AHS/AHM36 SSI
FLEXIBLE, SMART, COMPACT

Absolute encoders

SICK
Sensor Intelligence.

Compact. First-class. One of a kind. The new AHS36/AHM36 singleturn and multiturn absolute encoders from SICK. With their compact size – just 36 mm – and special rotating connector/cable outlet, these encoders are ideal for applications where larger housing diameters would take too much space. There is an extensive range of versions available with blind hollow shafts or solid shafts, each with different assembly hole patterns, thus permitting virtually any application possibility. The AHS36/AHM36 encoders are particularly popular for automated guided systems (AGS), industrial vehicles, and utility vehicles. However, they are also in demand for packaging machines, logistics applications, and in machine construction.

Small yet great

In machine construction, and particularly in AGS, the trend is toward more and more compact designs which offer exceptional performance. The new AHS36/AHM36 encoders were developed with this in mind. They provide an exceptional technical performance coupled with extremely compact dimensions.

Diversity is the order of the day

In order to provide maximum flexibility in the design of the customer-side mechanical interface, the AHS36/AHM36 encoders are available with three different types of flange (face mount flange, servo flange, blind hollow shaft) each with five different shaft diameters.
Various assembly hole patterns are available in the face mount flange. A range of different pitch hole diameters are covered by the flexible stator coupling on the blind hollow shaft.
And last but not least, a range of adapters guarantee compatibility with almost all 36 mm absolute encoders up to 60 mm flange designs.
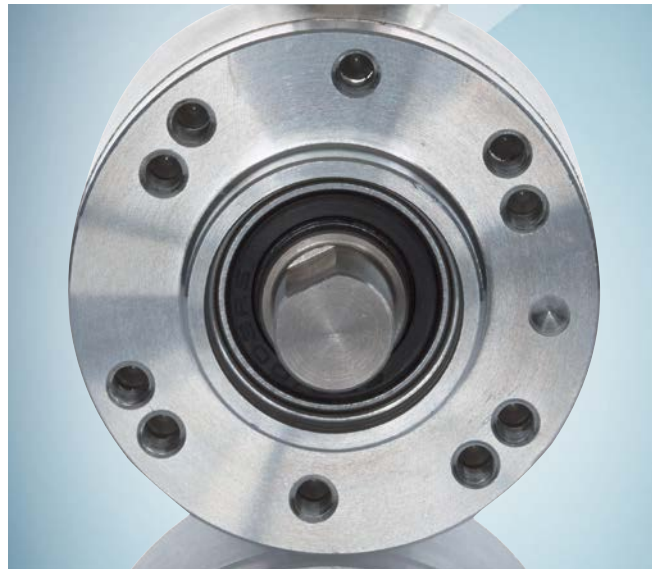
reddot award 2014
winner

Simply by moving

Customized solutions par excellence:
The rotating connector/cable outlet is the latest
SICK encoder innovation.

This makes it possible to integrate the
AHS36/AHM36 into the most limited of spaces
and reduces the number of encoder variants when
different installation situations are required.

That's the way…: With the rotating connector and cable outlet, the numerous flanges for mechanical adaptation, and the simple programming process, SICK sets the benchmark for products of this size and offers the best package in the 36 mm class.

The full range

Thanks to the Programming Tool, configuring the „SSI" version is extremely easy and flexible, even allowing adjustment of the SSI bit structure. And the key benefit is that 1 encoder is compatible with almost any SSI encoder.

For rough environments

The fully magnetic AHS36/AHM36 are tough enough to withstand dust, powerful water jets, or brief periods of immersion (IP66, IP67), and can operate reliably at temperatures of -40 °C to +100 °C.
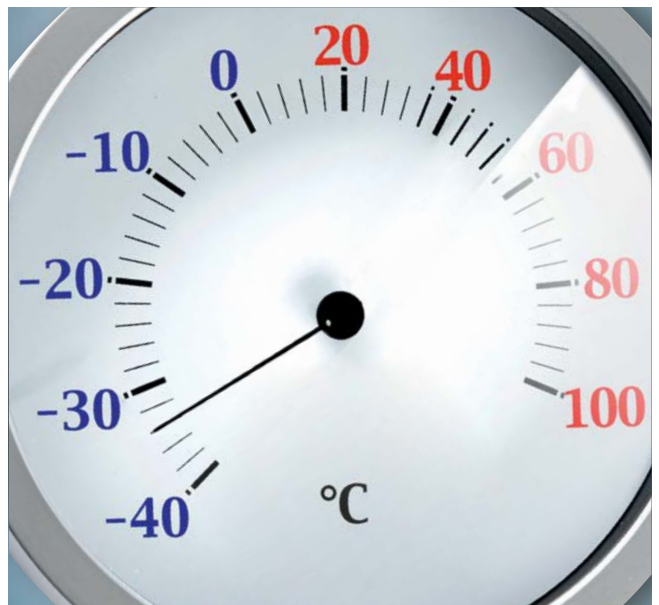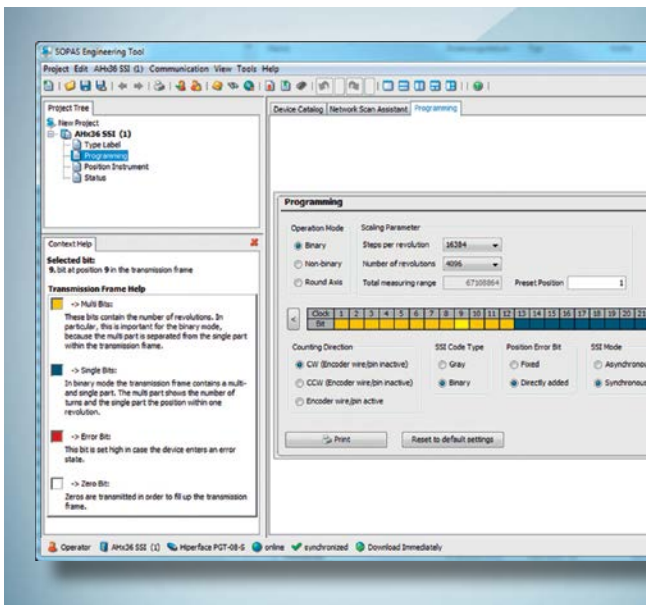
Programmable parameters

