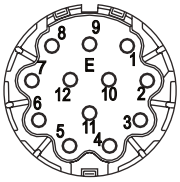
Plug insert
12 pin
(plug-in face)

DOS-2312-W01



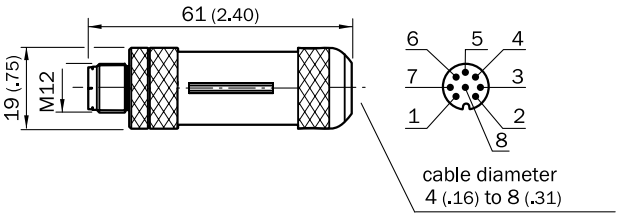


Main dimensions
Plug

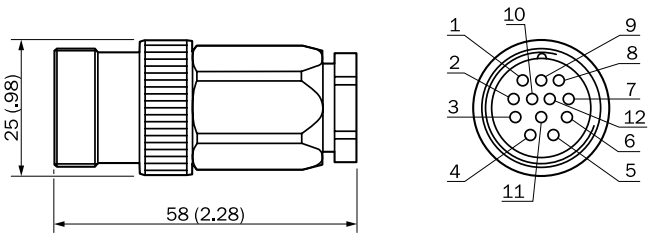


Contact arrangement
Mating view

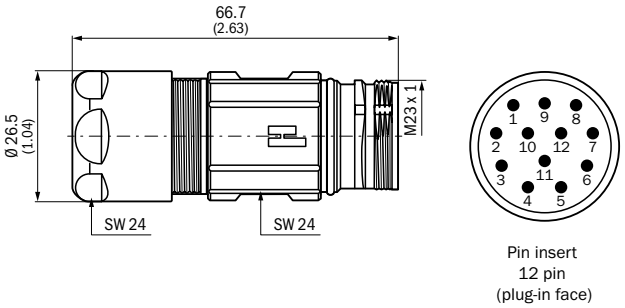
STE-1208-GA01



STE-2312-G

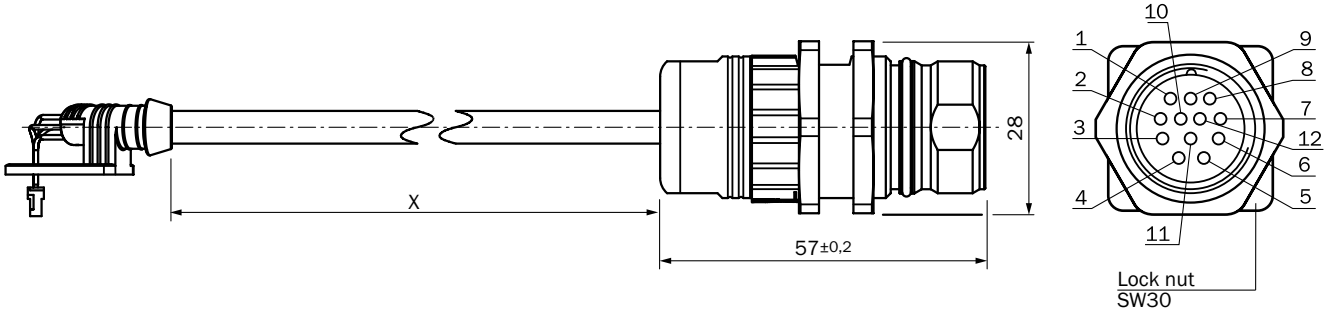


STE-2312-G01

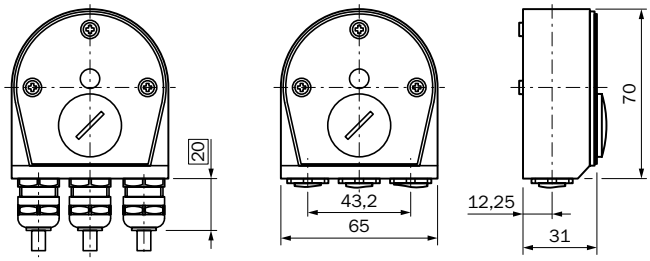


Pin insert
12 pin
(plug-in face)

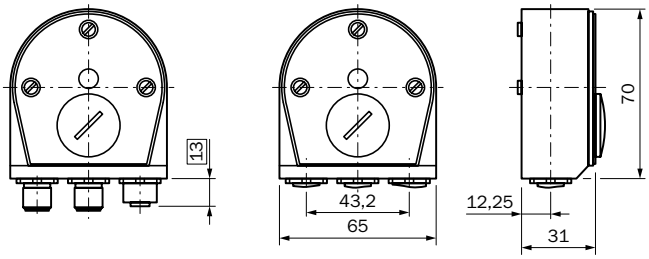
STL-2312-GxxxAA3



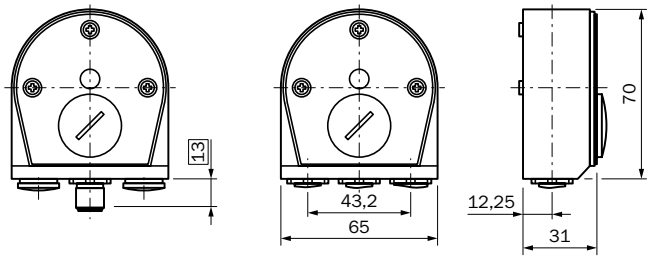
AD-ATM60-KA3PR
AD-ATM60-KRxCO



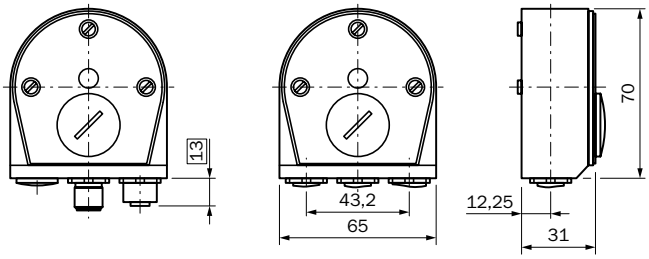
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AD-ATM60-SR3PR



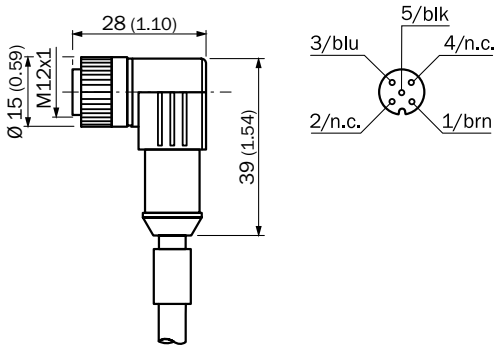
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AD-ATM60-SRxDN



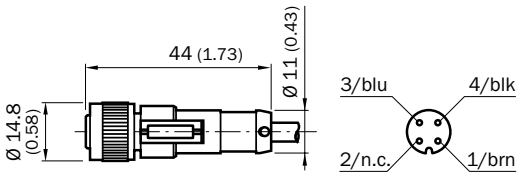
AD-ATM60-SR2CO



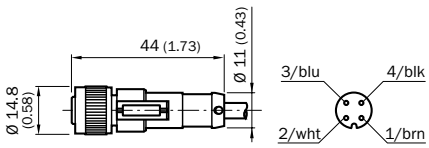
DOL-1202-W05MC



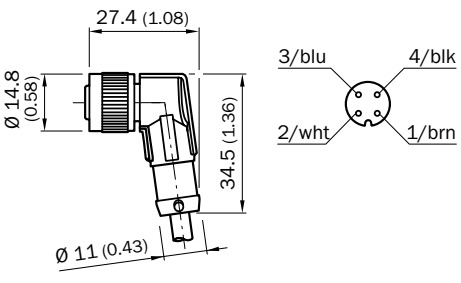
DOL-1204-G05M



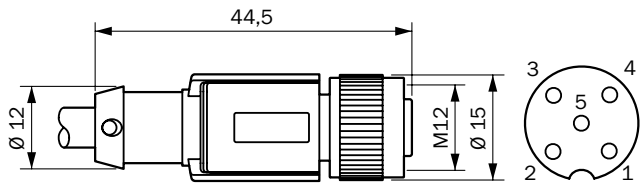
DOL-1204-GxxMC



DOL-1204-WxxMC



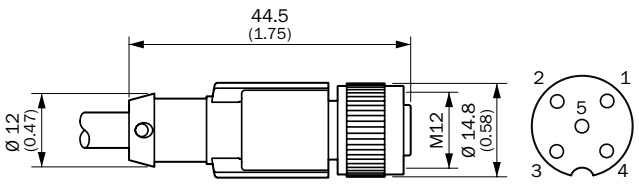
DOL-1205-GxxMY



female contact M12 x1, straight, shielded

① Shield wire
② Red
③ Black
④ White
⑤ Blue

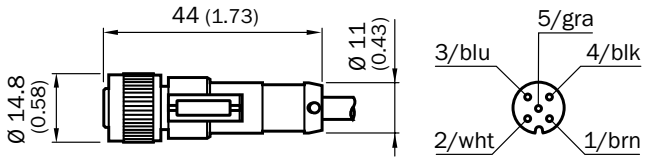
DOL-1205-GxxxACSCO



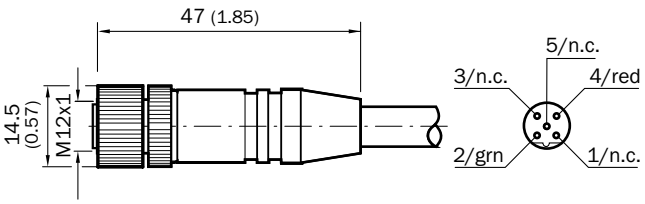
female connector M12 x1, straight, screened

① Brown
② White
③ Blue
④ Black
⑤ Gray

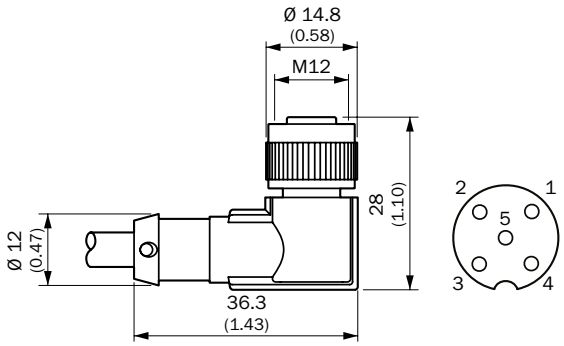
DOL-1205-GxxMAC



DOL-1205-GxxMQ



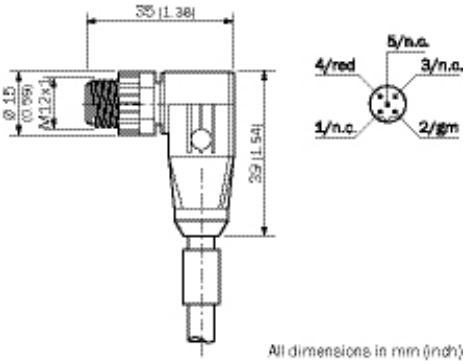
DOL-1205-WxxxACSCO



female connector M 12 x 1, angled, screened

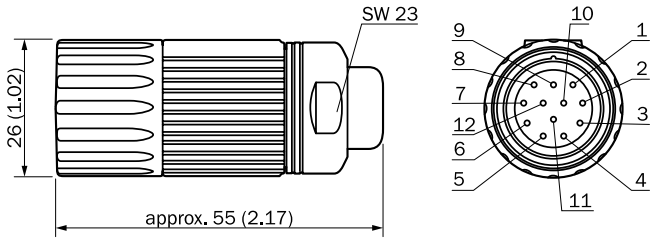
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② White
③ Blue
④ Black
⑤ Gray

DOL-1205-WxxMQ



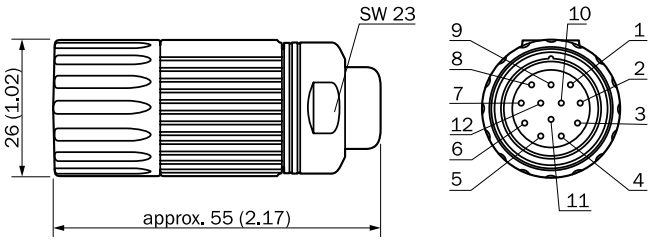
② Green
④ Red

DOL-2308-GxxxAA6



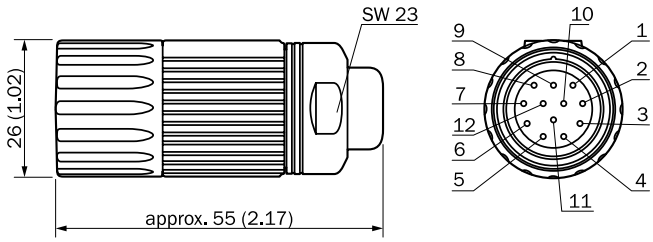
① Blue
② White
③ Yellow
⑧ Red
⑨ Pink
⑩ Brown
⑪ Purple
⑫ Black

DOL-2312-GxxxMD2



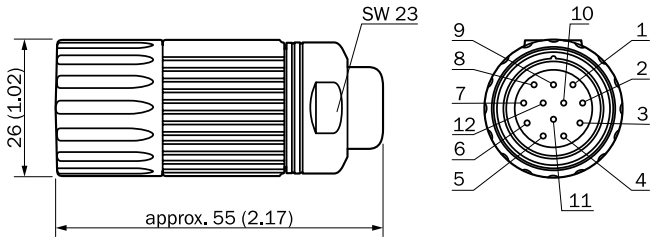
① Red
② Blue
③ Yellow
④ White
⑤ Orange
⑥ Brown
⑦ Purple
⑧ Black
⑨ Orange/black
⑩ Green
⑪ Gray
⑫ Pink

DOL-2312-GxxxMA1



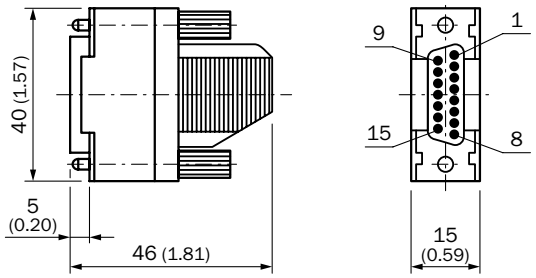
① Blue
② White
③ Yellow
④ Gray
⑤ Green
⑥ Pink
⑦ Black
⑧ Red
⑨ Orange
⑩ Brown
⑪ Purple
⑫ Orange/black

DOL-2312-GxxxMA2

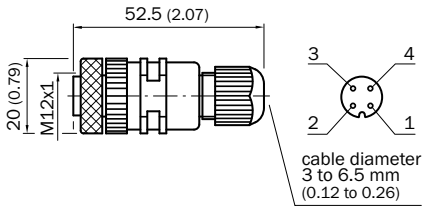


① Blue
② White
③ Yellow
⑤ Pink
⑧ Red
⑨ Orange
⑩ Brown
⑪ Purple

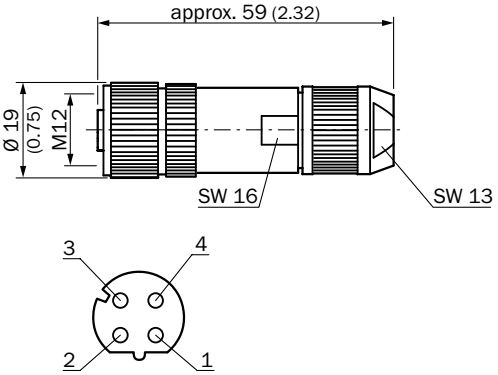
DOS-0D37-G
STE-0D15-G



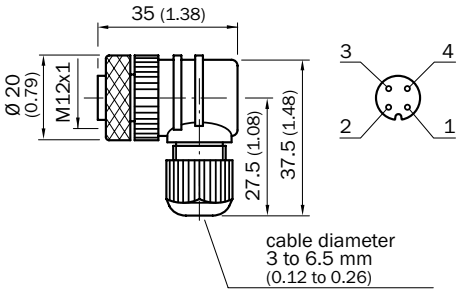
DOS-1204-G



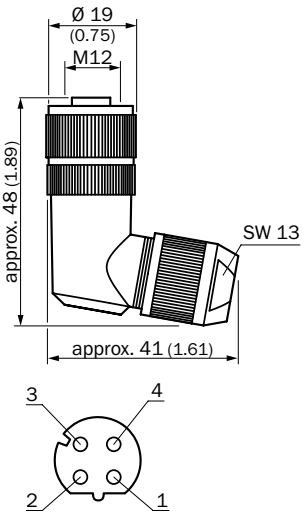
DOS-1204-Gx



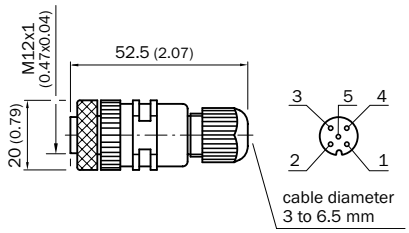
DOS-1204-W



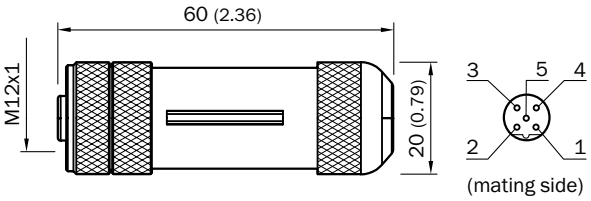
DOS-1204-Wx



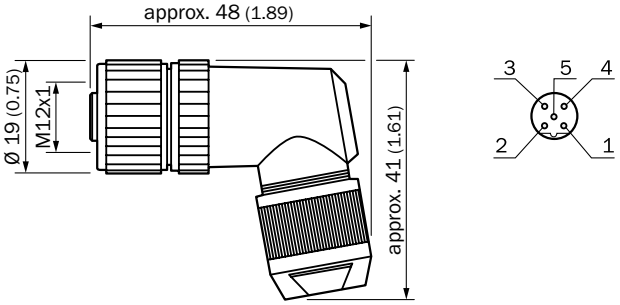
DOS-1205-G
DOS-1205-GA



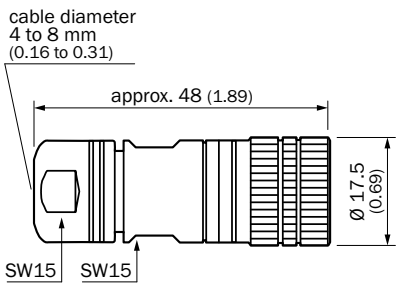
DOS-1205-GQ



DOS-1205-WQ

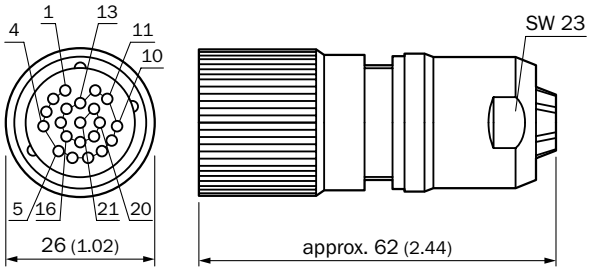


DOS-1507-G
DSC-1507-G
STE-1507-G



K

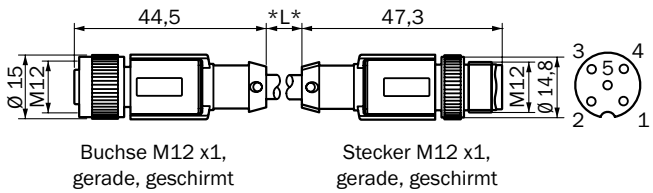
DOS-2321-G
DOL-2321-GxxxPA4



Pin color assignment (applies to all DOL-2321-GxxxPA4)

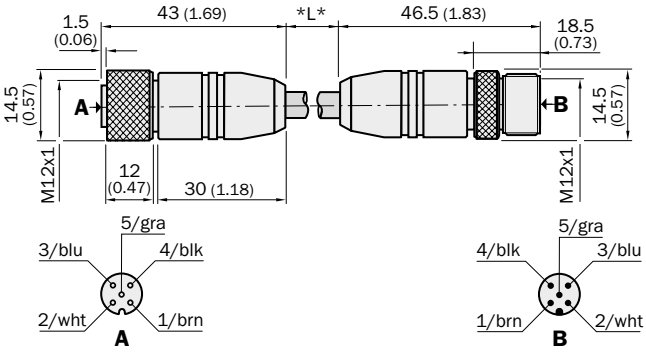
① Violet
② White/brown
③ White/green
④ White/yellow
⑤ White/gray
⑥ White/pink
⑦ White/blue
⑧ White/red
⑨ White/black
⑩ Brown/green
⑪ Brown/yellow
⑫ Brown/gray
⑬ Brown/pink
⑭ Brown/blue
⑮ Brown/red
⑯ Green
⑰ Pink
⑱ Yellow
⑲ Brown
⑳ Blue
㉑ Red

DSL-1205-GxxMY



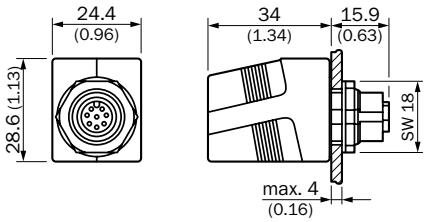
① Shield wire
② Red
③ Black
④ White
⑤ Blue

DSL-1205-G06MK

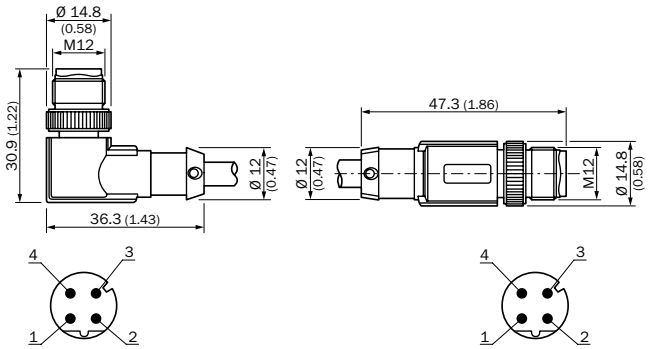


8015560/2015-09-01
Subject to change without notice

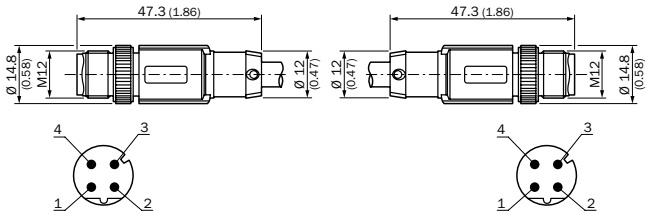
Feedthrough female connector Ethernet RJ45