- Movement of SSI position bits
- Singleturn resolution
- Multiturn resolution
- Counting direction (cw/ccw)
- Set preset values
- Select operating mode: Binary, non-binary, round axis
- SSI code type gray/binary
- Position error bit
- SSI mode synchronous/asynchronous
- Reset to factory settings

FLEXIBLE, SMART, COMPACT

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 rotatable 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 AHS/AHM36 SSI 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 to +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 single-turn 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
- Rotatable M12 male connector or 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 to +100 °C (depending on the type)

Your benefits

- Simple, time-saving mechanical installation due to a rotatable plug 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

Additional information

➜ 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.

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		
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
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)	± 0,15° (at 20°C)
Measurement step	0,09°	0,022°
Initialization time	100 ms [2]	

[1] Programmable via SICK programming tools

[2] Valid positional data can be read once this time has elapsed.

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	60kHz ... 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 version only), PRESET, counting direction, code type, shifting of 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.

Electrical data

	Basic	Advanced
Connection type	Male connector M12, 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 [4]	230 years (EN ISO 13849-1)	

[4] This product is an standard product and does not constitute a safety component as defined in the Machinery Directive. Calculation based on nominal load of components, average ambient temperatrue 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	
Operating speed max.			
	Singleturn	9,000 /min [1]	6,000 /min [2] [3]
	Multiturn	6,000 /min [1]	6,000 /min [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	
Rotor moment of inertia			
	Solid shaft	2.5 gcm²	
	Blind hollow shaft	15 gcm²	
Max. angular acceleration		≤ 500,000 rad/s²	

[1] Self warming of 3.5 K per 1000 revolutions/min when applying note working temperature range.

[2] Self warming of 5.5 K per 1000 revolutions/min when applying note working 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 air humidity	90 % (condensation not permitted)	
Working 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] With mating connector fitted.

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

Type code

Singleturn

Type

B	Basic
A	Advanced

Mechanical Interface [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	Servoflange, solid shaft 6x12 mm
S	9	Servoflange, solid shaft 8x12 mm
S	2	Servoflange, solid shaft 10x12 mm
S	A	Servoflange, solid shaft 1/4"x12 mm
S	B	Servoflange, solid shaft 3/8"x12 mm
S	3	Face mount flange, solid shaft 6x12 mm
S	5	Face mount flange, solid shaft 8x12 mm
S	4	Face mount flange, solid shaft 10x12 mm
S	8	Face mount flange, solid shaft 1/4"x12 mm
S	7	Face mount flange, solid shaft 3/8"x12 mm
S	C	Face mount flange 10x24 mm for use with the adapters 2072298 and 2072295 [2]
S	D	Servoflange, solid shaft 6x12 mm for adaption on 1,25 m Ecoline wire draw mechanic [5]

Electrical Interface

A	4,5 ... 32V, SSI, Gray
P	4,5 ... 32V, SSI, Gray/ binary programmable (only type A)

Connection Type

C	M12 x 8-pin, universal
J	Cable 8-core, universal 0,5 m [3]
K	Cable 8-core, universal 1,5 m [3]
L	Cable 8-core, universal 3 m [3]
M	Cable 8-core, universal 5 m [3]

Resolution

00256 ... 04.096	Steps per revolution (type B) [4]
00256 ... 16.384	Steps per revolution (type A) [4]

A	H	S	3	6	-				O					

[1] With the help of flange adapters other mechanical interfaces can be implemented, see proposed fitting p.17.

[2] Permissible load capacity of shaft lower than specified in technical data

[3] NRTL certification is only valid for working temperature of - 40 ° C to + 85 ° C

[4] Number of steps non-programmable encoders: Basic: 256, 360, 512, 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. Number of steps programmable enoders (only advanced): 16,384, programmable via programming tool.

[5] Enclosure rating always IP65 on shaft side

Multiturn

Type

| B | Basic |
| A | Advanced |

Mechanical Interface [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	Servoflange, solid shaft 6x12 mm
S	9	Servoflange, solid shaft 8x12 mm
S	2	Servoflange, solid shaft 10x12 mm
S	A	Servoflange, solid shaft 1/4"x12 mm
S	B	Servoflange, solid shaft 3/8"x12 mm
S	3	Face mount flange, solid shaft 6x12 mm
S	5	Face mount flange, solid shaft 8x12 mm
S	4	Face mount flange, solid shaft 10x12 mm
S	8	Face mount flange, solid shaft 1/4"x12 mm
S	7	Face mount flange, solid shaft 3/8"x12 mm
S	C	Face mount flange 10x24 mm for use with the adapters 2072298 and 2072295 [2]
S	D	Servoflange, solid shaft 6x12 mm for adaption on 1,25 m Ecoline wire draw mechanic [5]

Electrical Interface

| A | 4,5 ... 32V, SSI, Gray |
| P | 4,5 ... 32V, SSI, Gray /binary programmable (only type A) |

Connection Type

C	M12 x 8-pin, universal
J	Cable 8-core, universal 0,5 m [3]
K	Cable 8-core, universal 1,5 m [3]
L	Cable 8-core, universal 3 m [3]
M	Cable 8-core, universal 5 m [3]

Steps per turn

| 8x12 ... 12x12 | bit (type B)[4] |
| 8x12 ... 14x12 | bit (type A)[4] |

| A | H | M | 3 | 6 | | - | | | | O | | | | | |

[1] With the help of flange adapters other mechanical interfaces can be implemented, see proposed fitting p.17.

[2] Permissible load capacity of shaft lower than specified in technical data

[3] NRTL certification is only valid for working temperature of - 40 ° C to + 85 ° C

[4] Number of steps non-programmable encoders: Basic: 256, 360, 512, 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. Number of steps programmable enoders (only advanced): 16,384, programmable via programming tool.

[5] Enclosure rating always IP65 on shaft side

Ordering Information

Other models available at www.mysick.com/en/AHS_AHM36_SSI

Absolute singleturn, solid shaft, servo flange

- **Electrical interface:** SSI

Shaft diameter	Connection type	Number of steps	Resolution	Programmable	Model name	Part no.
6 x 12 mm	Male connector M12, 8-pin, universal	4,096	4,096 x 1	–	AHS36B-S1AC004096	1066017
6 x 12 mm	Male connector M12, 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	Model name	Part no.
6 x 12 mm	Male connector M12, 8-pin, universal	4,096	4,096 x 4,096	–	AHM36B-S1AC012x12	1066012
6 x 12 mm	Male connector M12, 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	Model name	Part no.
8 x 12 mm	Male connector M12, 8-pin, universal	16,384	16,384 x 1	–	AHS36A-S5AC016384	1067269

Absolute multiturn, solid shaft, face mount flange

- **Electrical interface:** SSI

Shaft diameter	Connection type	Number of steps	Resolution	Programmable	Model name	Part no.
6 x 12 mm	Male connector M12, 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	Model name	Part no.
6 mm	Male connector M12, 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

Absolute multiturn, blind hollow shaft

- **Electrical interface:** SSI

Shaft diameter	Connection type	Number of steps	Resolution	Programmable	Model name	Part no.
6 mm	Male connector M12, 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
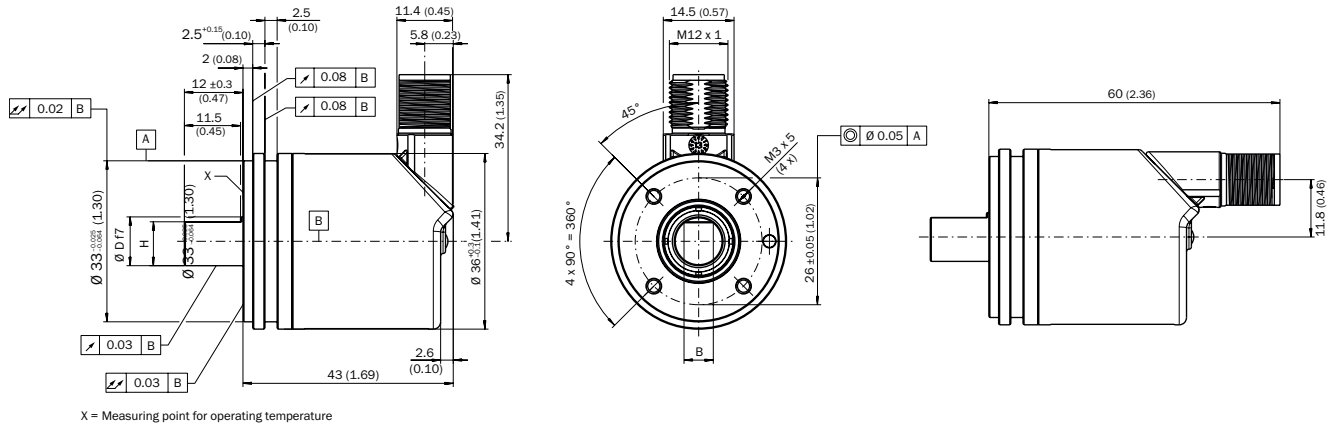
Solid shaft, servo flange, cable output