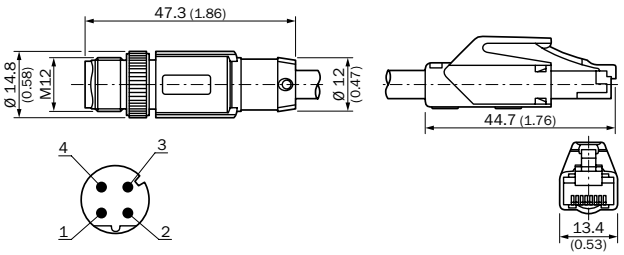
SSL-1204-FxxMZ90
SSL-1204-HxxME90



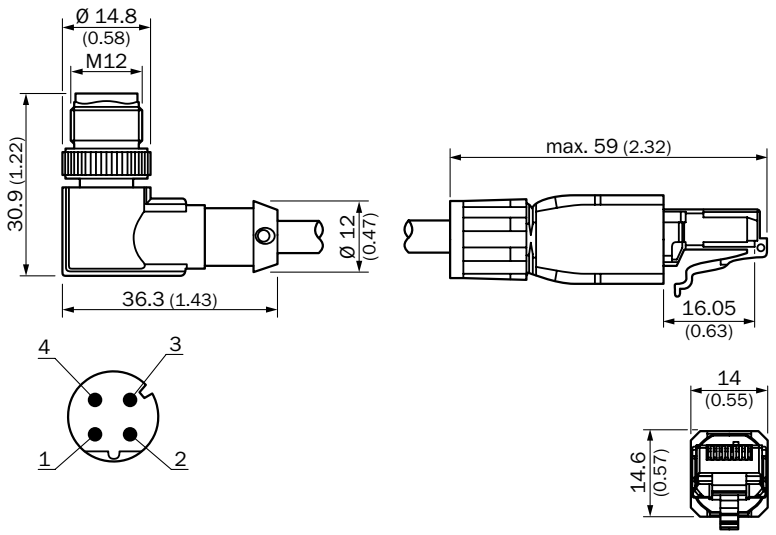
SSL-1204-GxxME90
SSL-1204-GxxMZ90



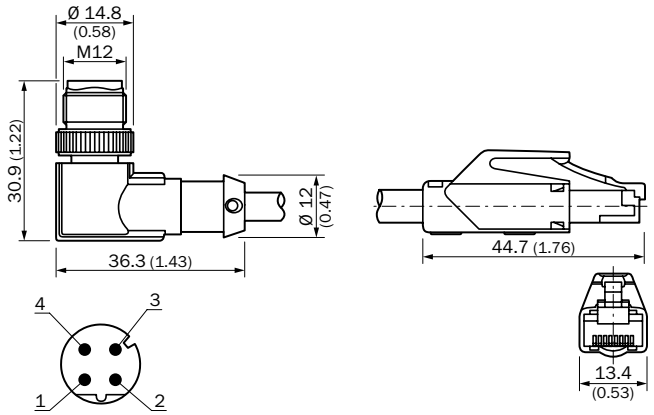
SSL-2J04-GxxME60



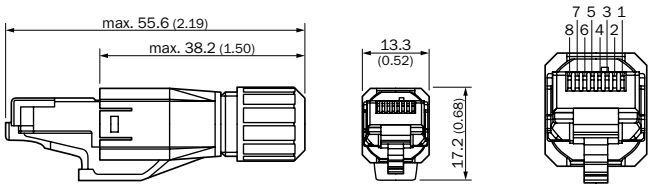
SSL-2J04-FxxMZ



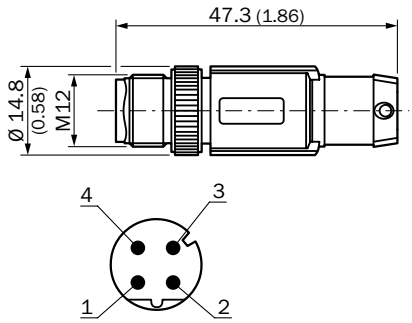
SSL-2J04-HxxME



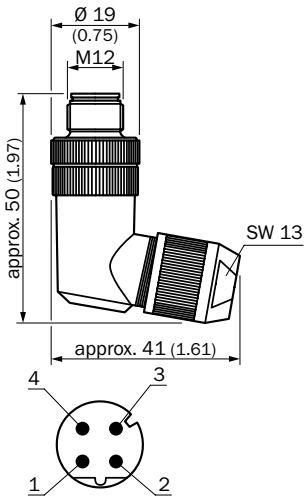
STE-0J04-GZ
STE-0J08-GE



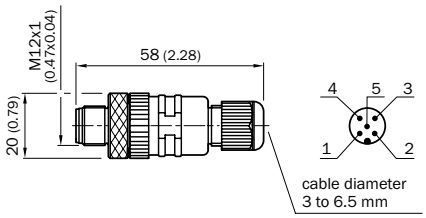
STE-1204-GE01
STE-1204-GZ



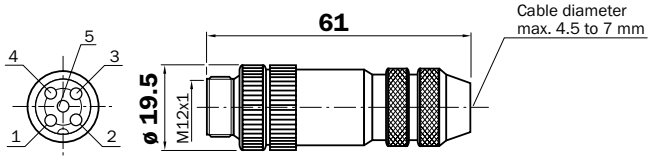
STE-1204-WE
STE-1204-WZ



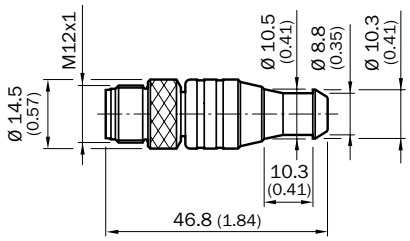
STE-1205-G



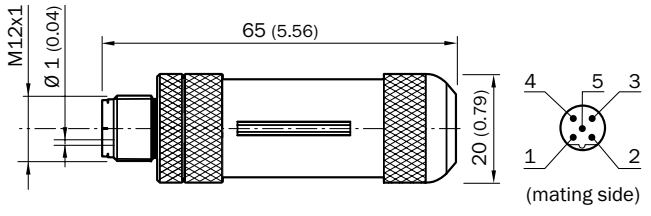
STE-1205-GA



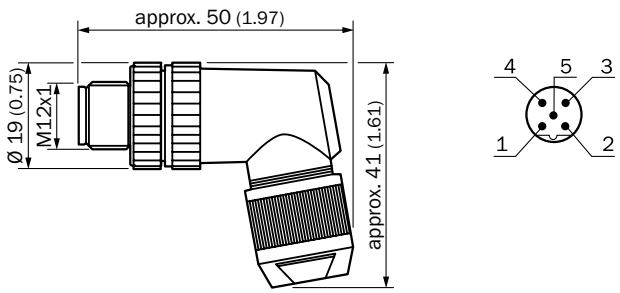
STE-1205-GKEND



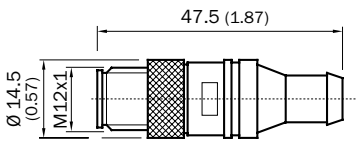
STE-1205-GQ



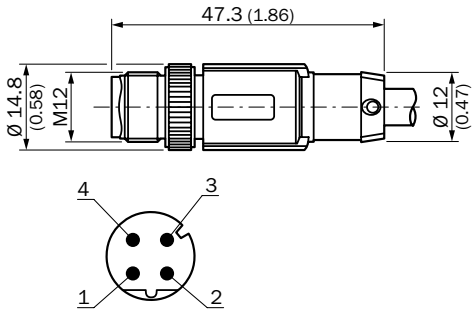
STE-1205-WQ



STE-END-Q

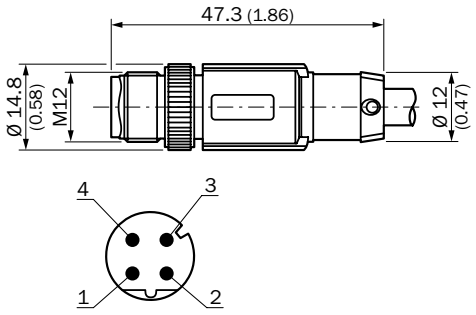


STL-1204-GxxME90



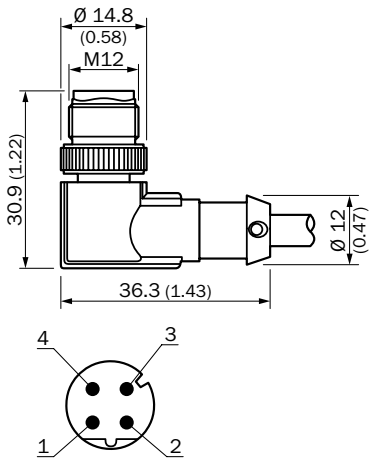
① White-orange
② White-green
③ Orange
④ Green

STL-1204-GxxMZ90



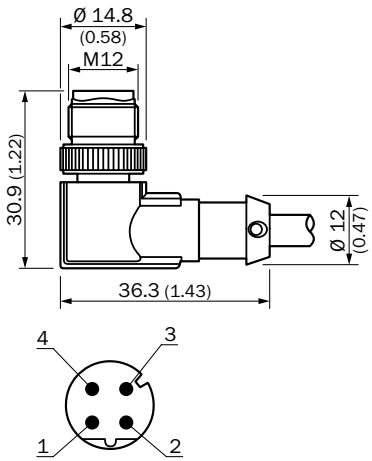
① Yellow
② White
③ Orange
④ Blue

STL-1204-WxxME90



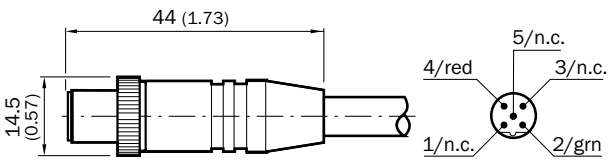
① White-orange
② White-green
③ Orange
④ Green

STL-1204-WxxMZ90

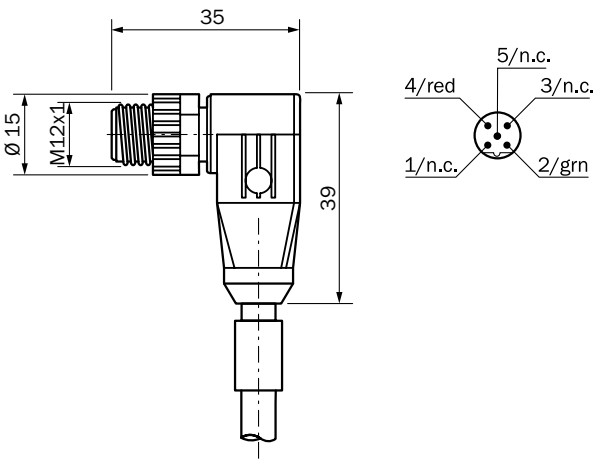


① Yellow
② White
③ Orange
④ Blue

STL-1205-GxxMQ

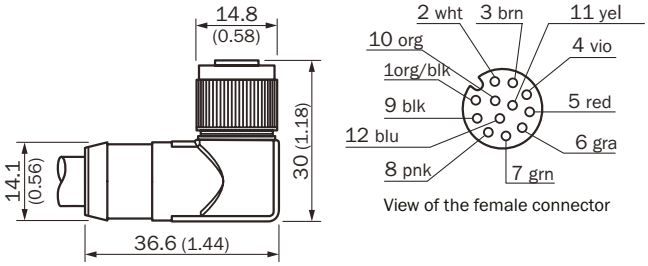


STL-1205-WxxMQ

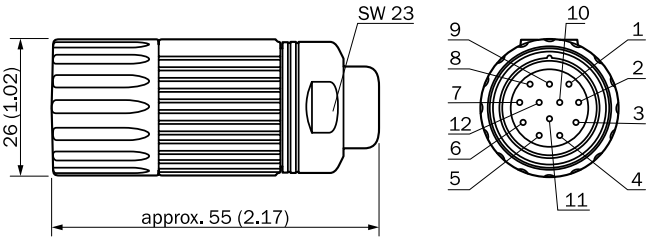


② Green
④ Red

DOL-1212-WxxMAC1



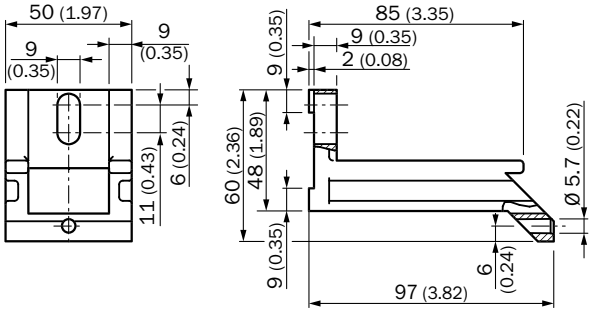
DOL-2312-GxxMLA5



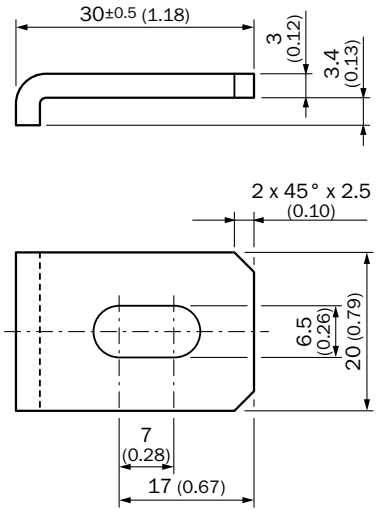
① Blue
② White
③ Yellow
⑧ Red
⑨ Orange
⑩ Brown
⑪ Purple
⑫ Black

Dimensional drawings for mounting systems

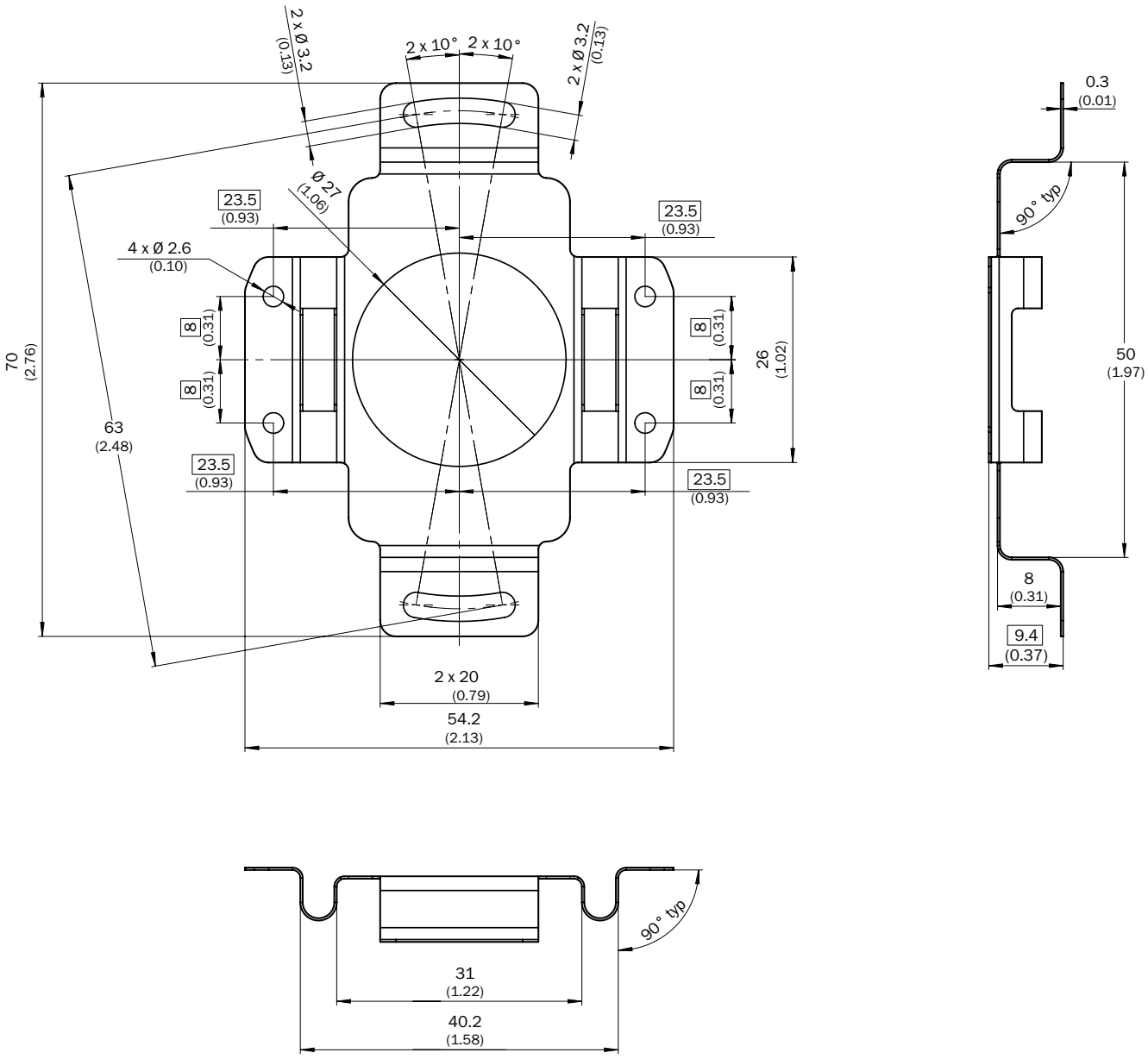
BEF-KHA-KHT53



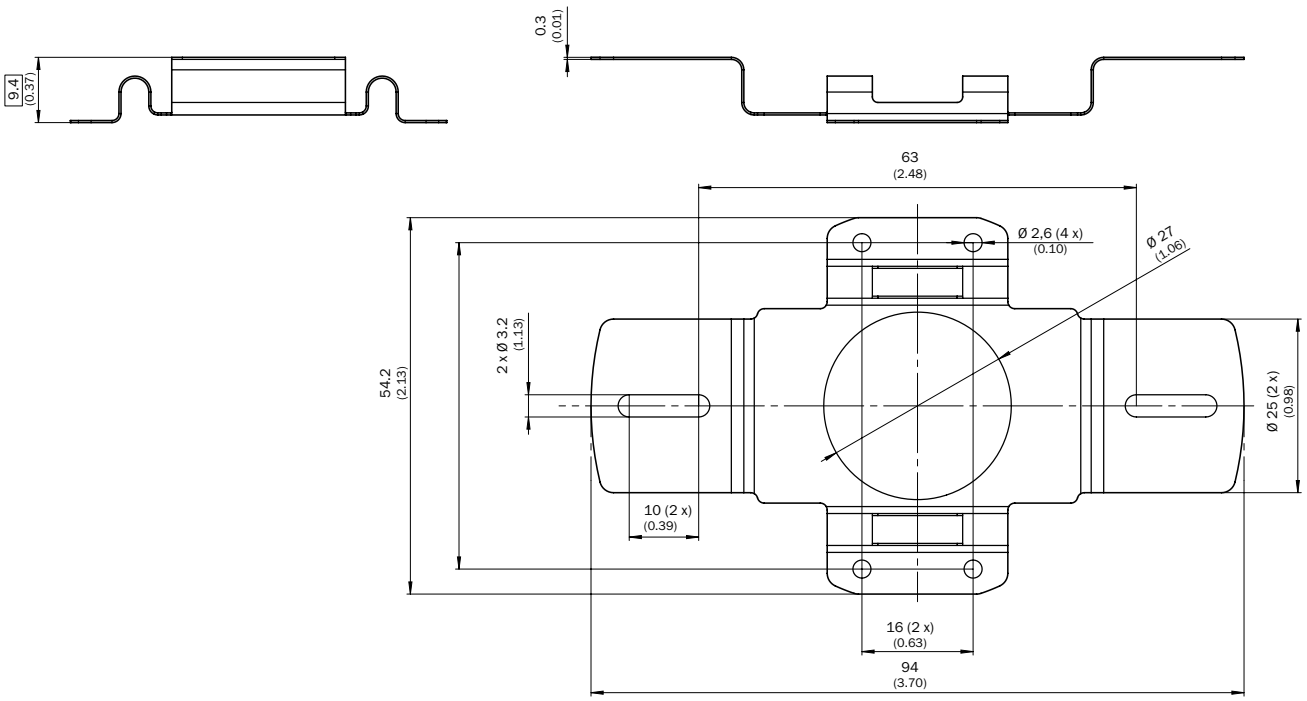
BEF-WK-KHT53



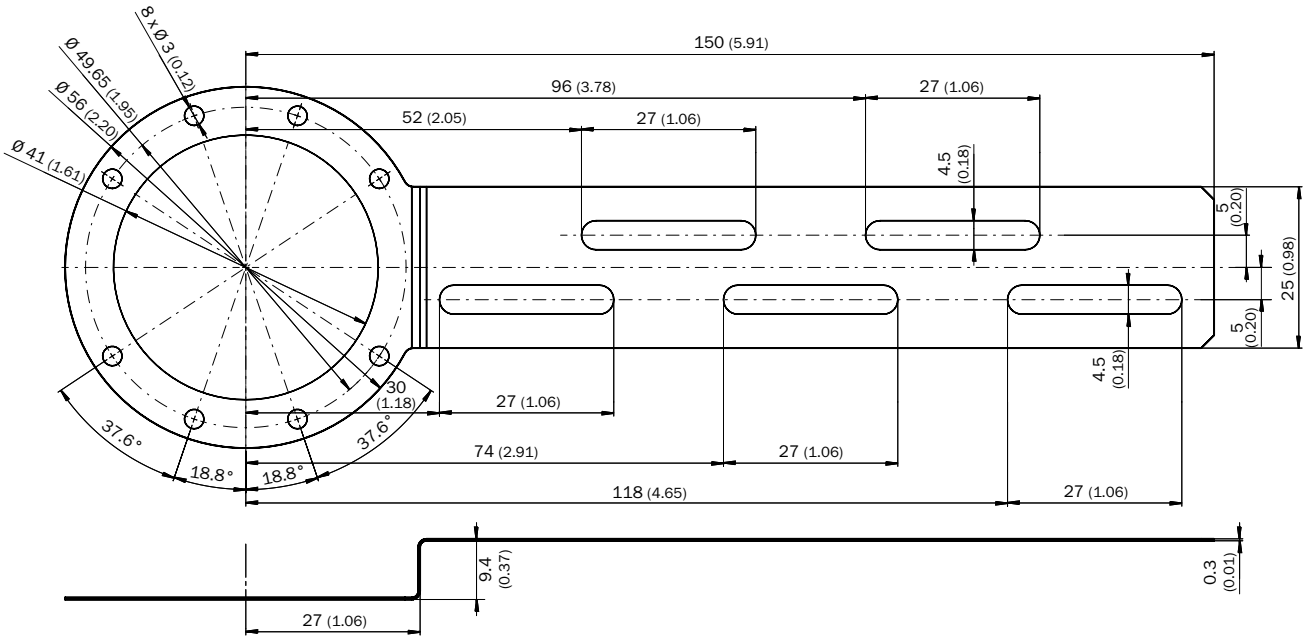
BEF-DS-09


2 x Ø 3.2
(0.13)
2 x 10°
2 x 10°
2 x Ø 3.2
(0.13)
Ø 27
(1.06)
23.5
(0.93)
23.5
(0.93)
4 x Ø 2.6
(0.10)
8
(0.31)
8
(0.31)
8
(0.31)
8
(0.31)
26
(1.02)
70
(2.76)
63
(2.48)
23.5
(0.93)
23.5
(0.93)
2 x 20
(0.79)
54.2
(2.13)
0.3
(0.01)
90° typ
50
(1.97)
8
(0.31)
9.4
(0.37)
90° typ
31
(1.22)
40.2
(1.58)