X = Measuring point for operating temperature
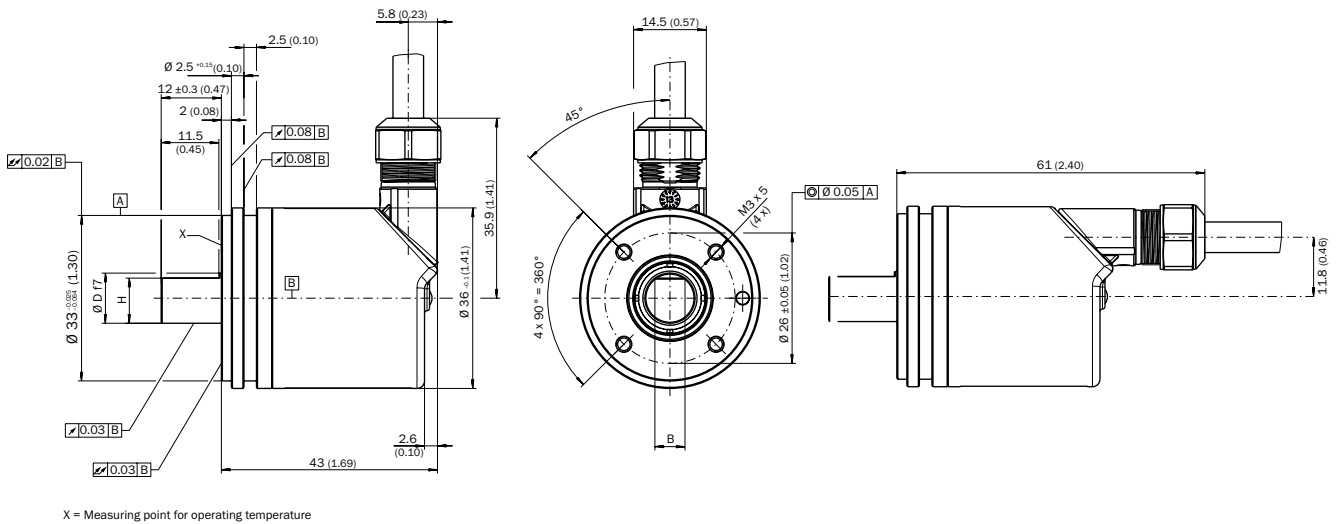
bending radius: R= 30 mm

Solid shaft, servo flange, for adaption on 1,25 m Ecoline wire draw mechanic, mechanical interface SD

X = Measuring point for operating temperature
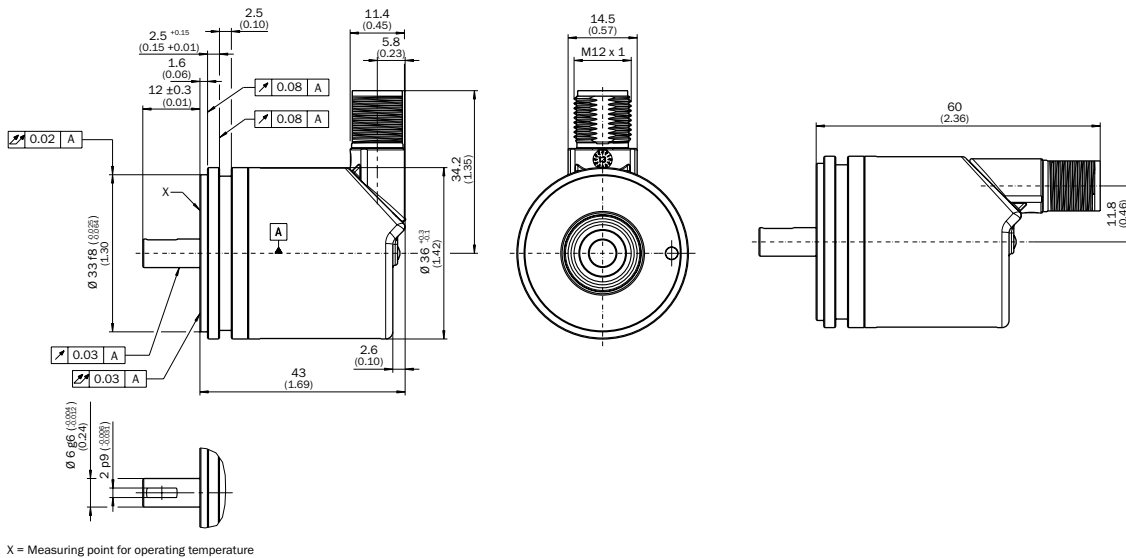
Solid shaft, face mount flange, M12 male connector
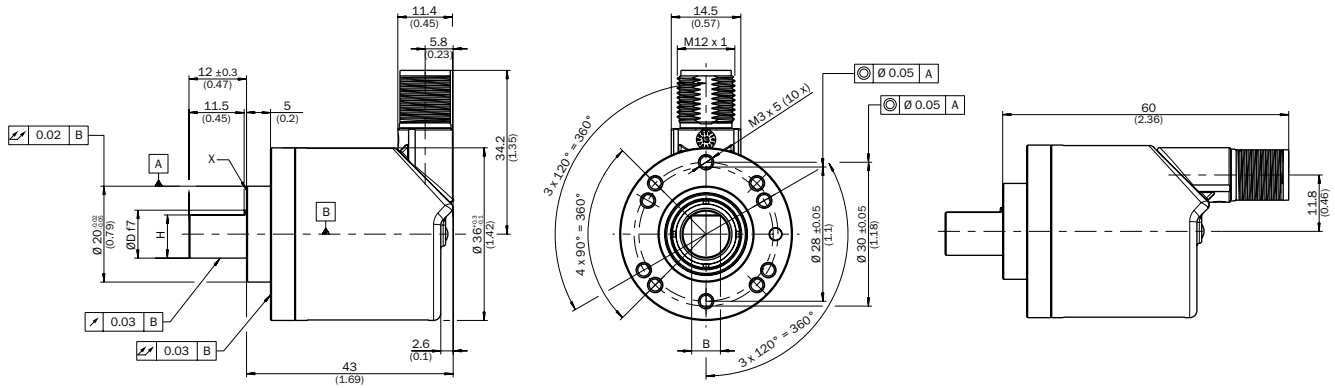
X = Measuring point for operating temperature

Solid shaft, face mount flange, cable output
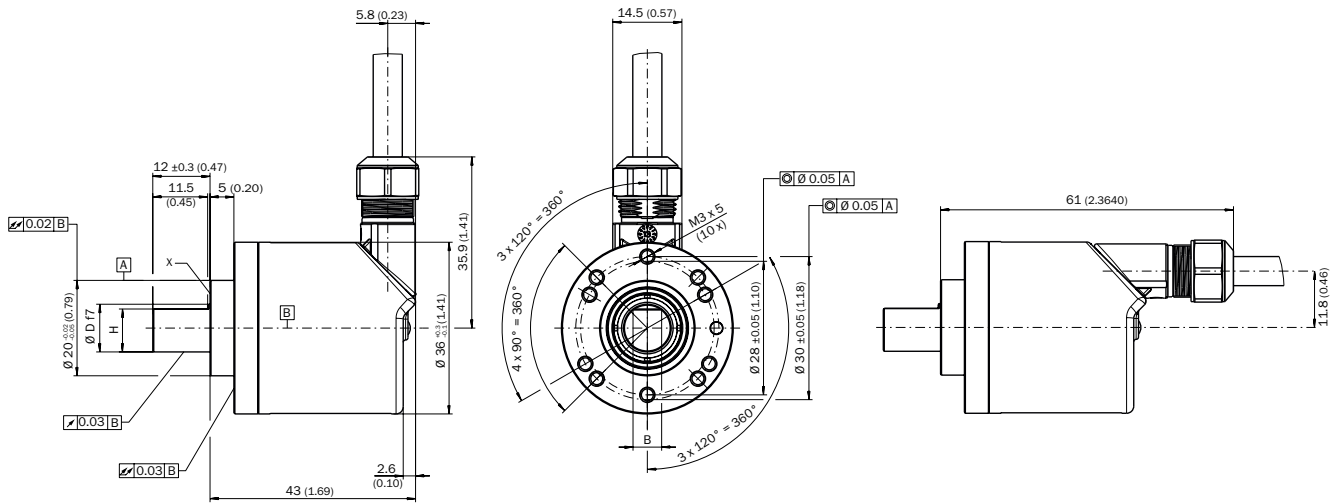
X = Measuring point for operating temperature

bending radius: R= 30 mm

Blind hollow shaft, M12 male connector
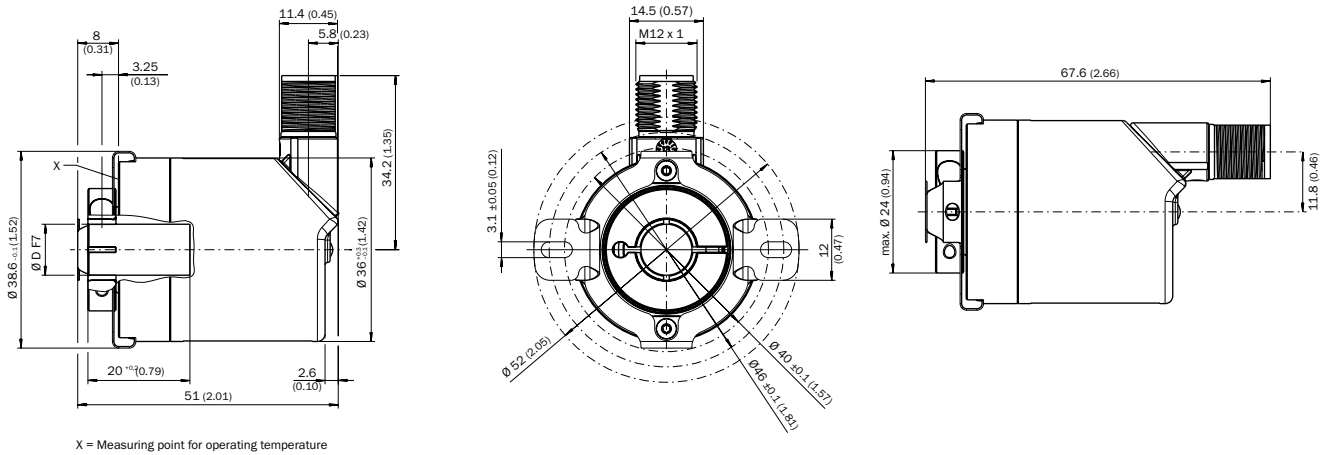
X = Measuring point for operating temperature