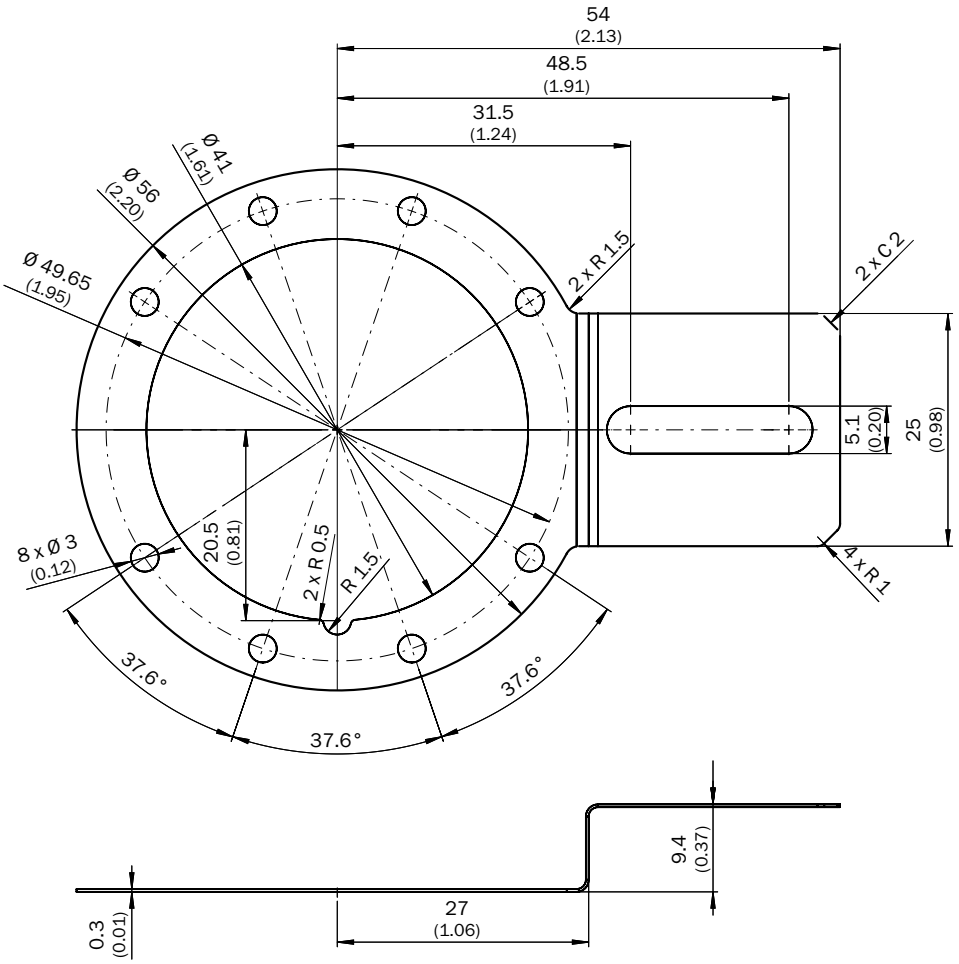
BEF-DS-10



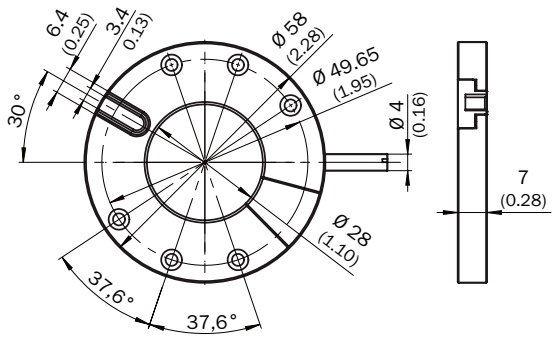
BEF-DS-11



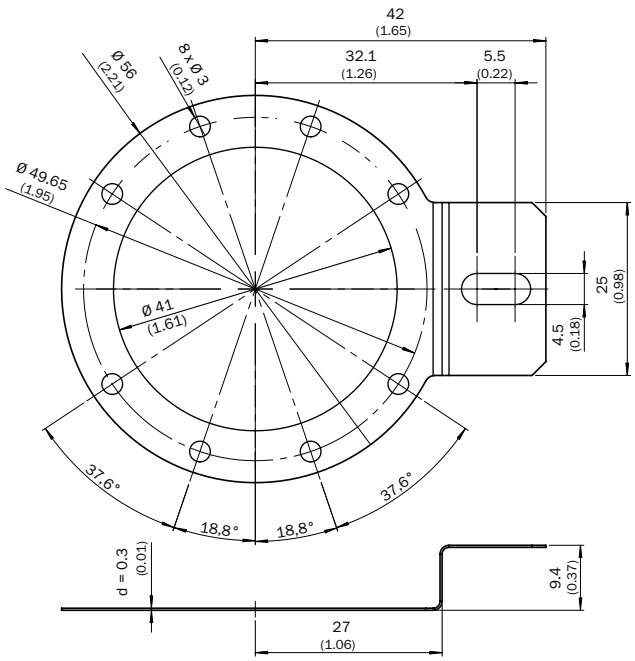
BEF-DS-12



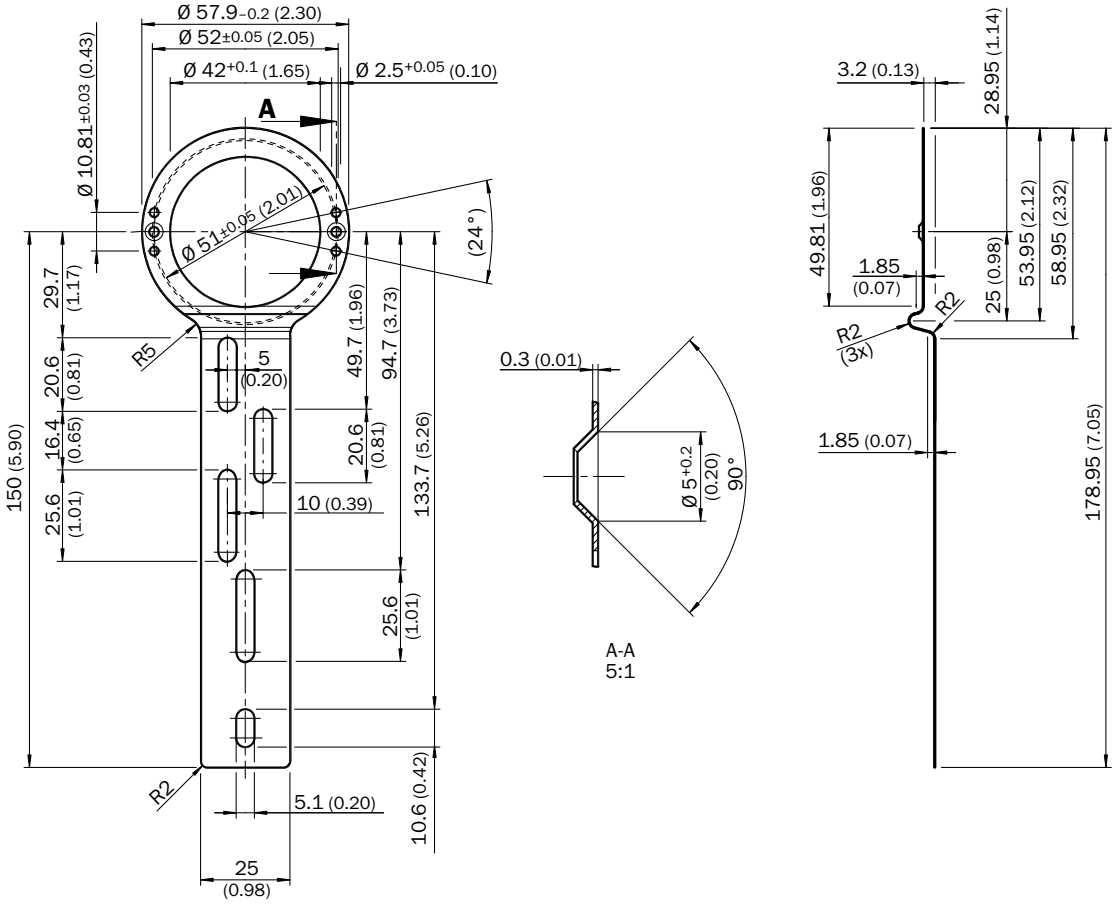
BEF-DS-13



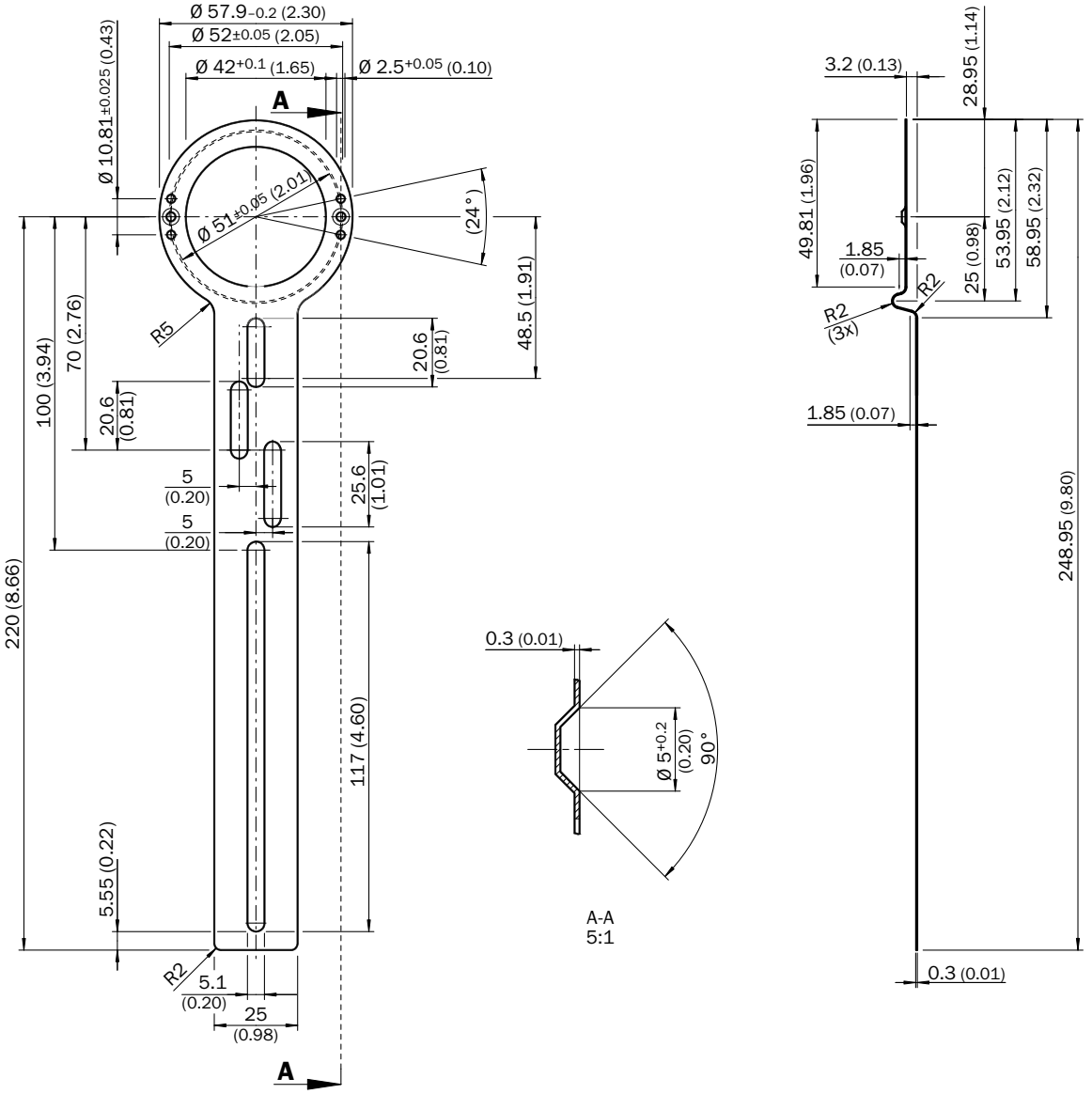
BEF-DS-14



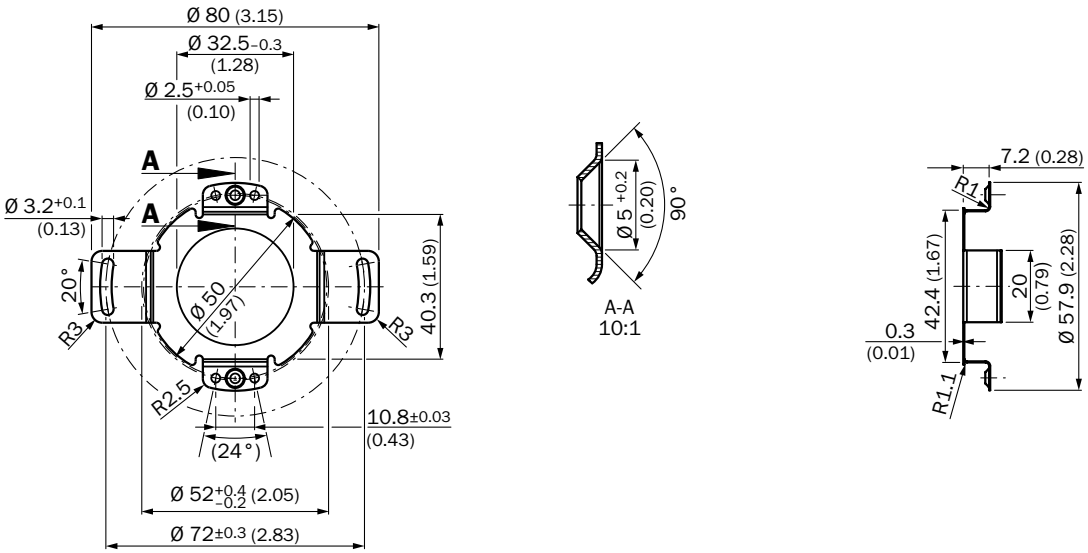
BEF-DS02DFS/VFS



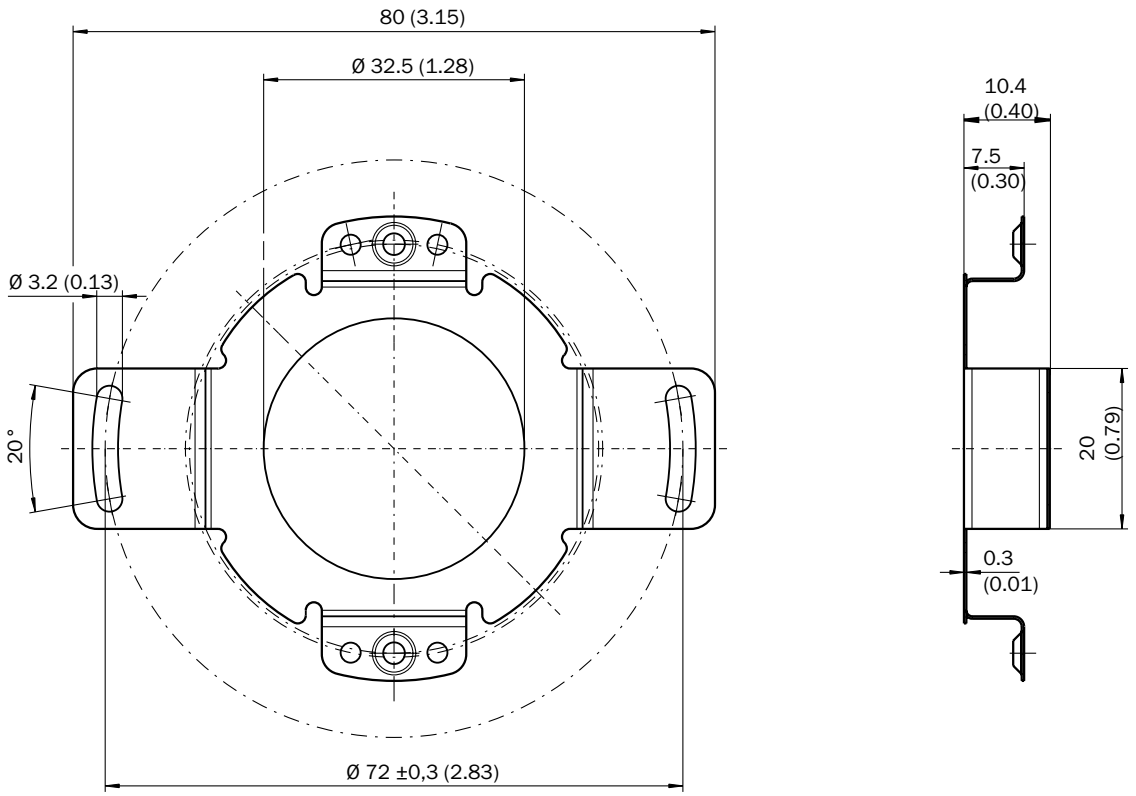
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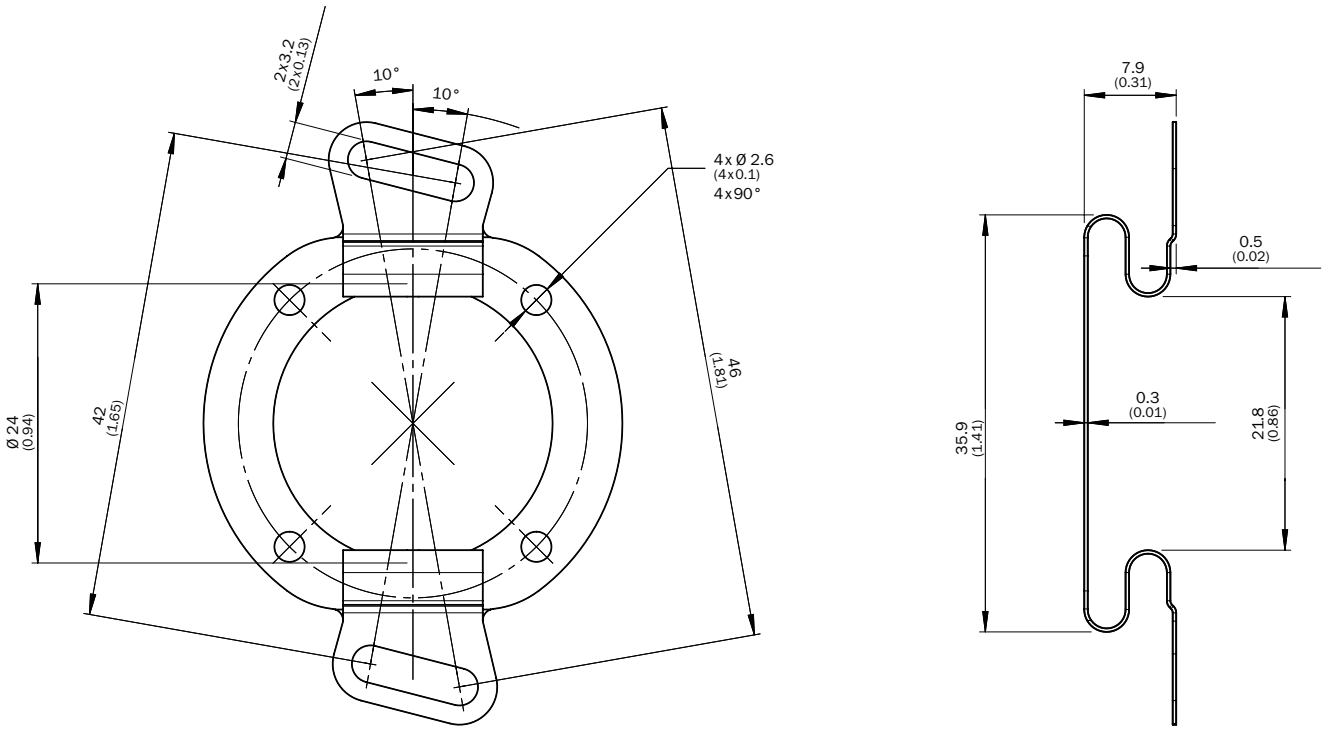
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BEF-DS07XFX

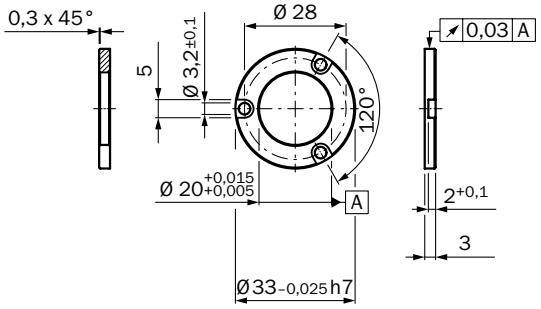


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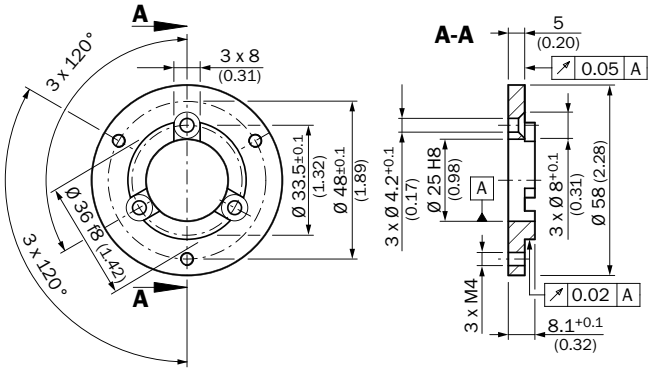
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BEF-FA-020-033



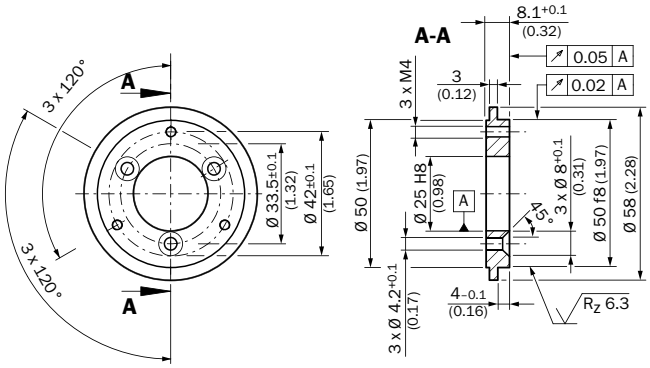
BEF-FA-025-036

General tolerances according to ISO 2768-mk



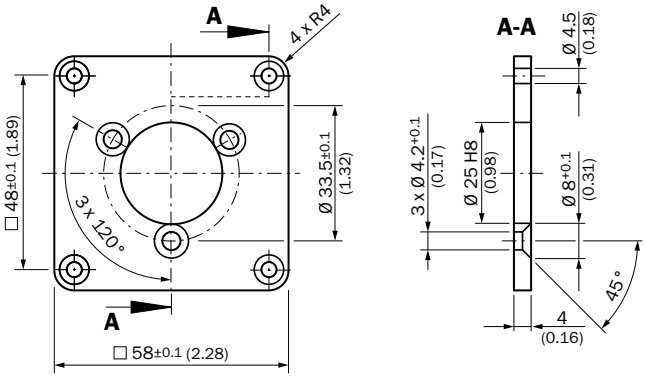
BEF-FA-025-050

General tolerances according to ISO 2768-mk



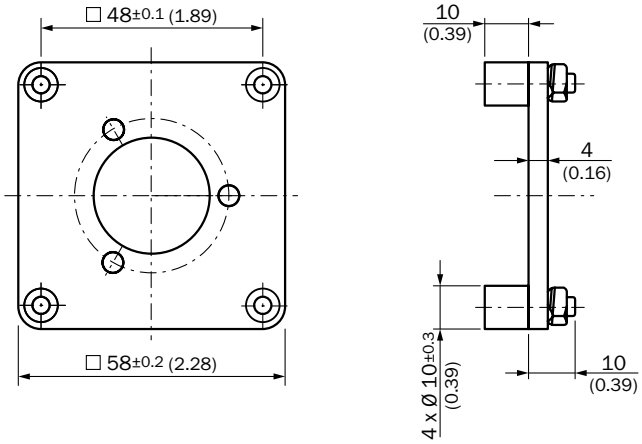
BEF-FA-025-060RCA

General tolerances according to ISO 2768-mk



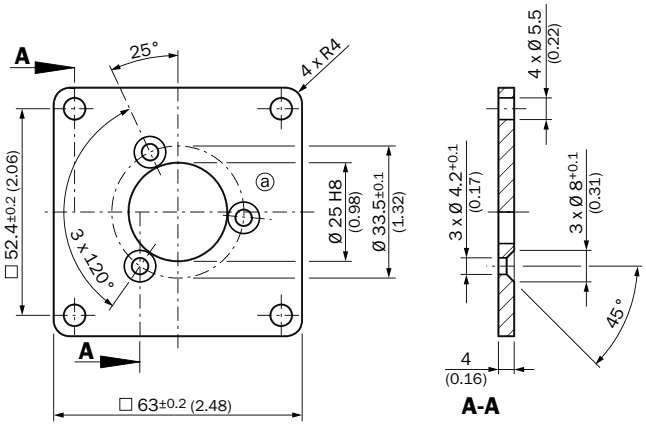
BEF-FA-025-060RSA

General tolerances according to ISO 2768-mk



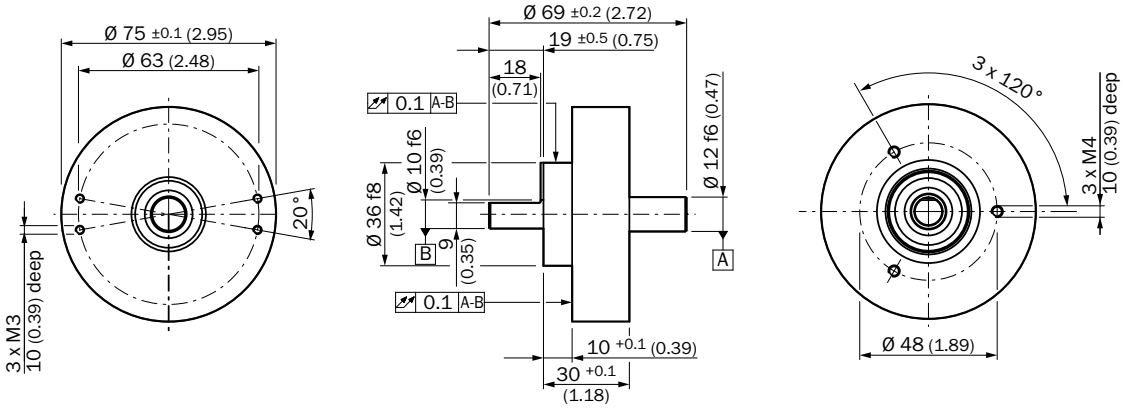
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General tolerances according to ISO 2768-mk