Customer-side shaft: Insertion depth min.15 mm ... max. 22 mm from contact surface stator coupling, recommended shaft-fitting: k7

Blind hollow shaft, cable output

X = Measuring point for operating temperature
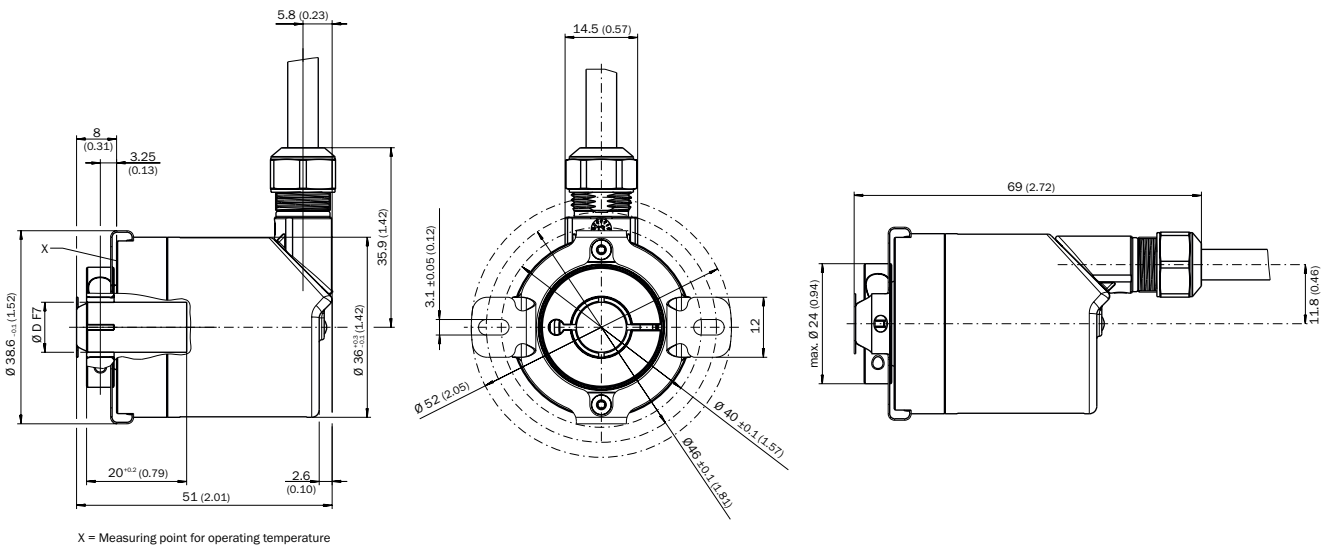
bending radius: R= 30 mm

Customer-side shaft: Insertion depth min.15 mm ... max. 22 mm from contact surface stator coupling, recommended shaft-fitting: k7

Proposed fitting

Solid shaft, face mount flange with flange adapter, centering collar D20 on D50 (BEF-FA-020-050, 2072297)
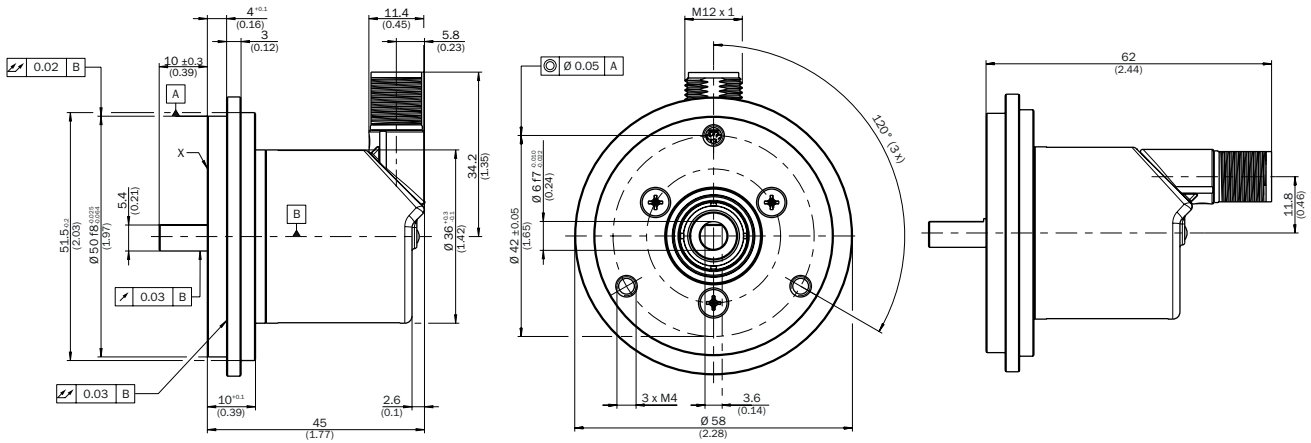
X = Measuring point for operating temperature

Ordering example for shaft diameter 6 mm: AHx36x-S3xx0xxxxx + BEF-FA-020-050 (adapter is not pre-mounted)

Solid shaft, face mount flange with flange adapter, centering collar D20 on D36 (BEF-FA-020-036, 2072298)
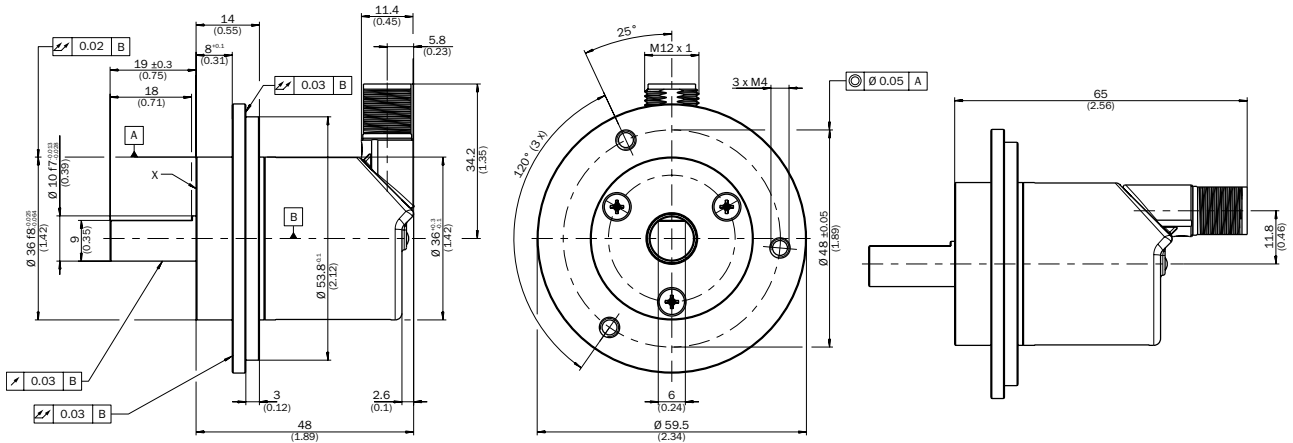
X = Measuring point for operating temperature

Ordering example for shaft diameter 10 mm: AHx36x-SCxx0xxxxx + BEF-FA-020-036 (adapter is not pre-mounted)

Solid shaft, face mount flange with flange adapter, centering collar D20 on D36, 2 mm high (BEF-FA-020-036-002, 2072296)
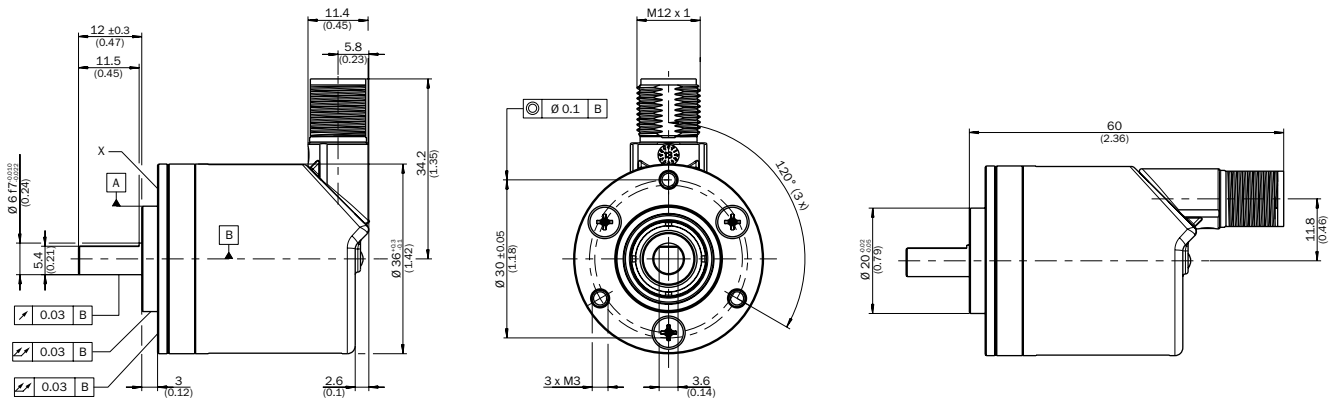
X = Measuring point for operating temperature

Ordering example for shaft diameter 6 mm: AHx36x-S3xx0xxxxx + BEF-FA-020-036-002 (adapter is not pre-mounted)