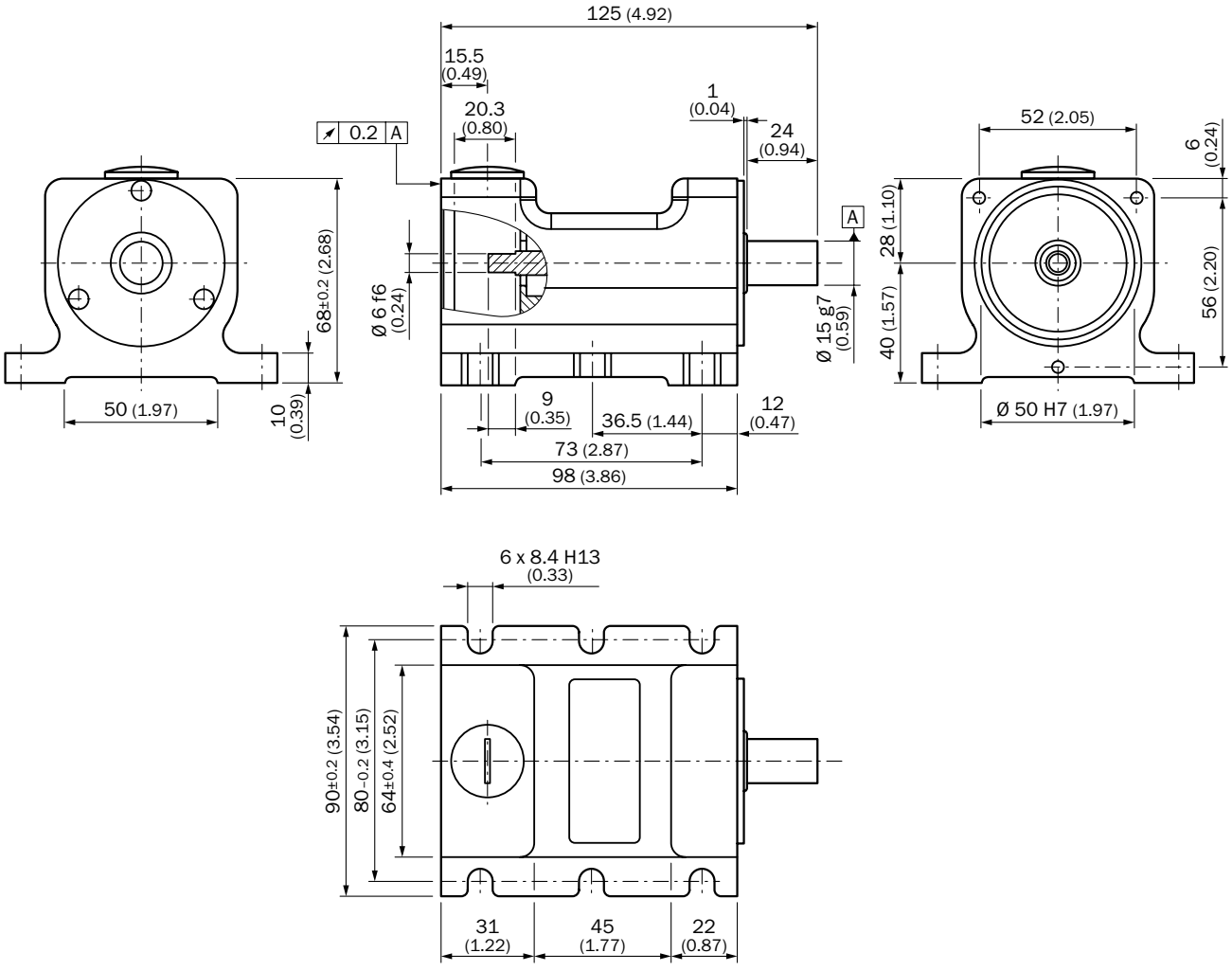


8015560/2015-09-01
Subject to change without notice

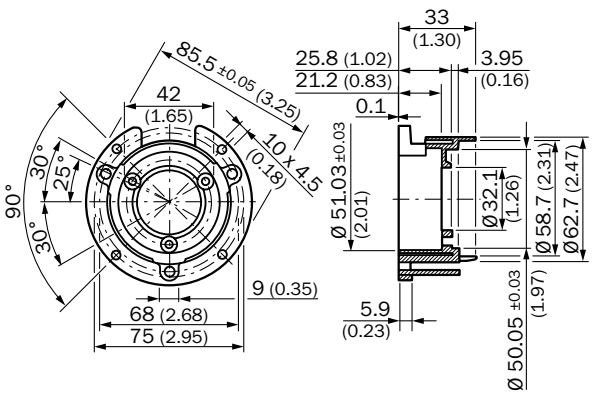
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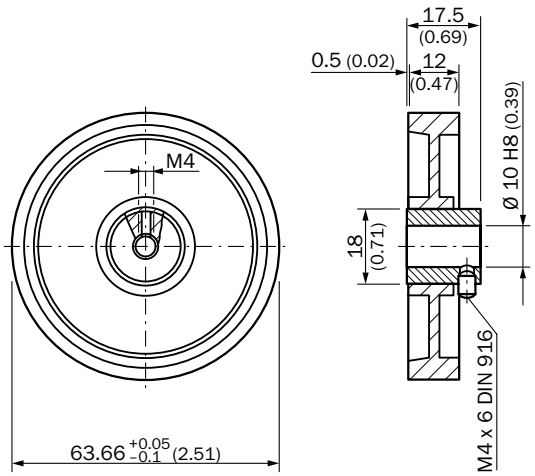
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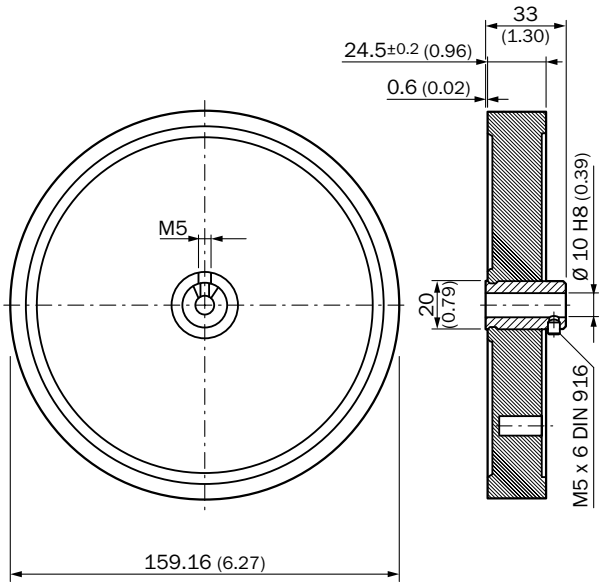
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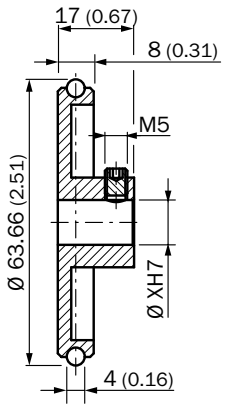
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BEF-MR-010020G



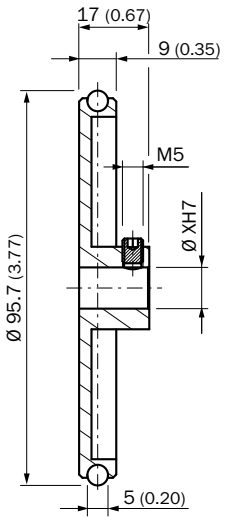
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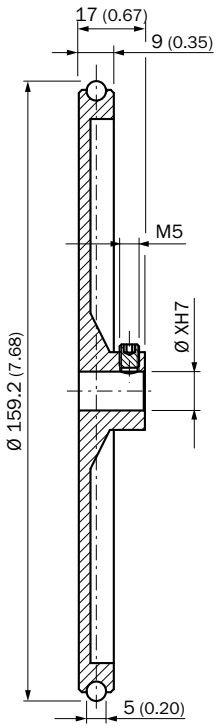
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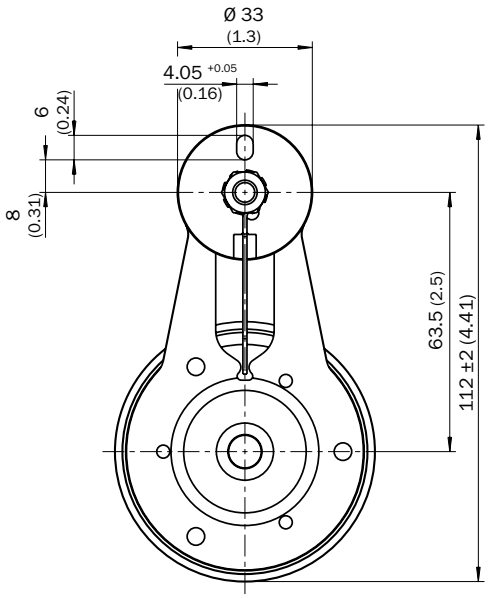
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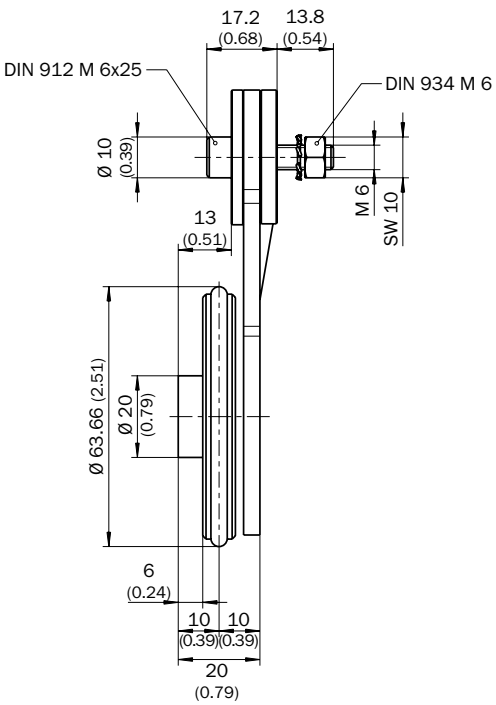


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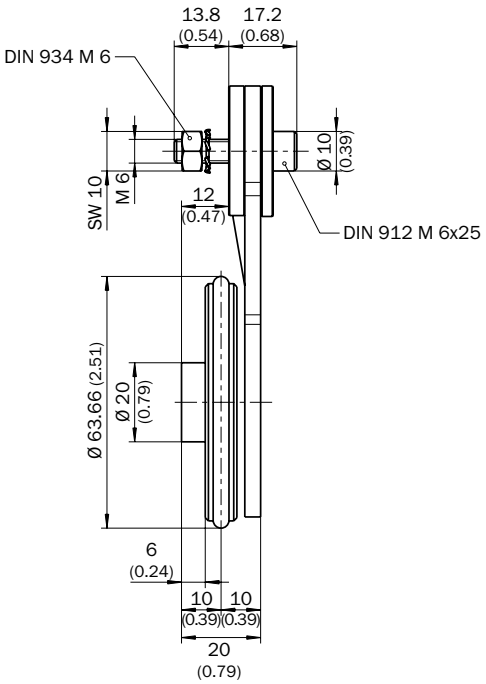


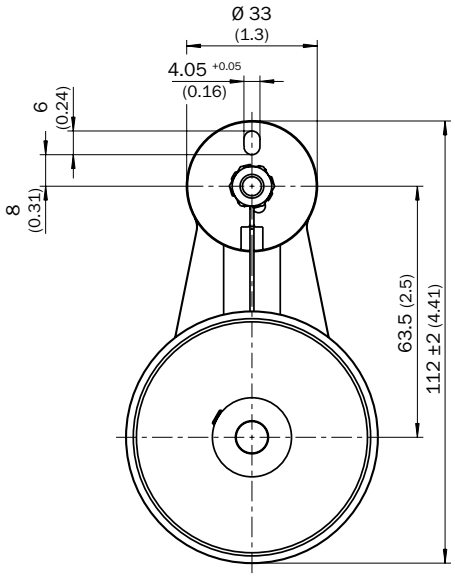
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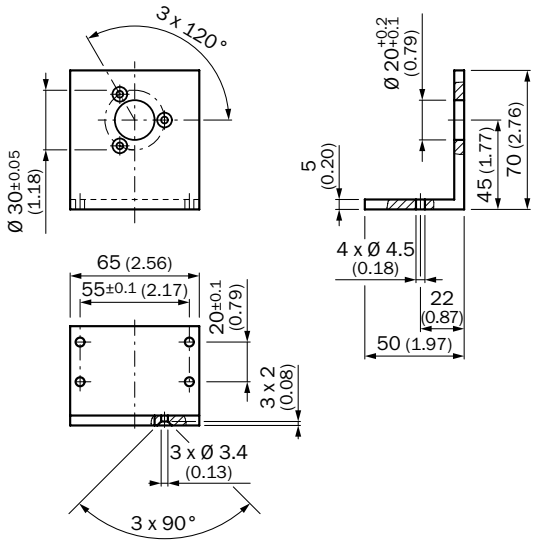


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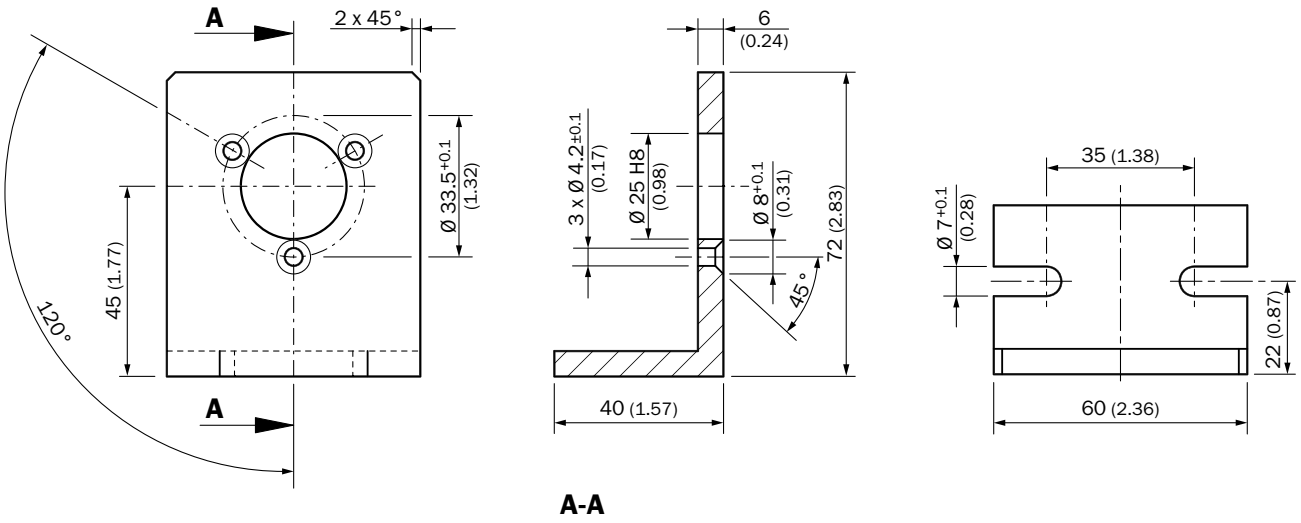




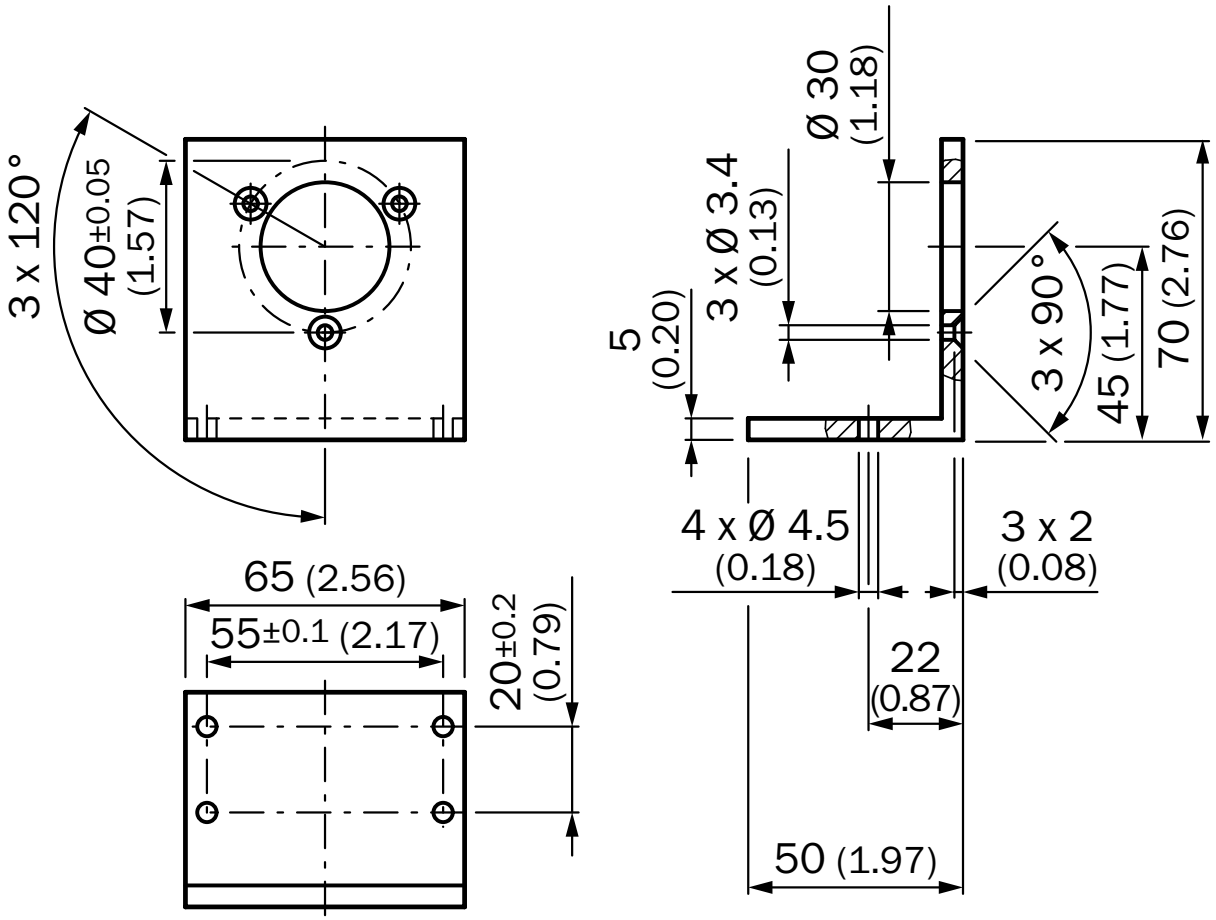
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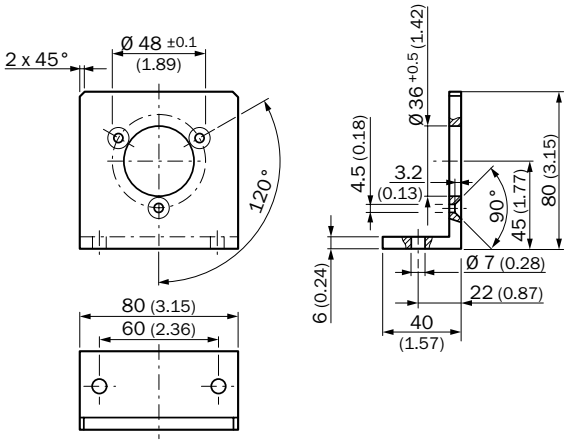
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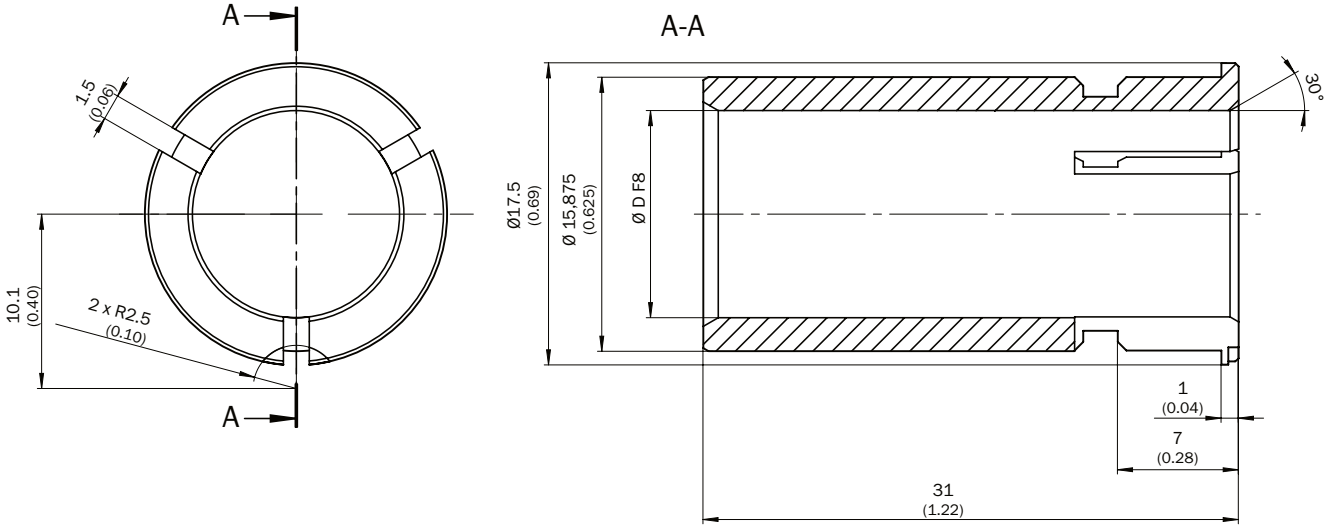
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BEF-WF-36

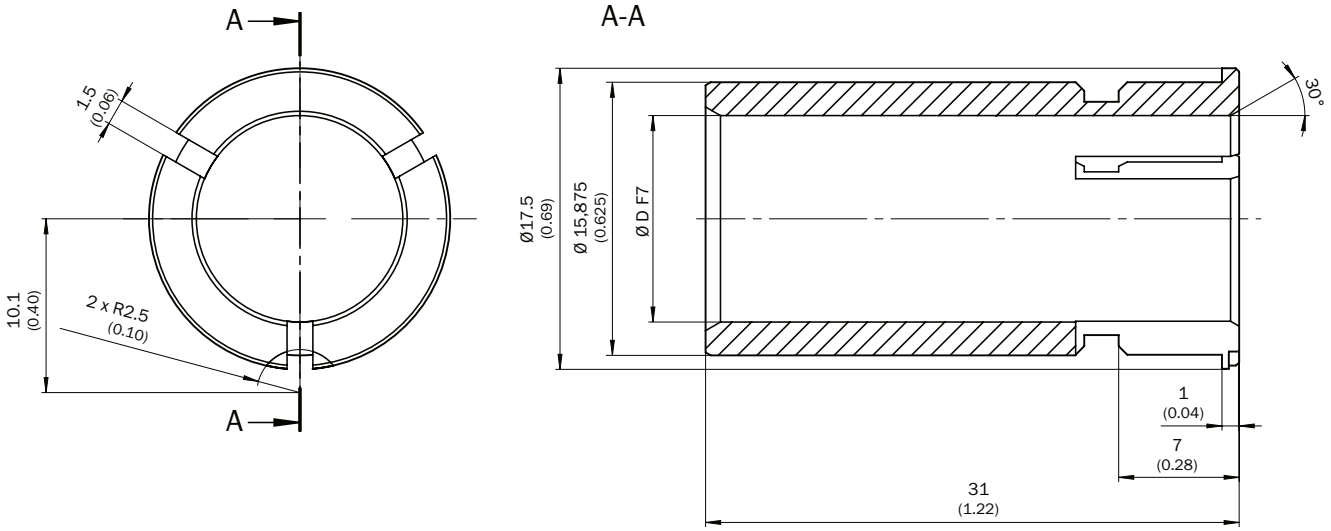


SPZ-58Z-006-P, SPZ-58Z-008-P, SPZ-58Z-010-P, SPZ-58Z-012-P, SPZ-58Z-12Z-P, SPZ-58Z-38Z-P



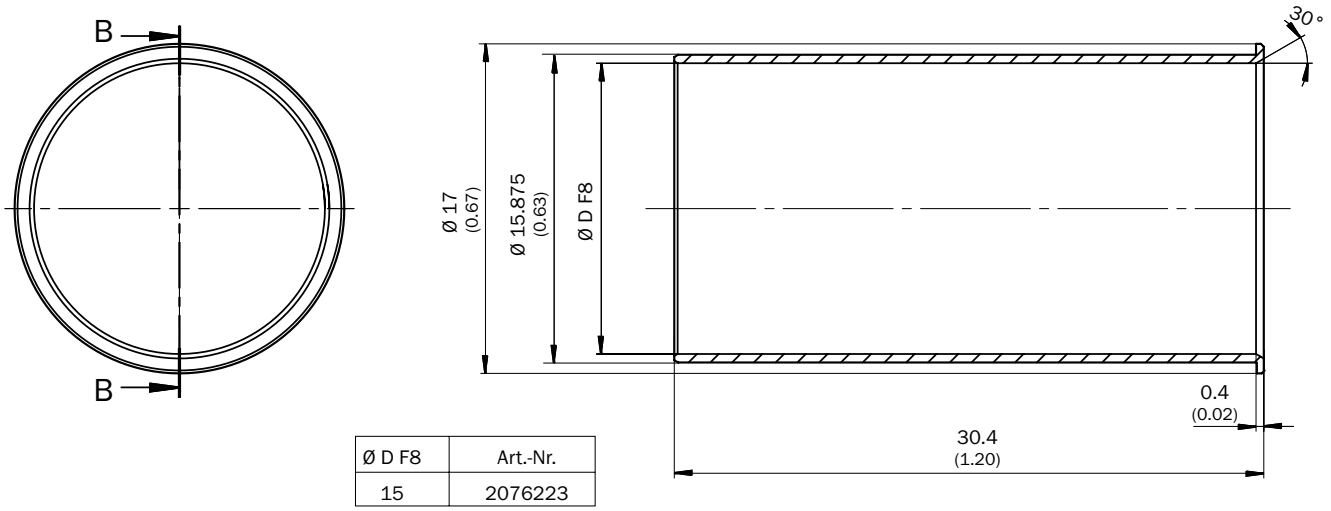
Ø D F8	Art.-No.
6	2076228
8	2076229
3/8″ (9.525)	2076226
10	2076230
12	2076231
1/2″ (12.7)	2076227

SPZ-58Z-008-M, SPZ-58Z-010-M, SPZ-58Z-012-M, SPZ-58Z-014-M, SPZ-58Z-12Z-M, SPZ-58Z-38Z-M



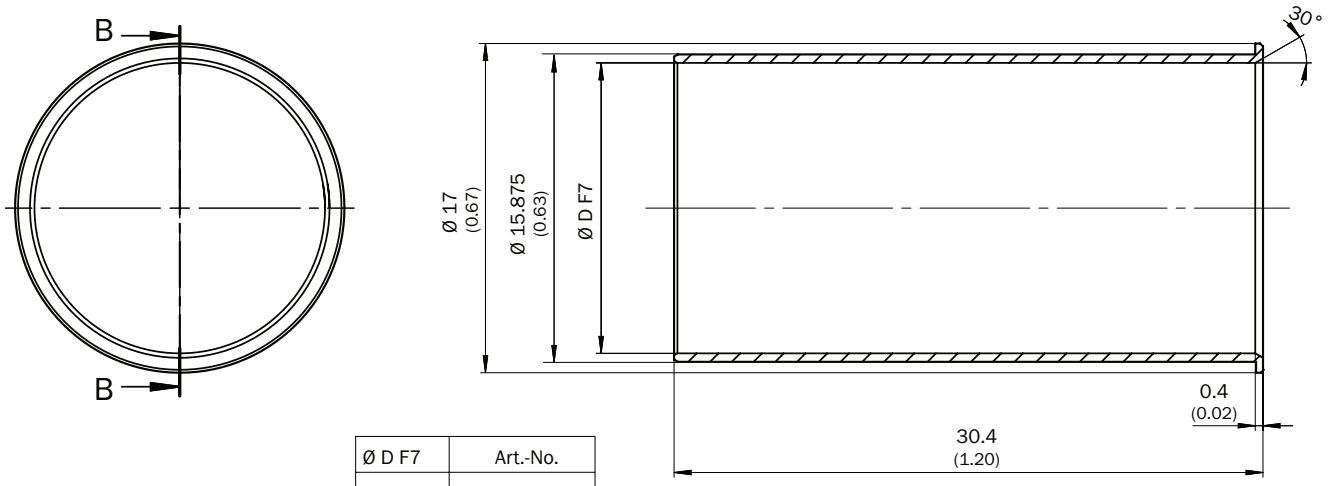
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12	2076221
1/2″ (12.7)	2076225
14	2076222

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



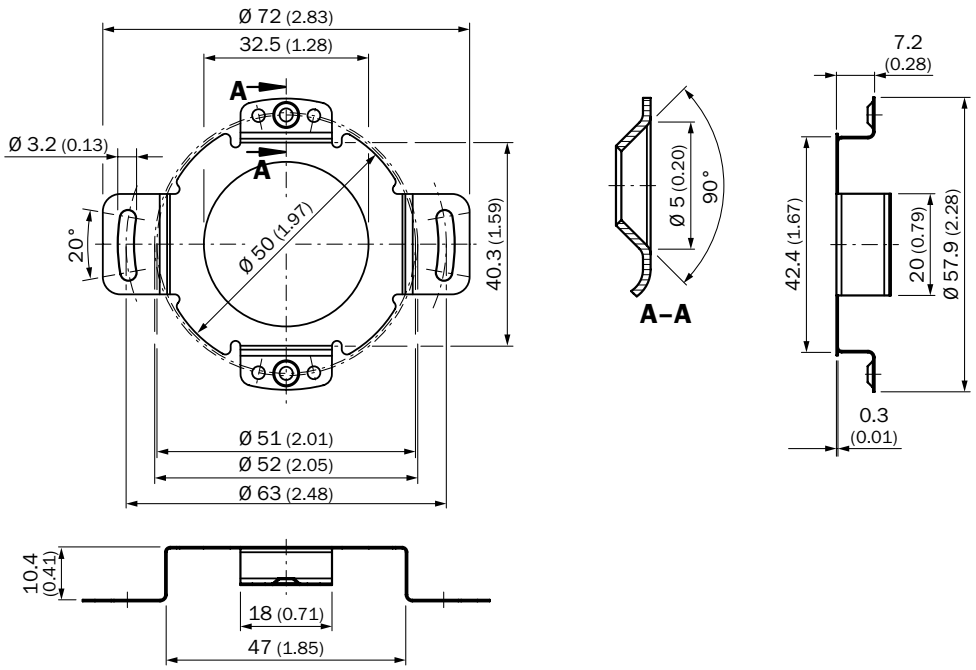
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SPZ-58Z-015-M

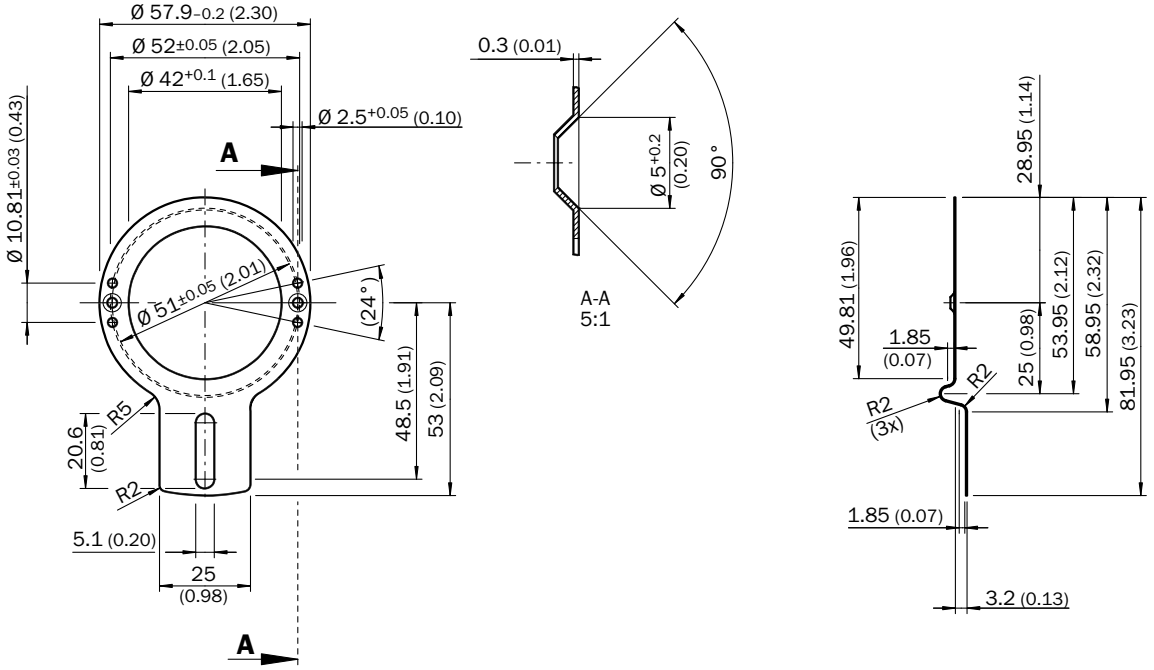


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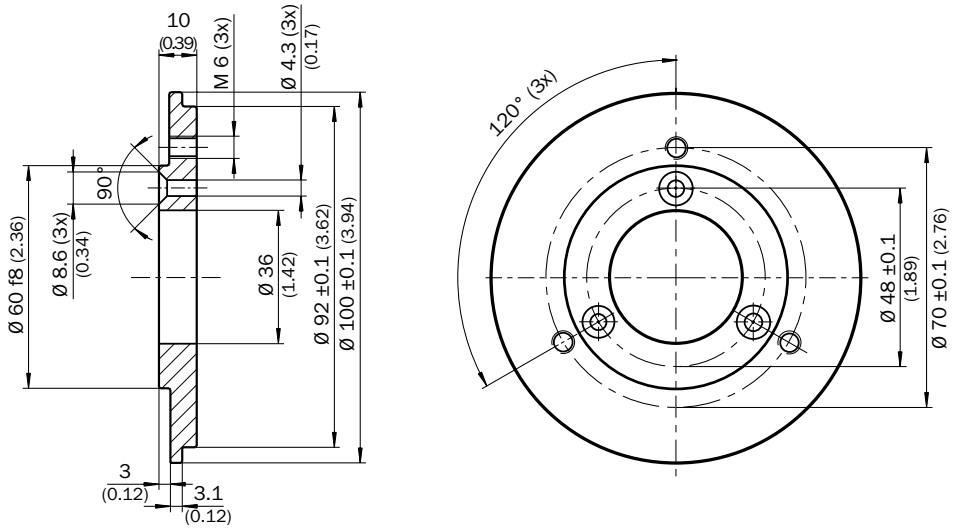
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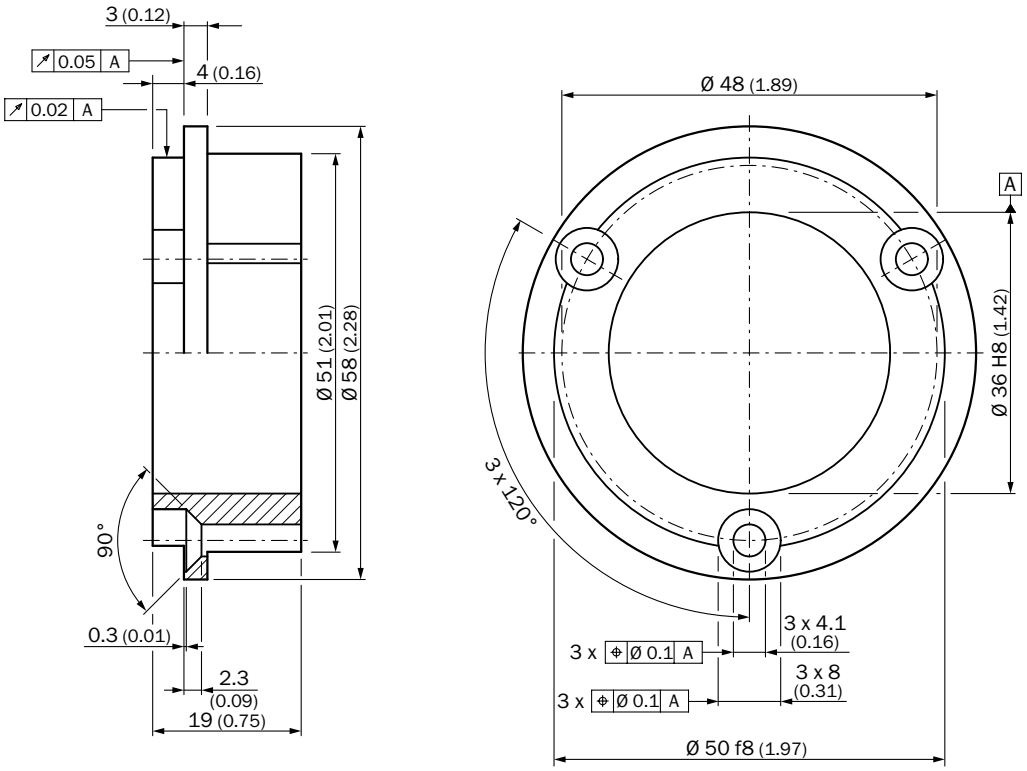
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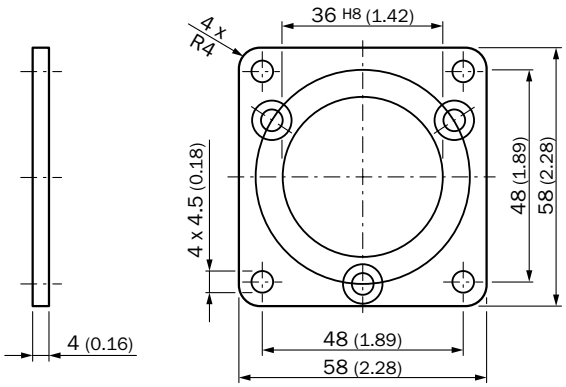
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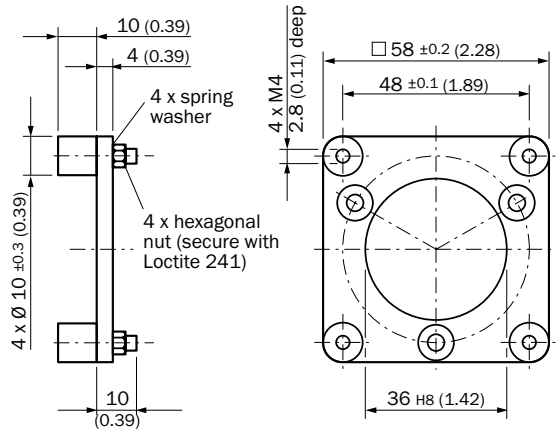
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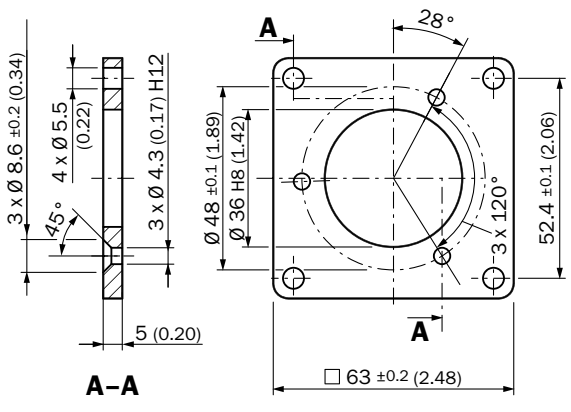
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BEF-FA-036-060RSA

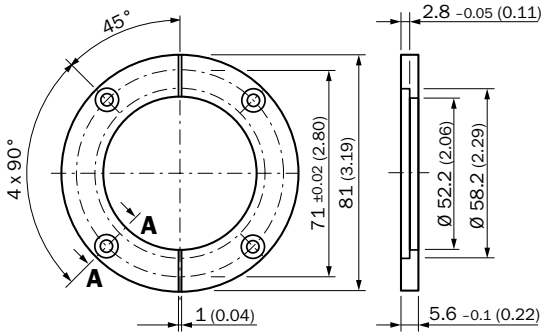


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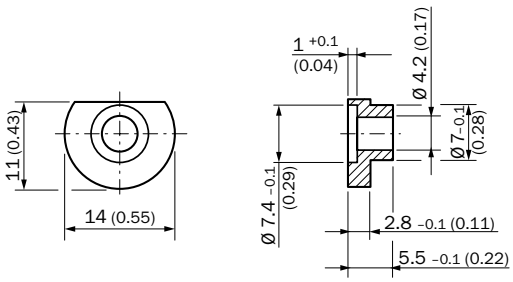


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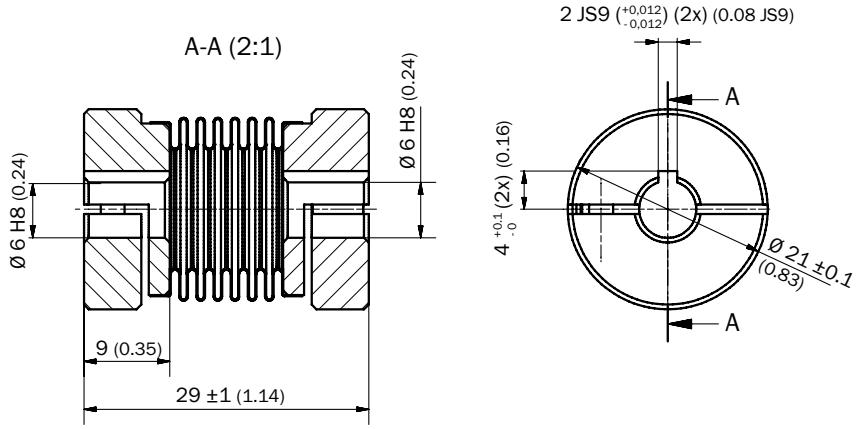


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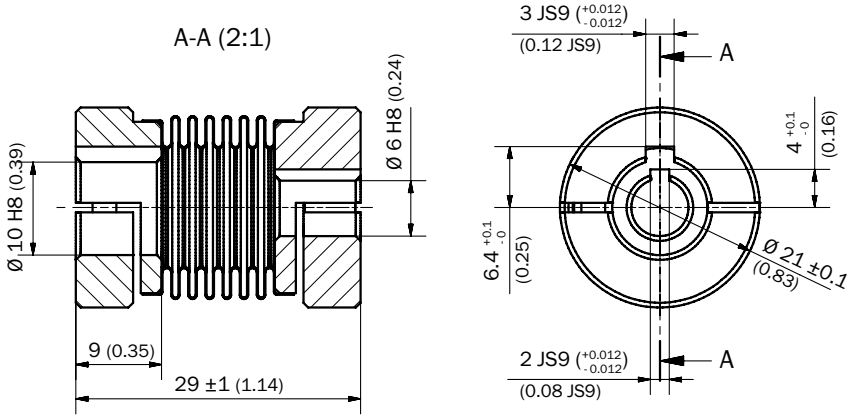


Dimensional drawings for shaft adaptation

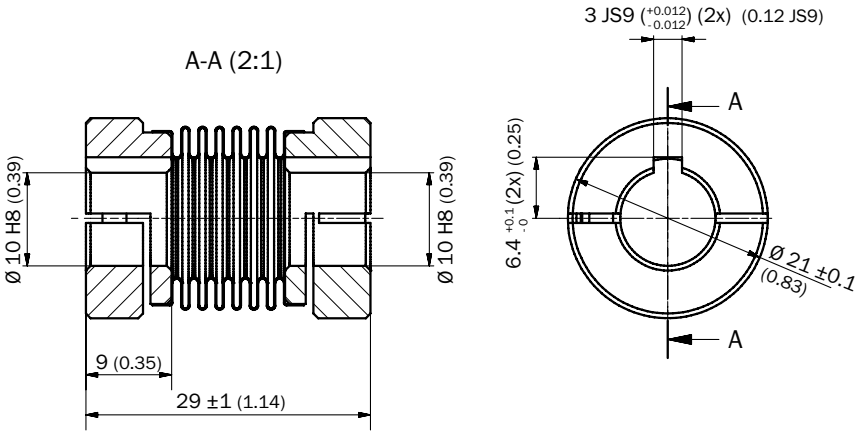
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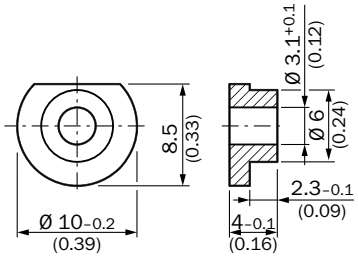
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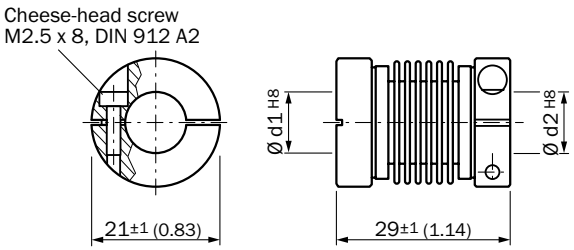
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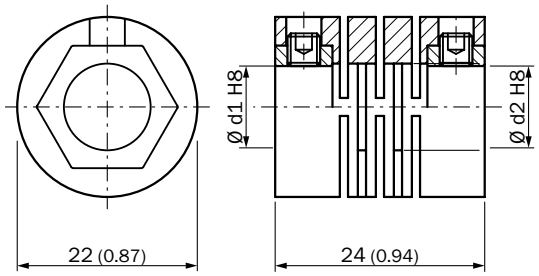
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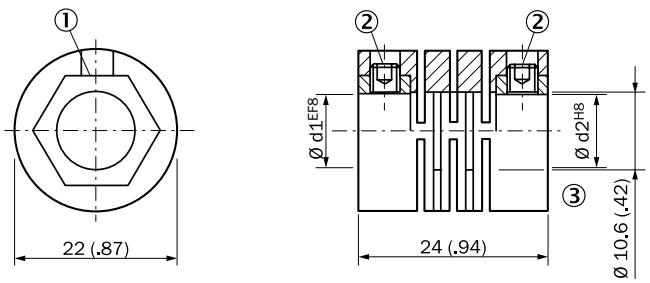
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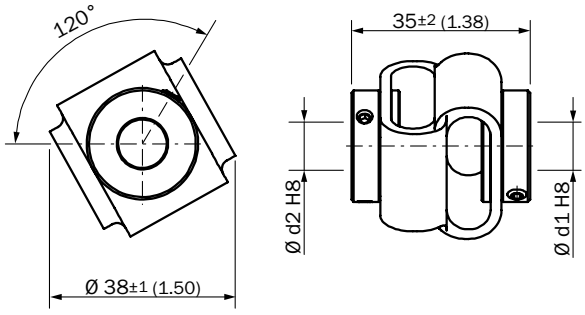
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KUP-0610-S
KUP-0610-MS
KUP-1010-S



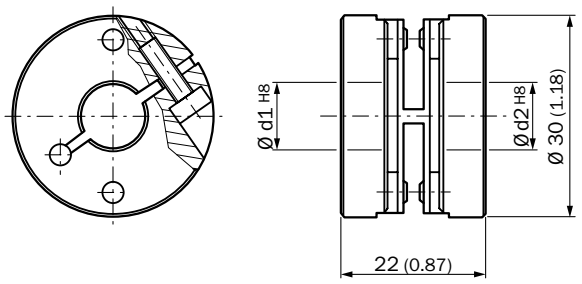
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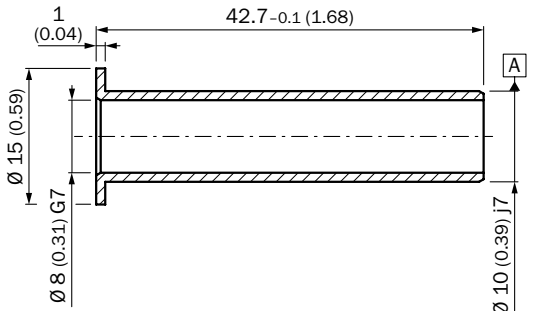
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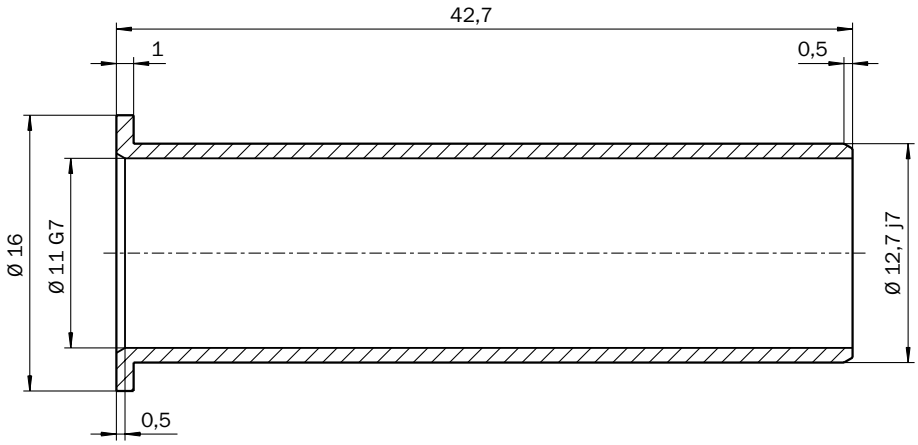
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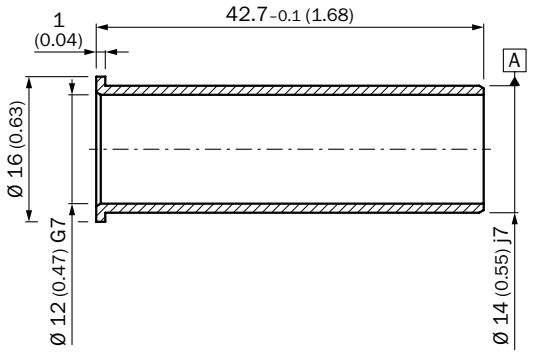
PEEK conductor insulation, 8 x 10 mm



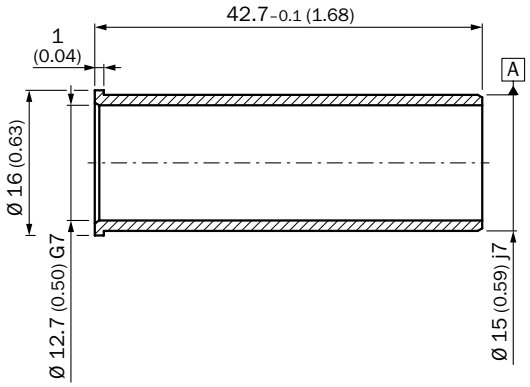
PEEK conductor insulation, 11 x 12.7 mm



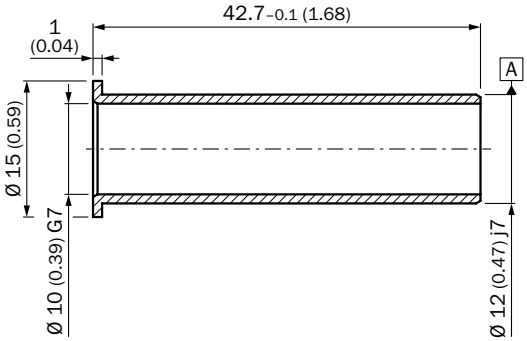
PEEK conductor insulation, 12 x 14 mm



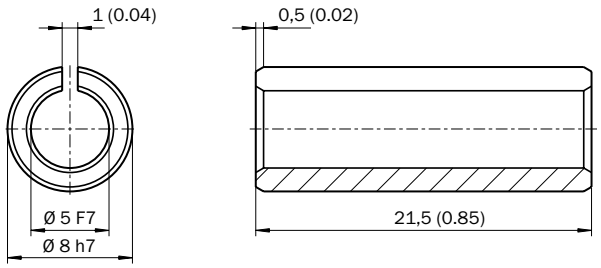
PEEK conductor insulation, 12.7 x 15 mm



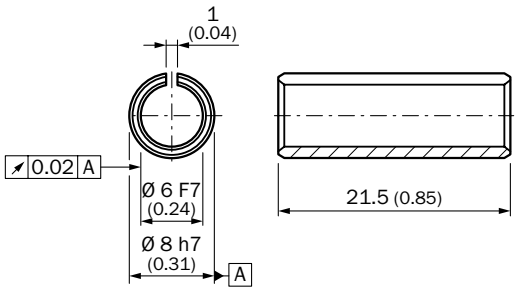
PEEK conductor insulation, 10 x 12 mm



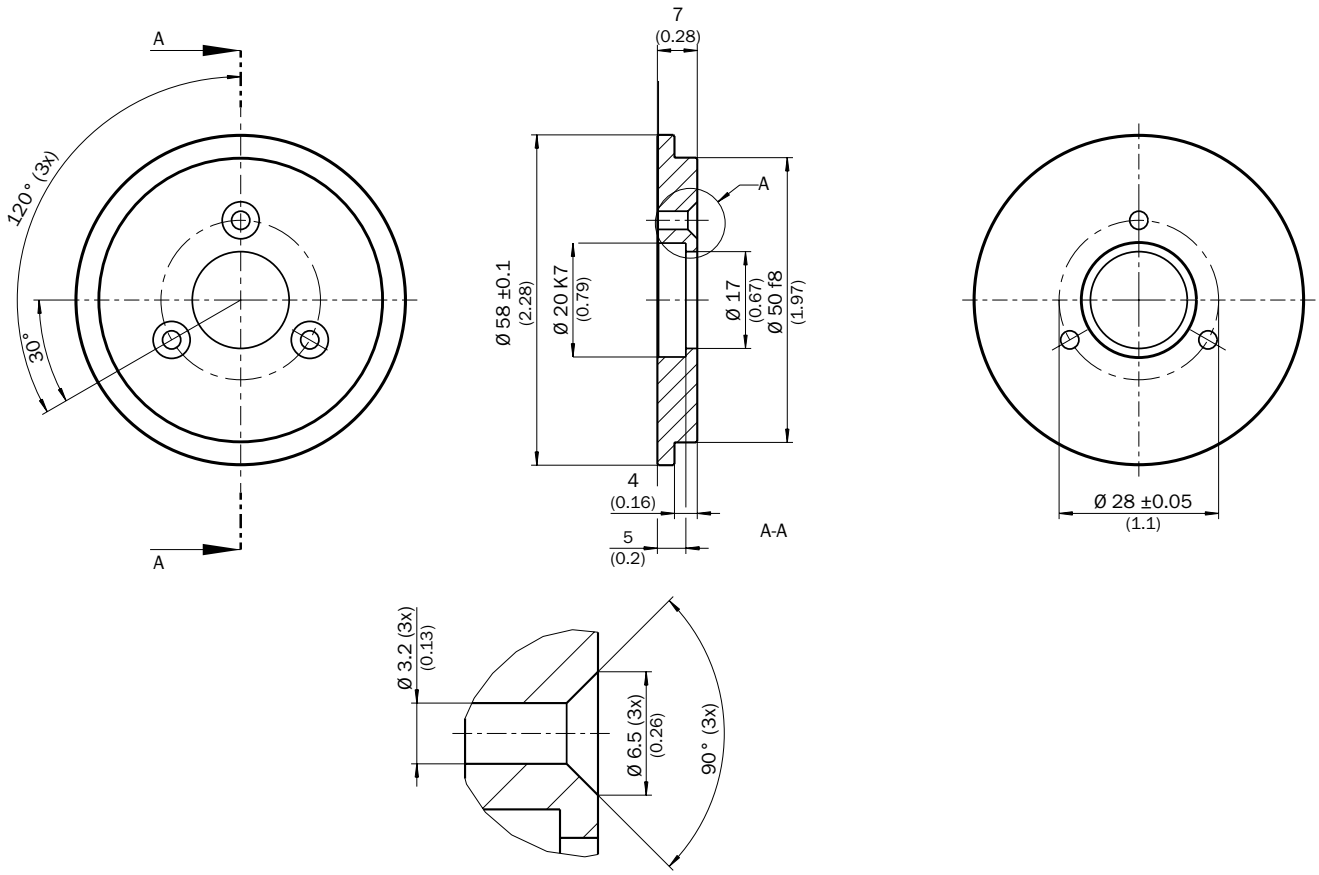
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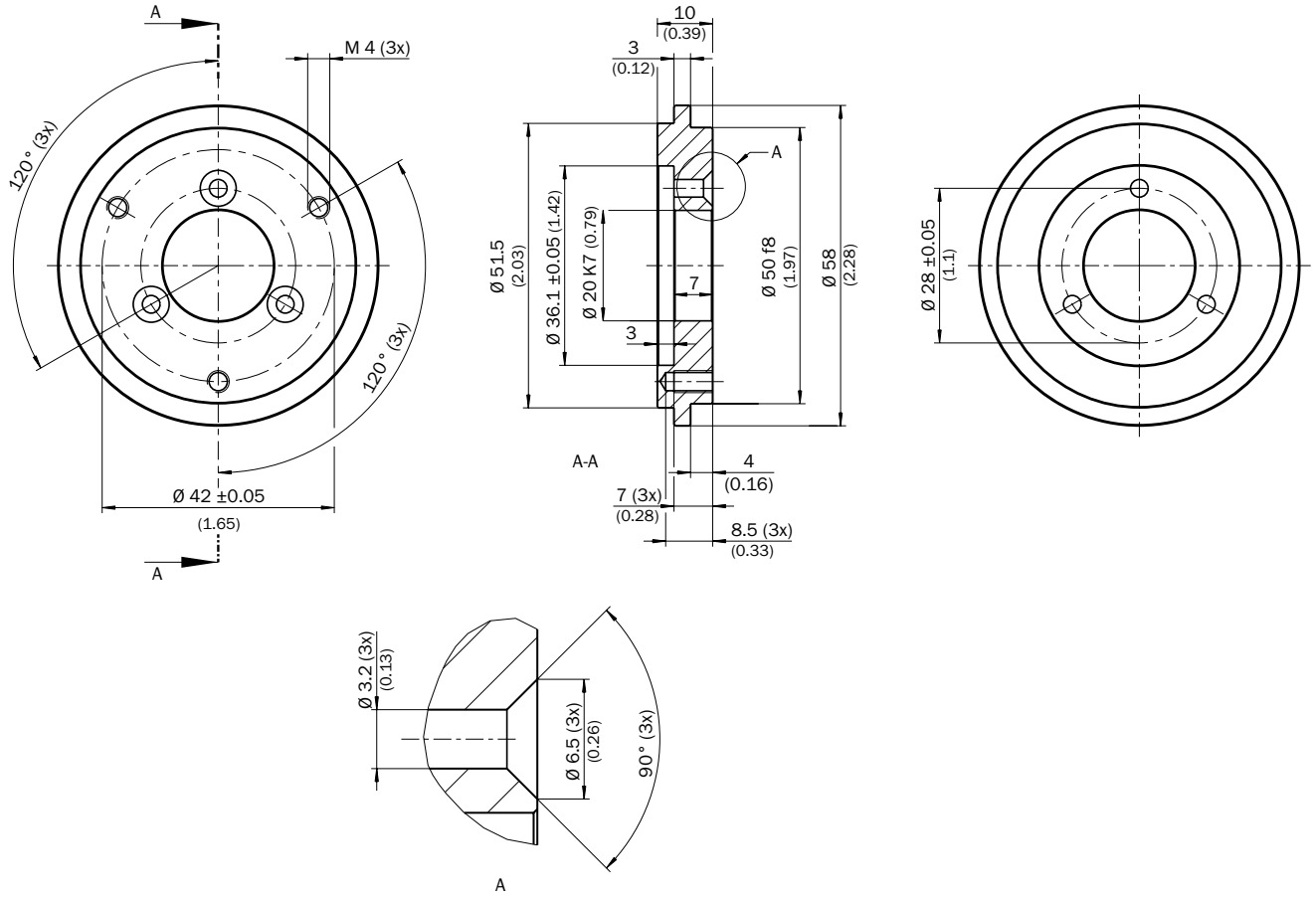
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BEF-FA-020-050007

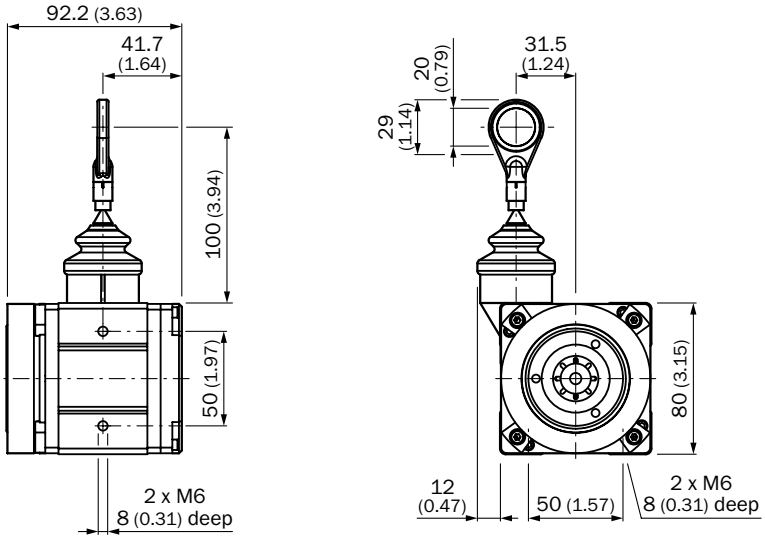


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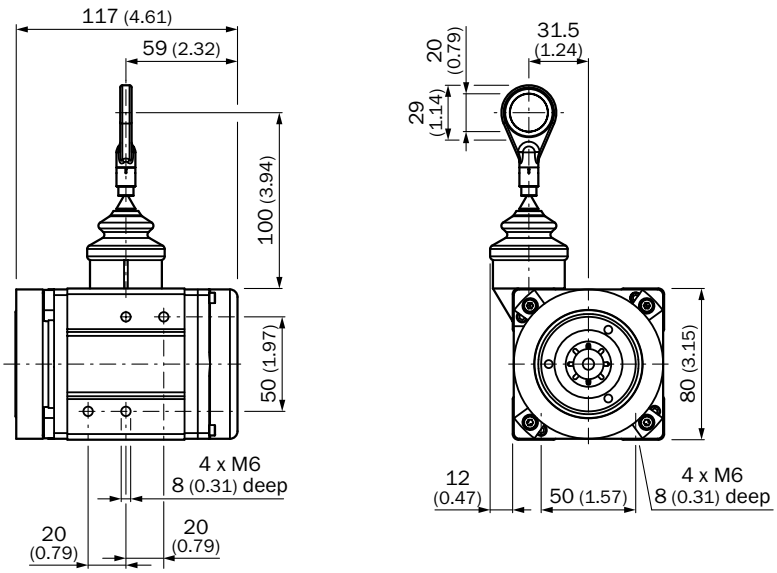


Dimensional drawings for additional accessories

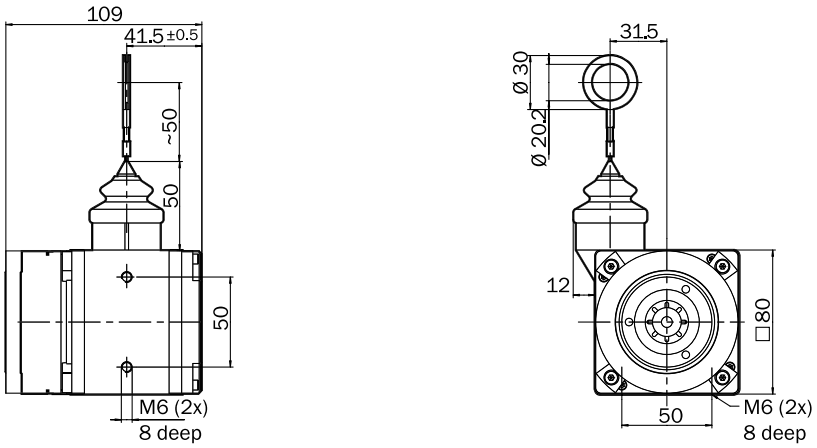
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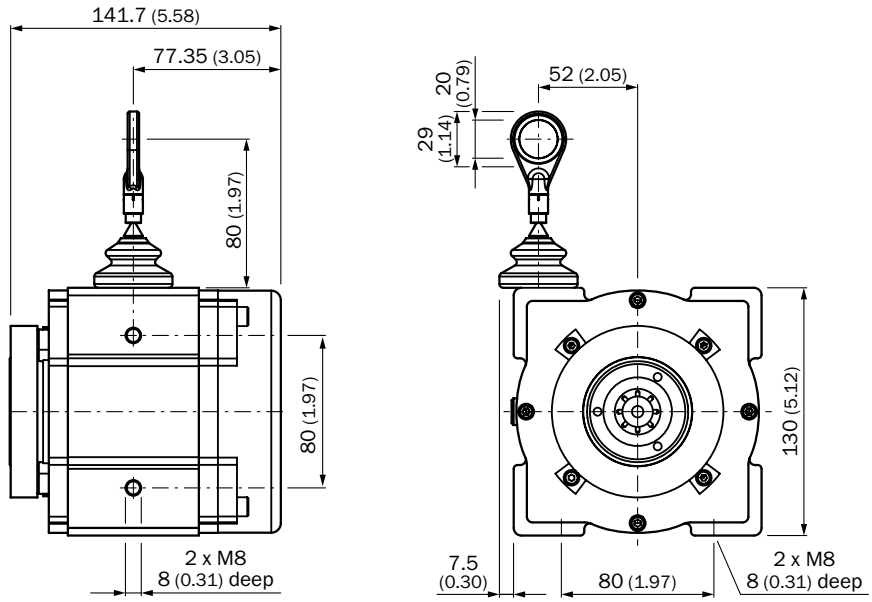
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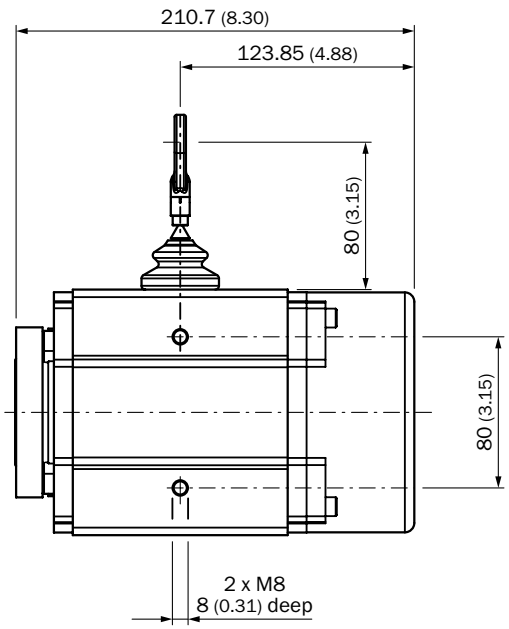
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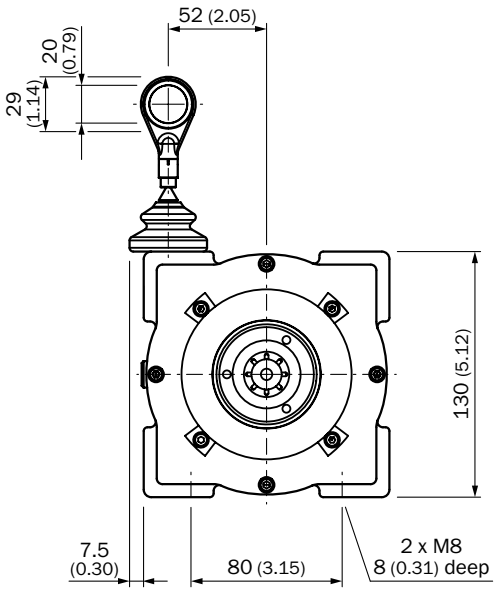


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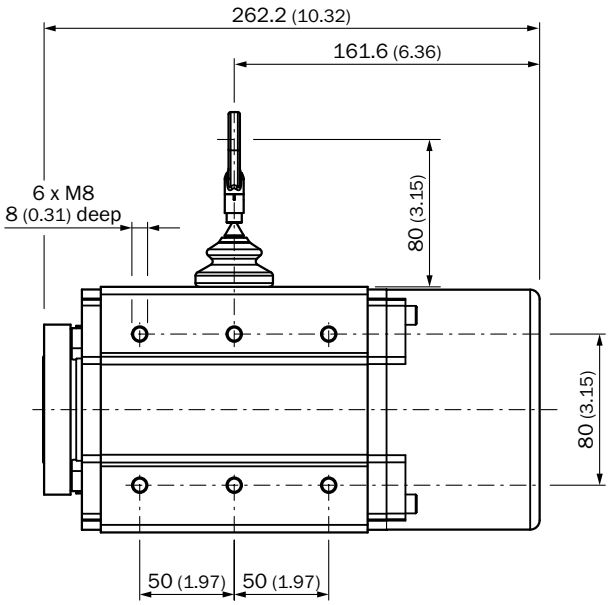


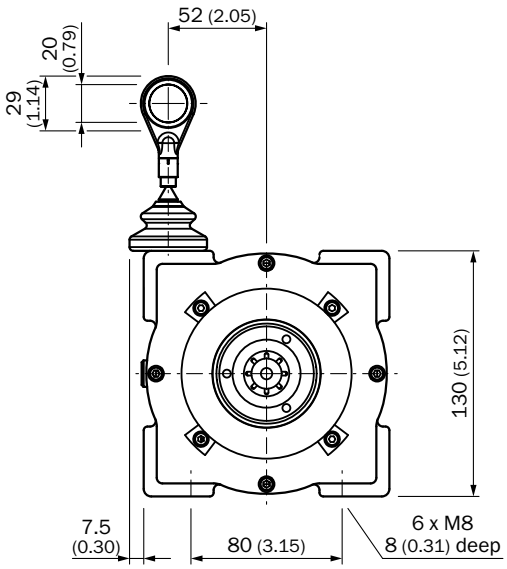
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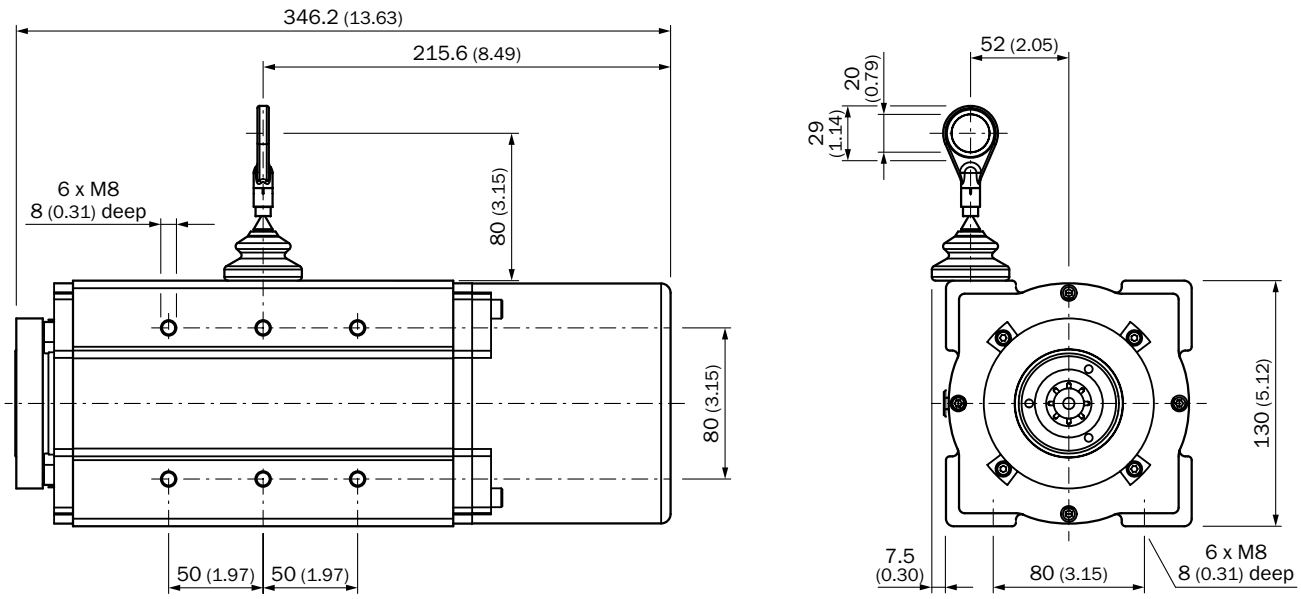


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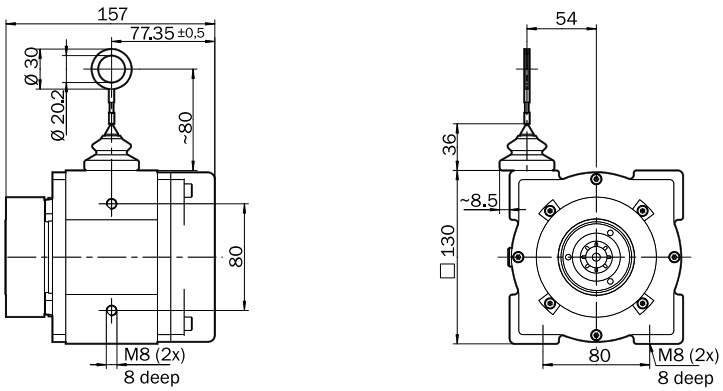




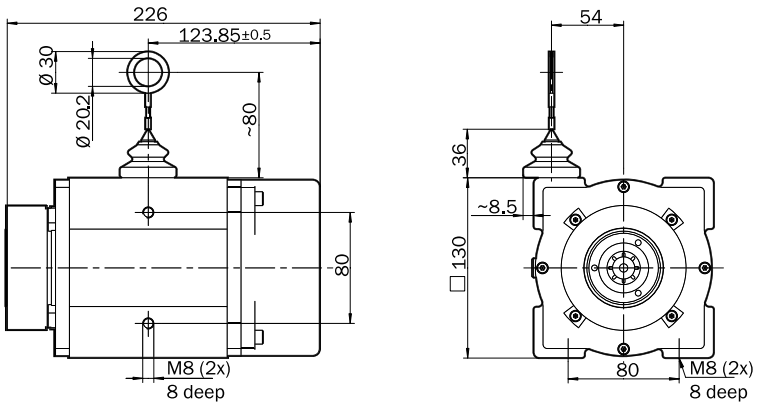
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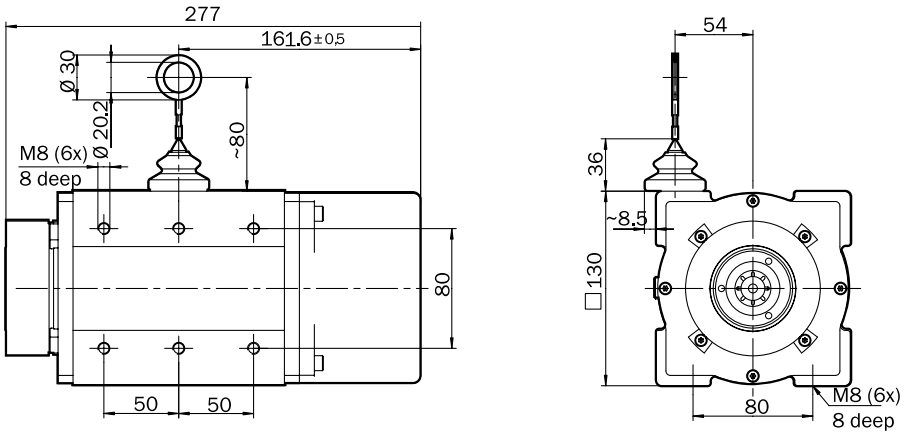
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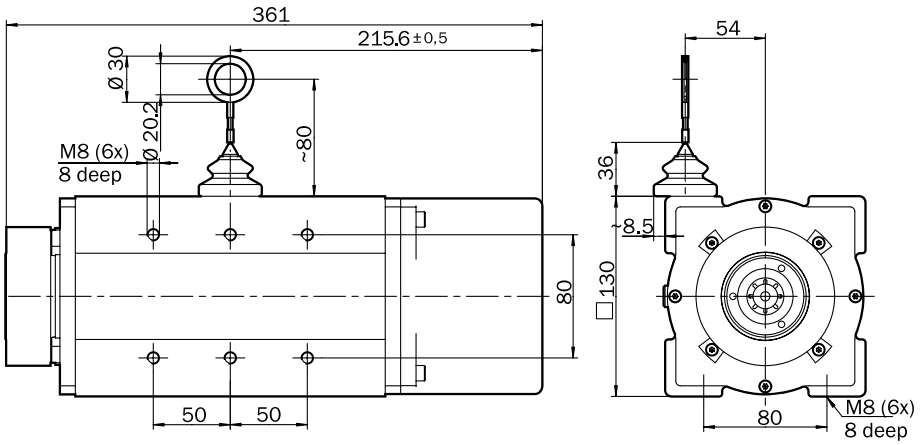
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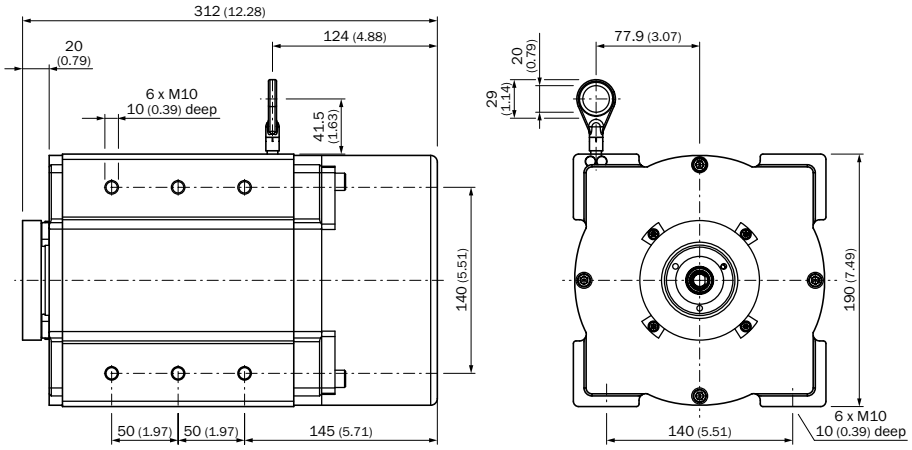
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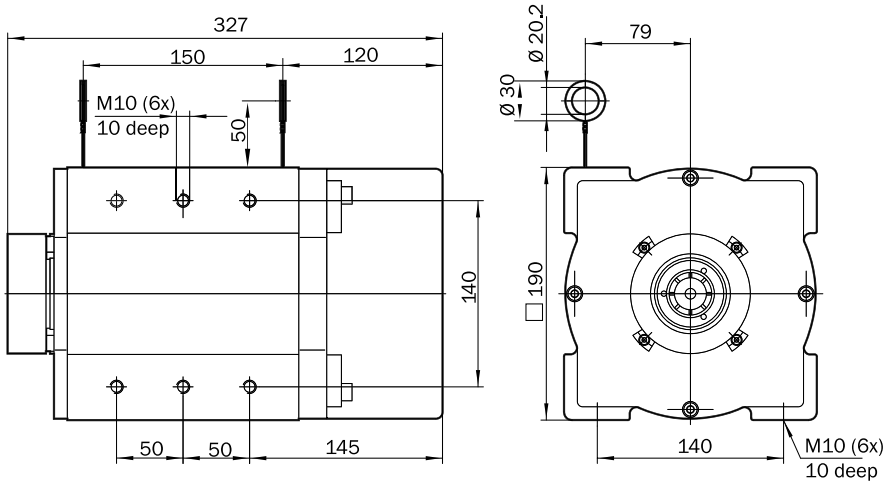
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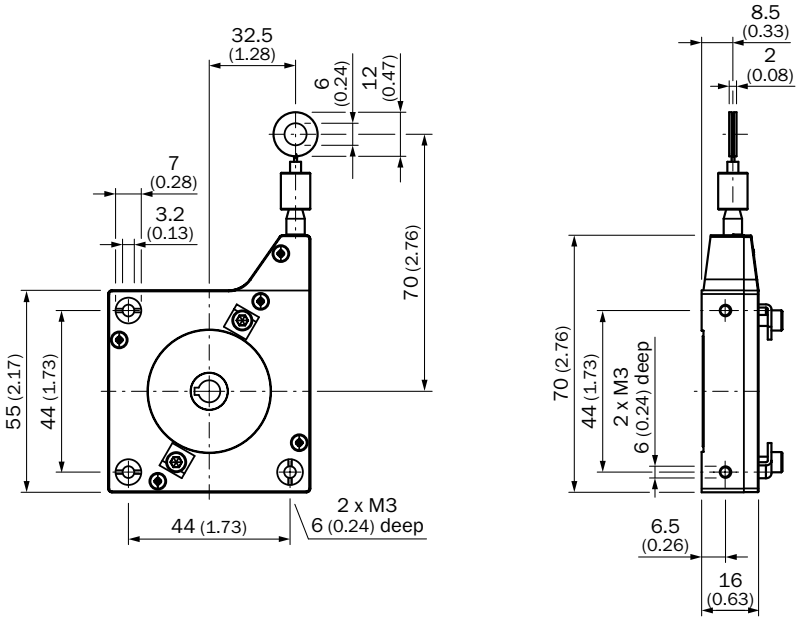
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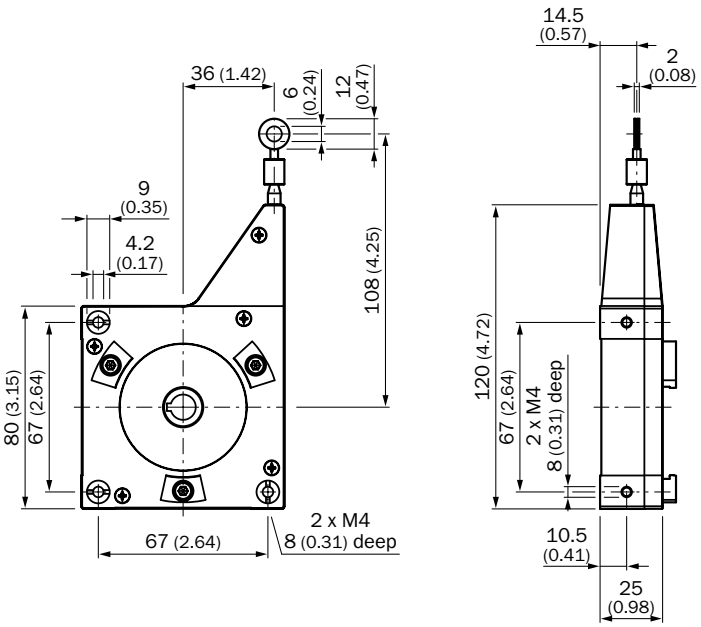
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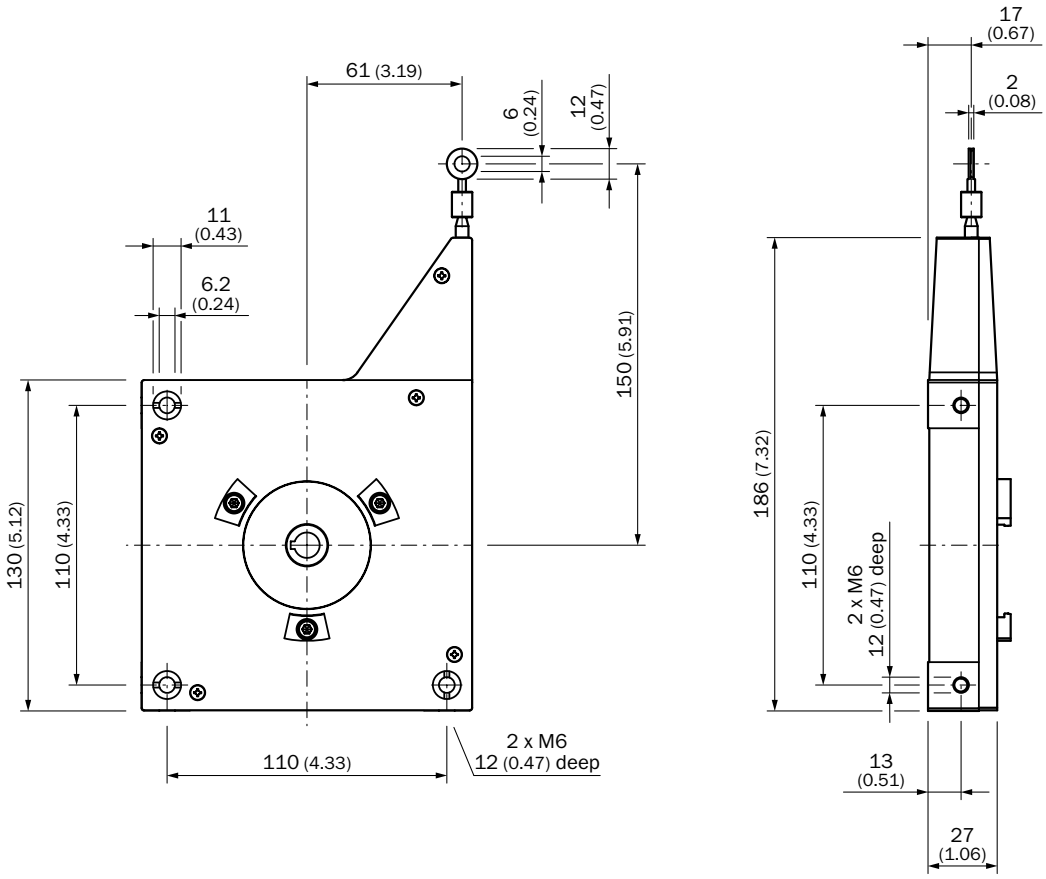
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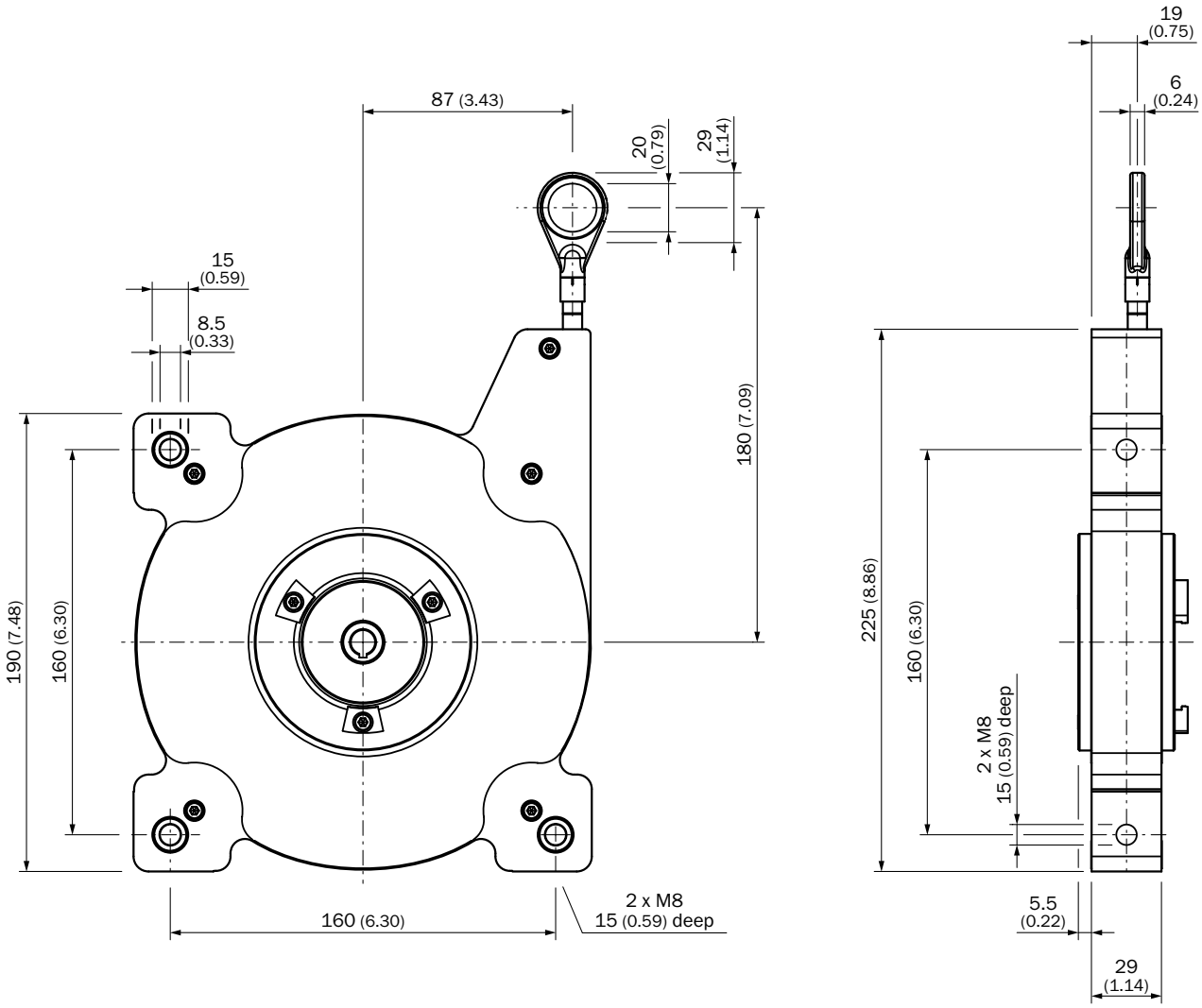
8015560/2015-09-01

Subject to change without notice

MRA-G130-105D3



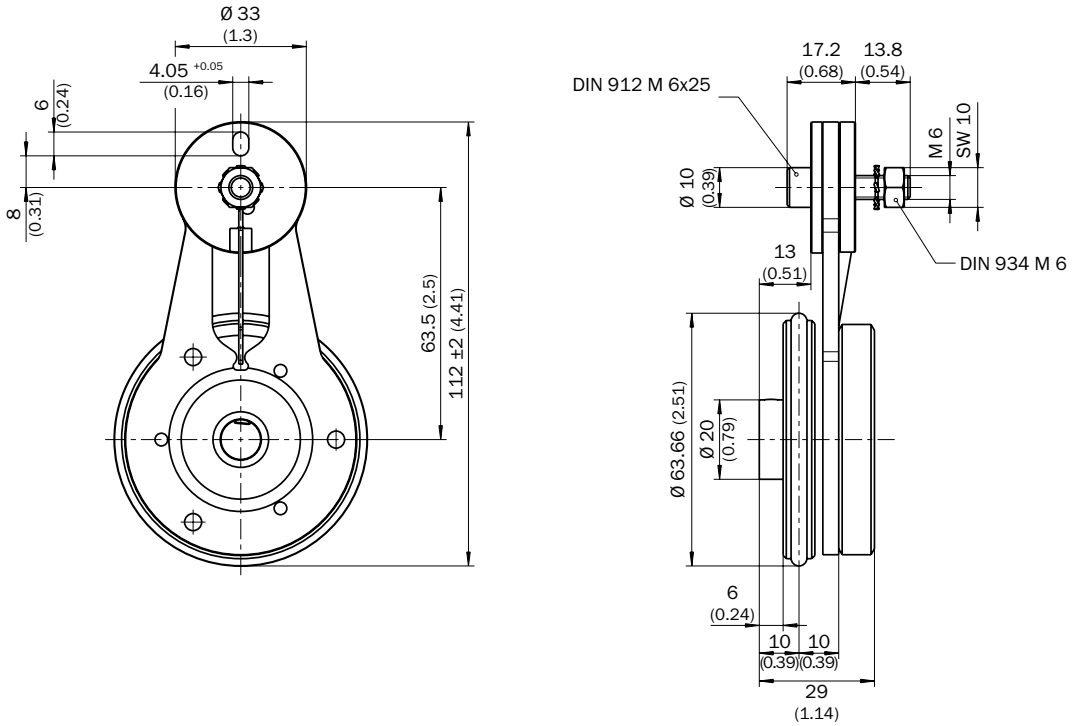
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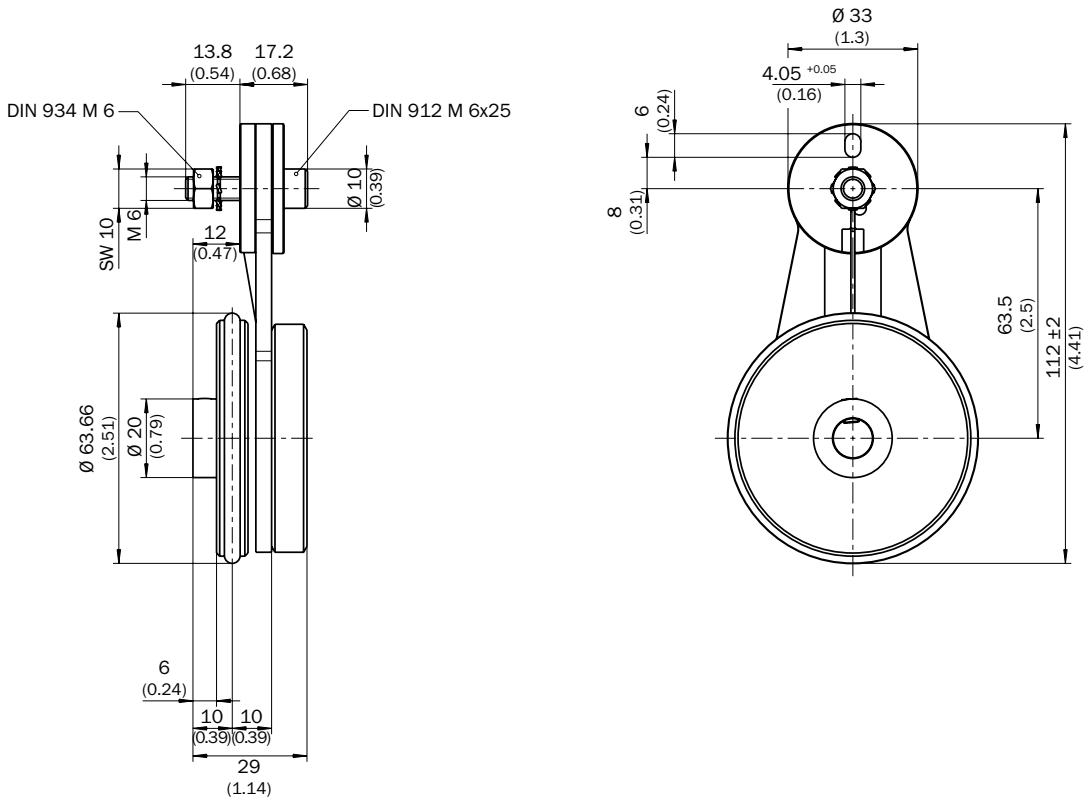
8015560/2015-09-01
Subject to change without notice

Dimensional drawings for other mounting accessories

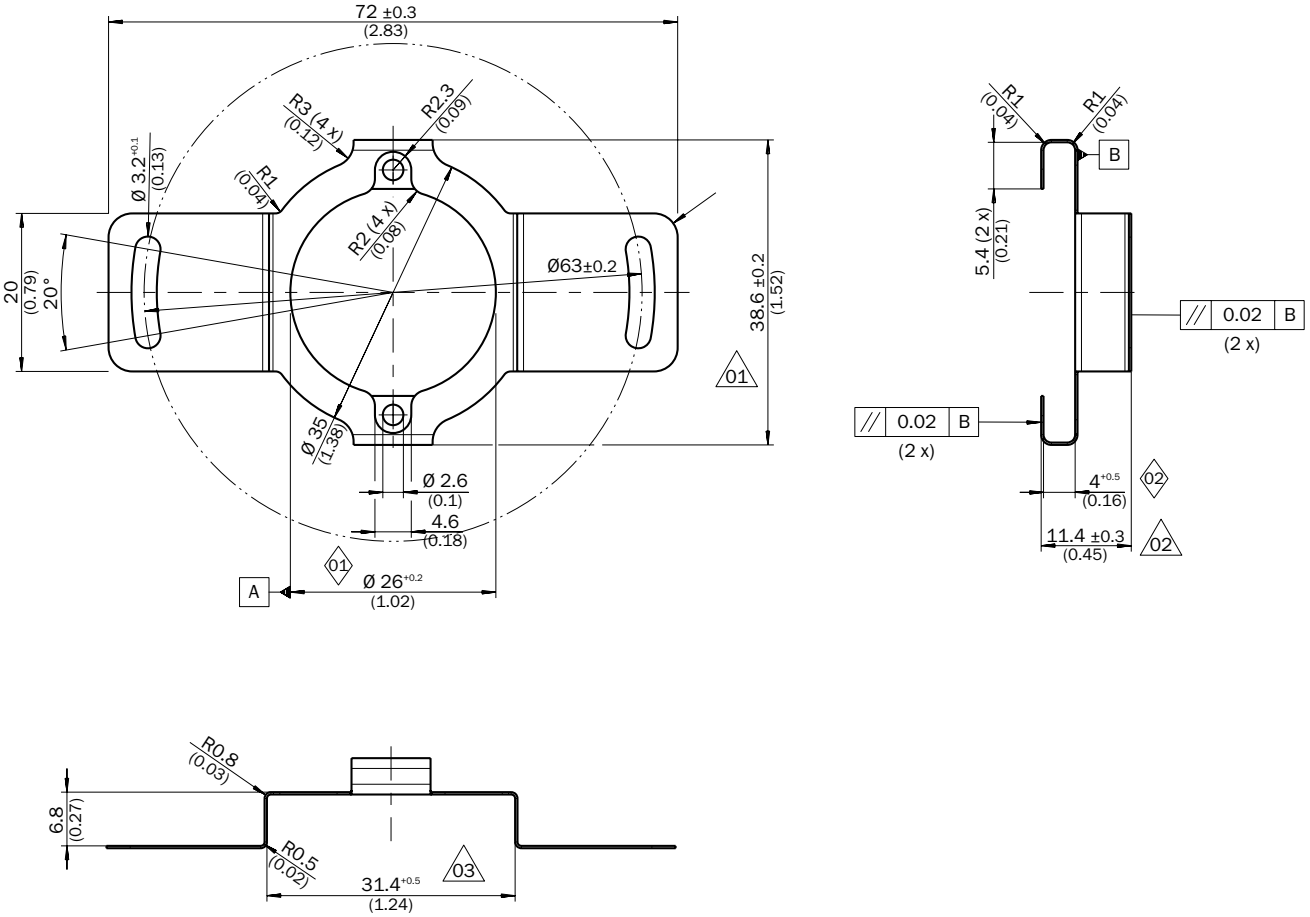
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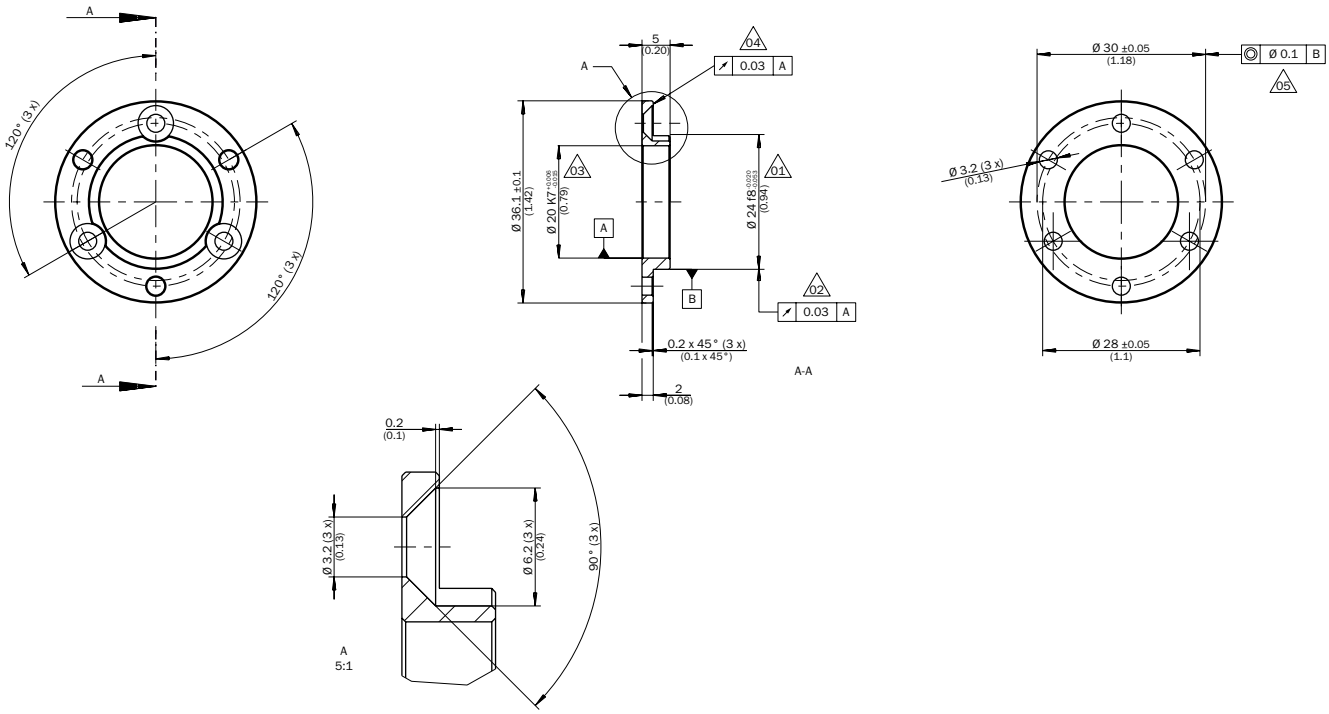
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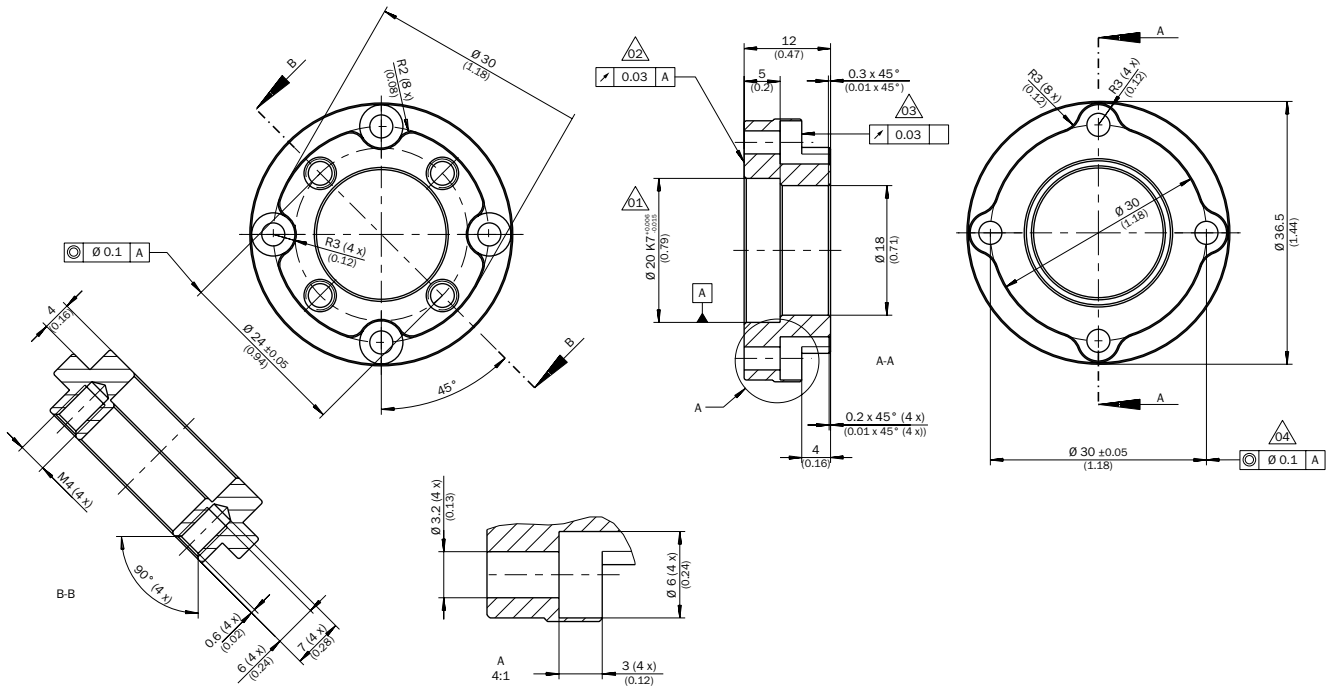
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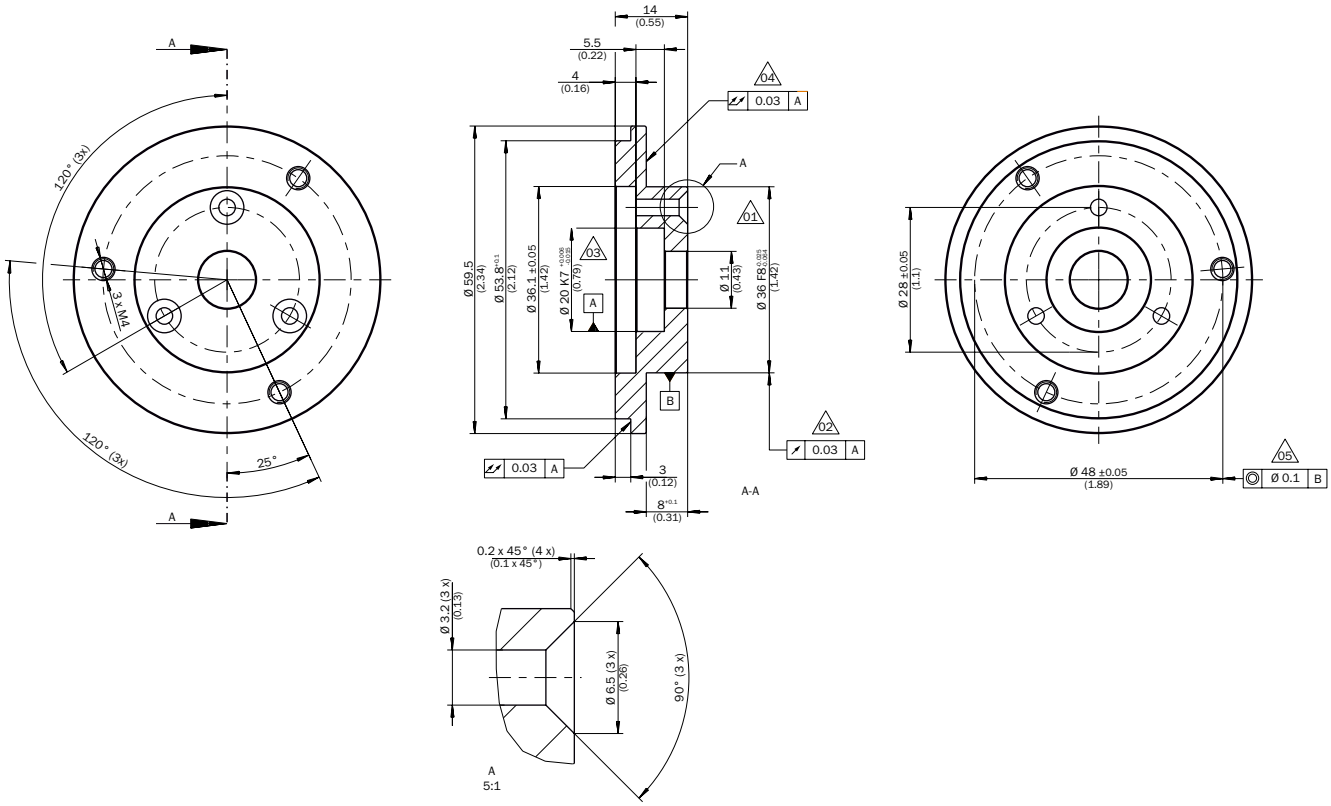
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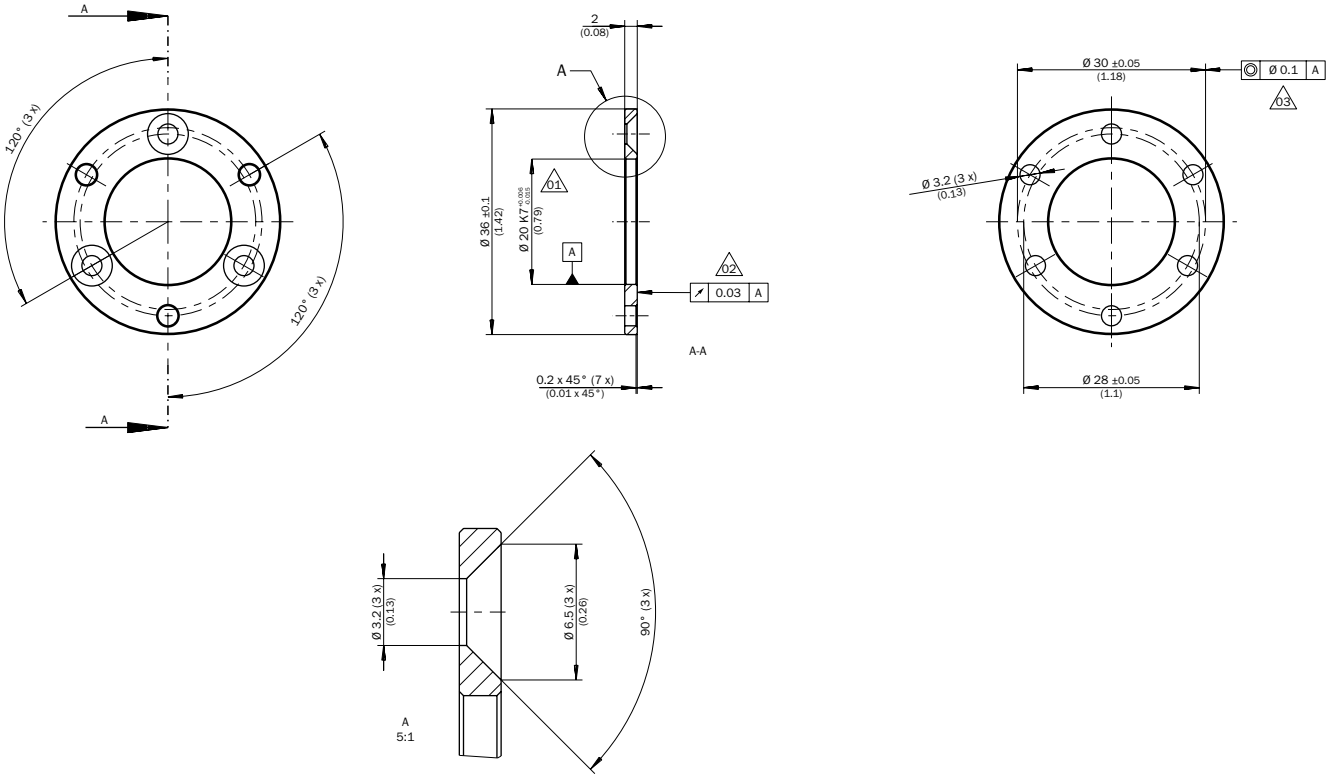
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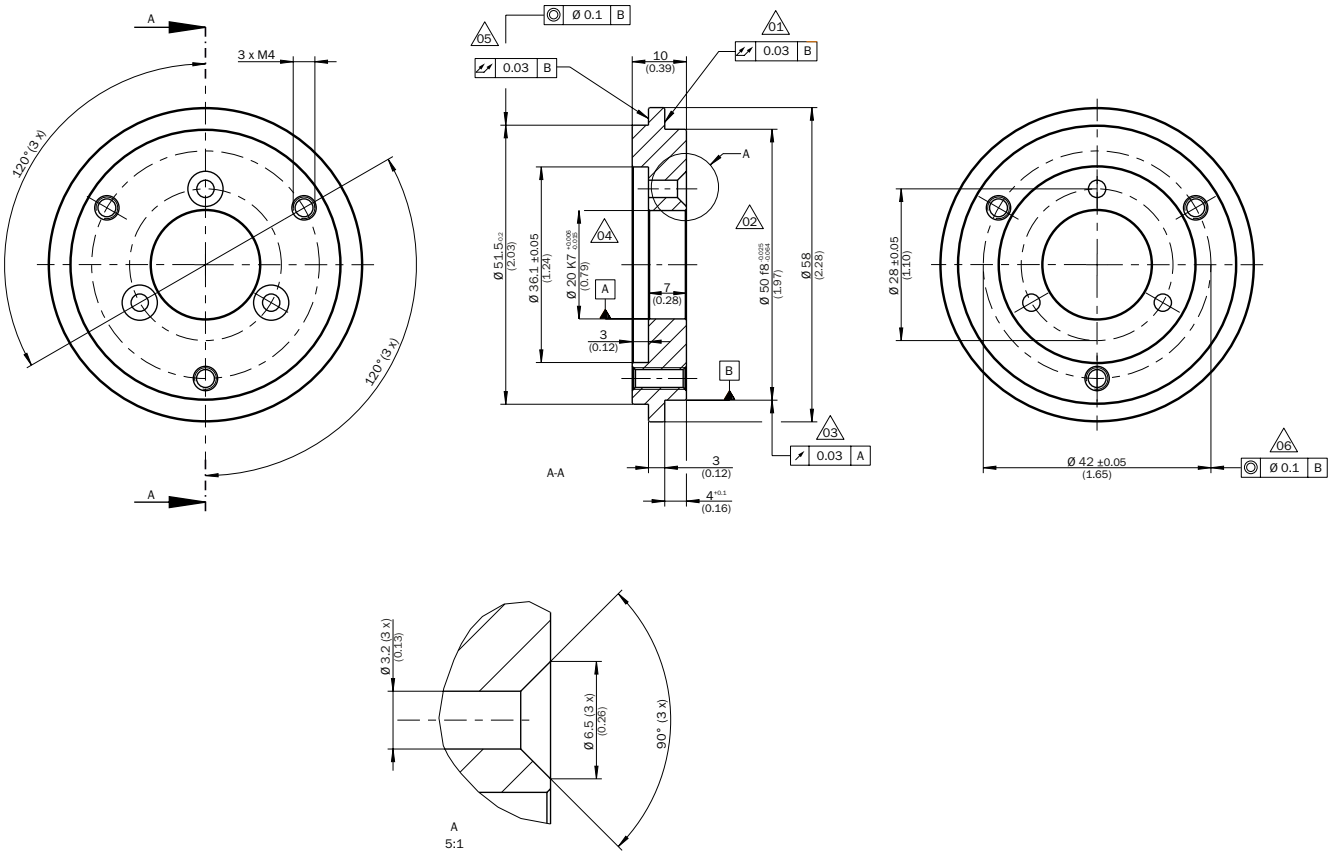
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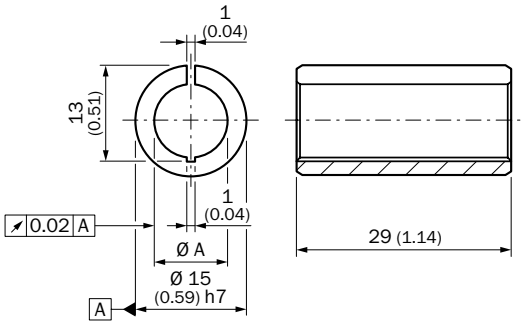
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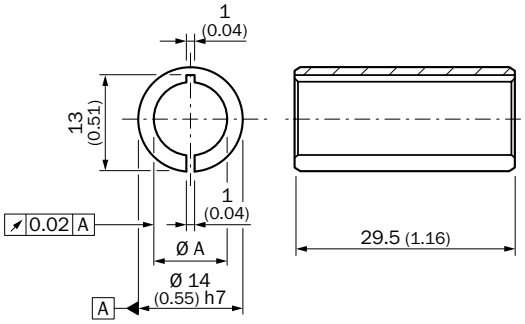
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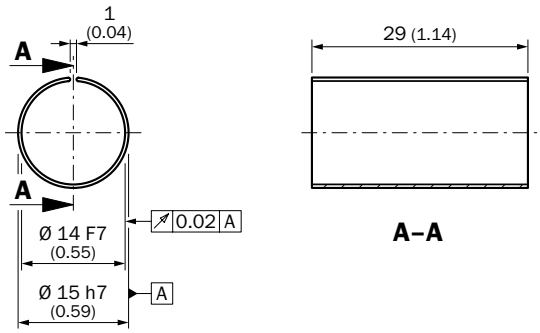
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SPZ-xxx-AD-D



SPZ-014-AD-A



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