Solid shaft, face mount flange with flange adapter, centering collar D20 on D30 (BEF-FA-020-024, 2072294)
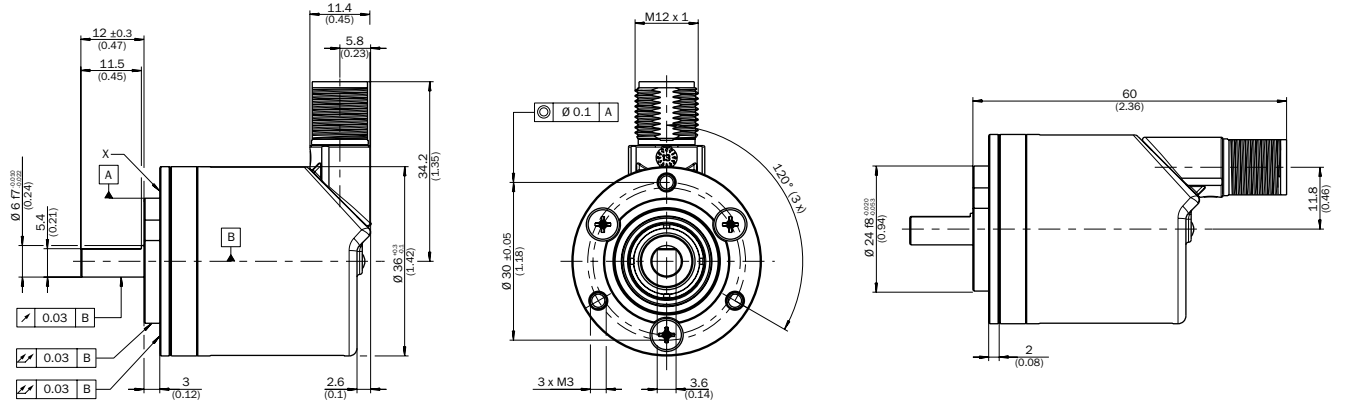
X = Measuring point for operating temperature

Ordering example for shaft diameter 6 mm: AHx36x-S3xx0xxxxx + BEF-FA-020-024 (adapter is not pre-mounted)

Solid shaft, face mount flange with flange adapter, centering collar D20 on D30 (BEF-FA-020-030, 2072295)
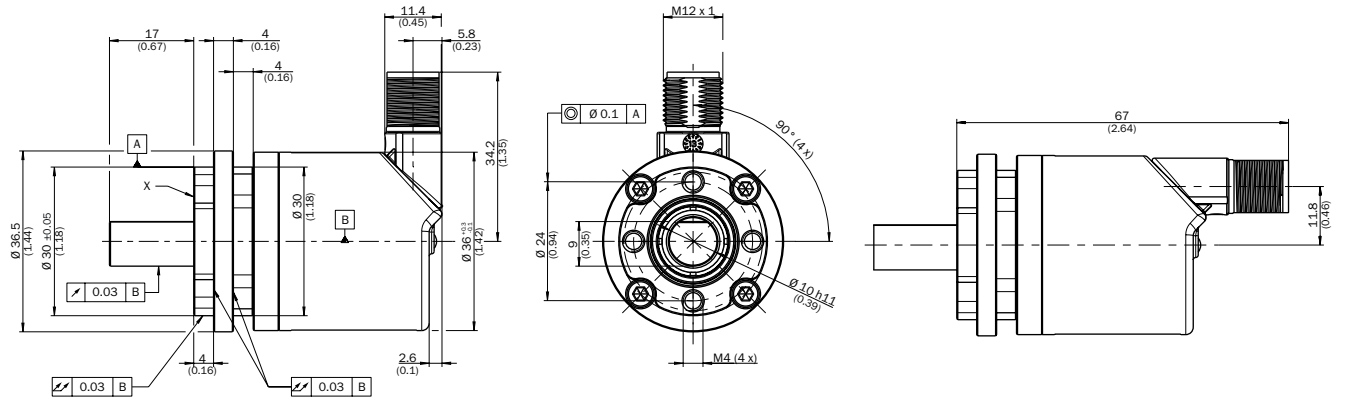
X = Measuring point for operating temperature

Ordering example for shaft diameter 10 mm: AHx36x-SCxx0xxxxx + BEF-FA-020-030 (adapter is not pre-mounted)

PIN assignment

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.

Male connector M12 of the encoder
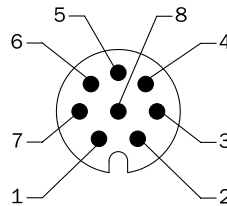
$V/\overline{R}$ Forwards / Reverse: This input programs the counting direction for the encoder. When it is not connected, this input is set to HIGH. If the encoder shaft is rotated clockwise (to the right) as viewed when facing the shaft, it counts in ascending order. If it should count in ascending 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.

Singleturn signal outputs

Singleturn SSI data format
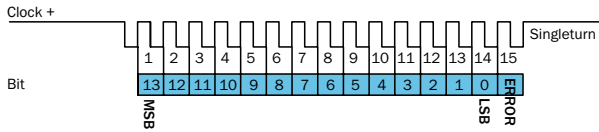
Cycle 1–14: position bits
Cycle 15: errorbit

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. On encoders that are not programmable, the error bit is always output as bit number 15. On programmable encoders, it can also be output "fixed" as bit number 15 or "directly added" 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 error bits 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 operate in asynchronous SSI mode.
Asynchronous and synchronous SSI modes can be selected for programmable encoders using the programming interface. Asynchronous SSI mode is selected as the default setting.

Asynchronous SSI mode:
The position is formed on a constant basis every 125 µs and made available. The time at which the position is calculated is not linked to the master's clock. In asynchronous mode, the interval between two pulse trains must be of a constant equal length, with a maximum variance of +/- 20%, and may not be longer than 600 ms.

Synchronous SSI mode:
The position is formed synchronously to the master's clock output, i.e., the position values at any one point are temporally linked to the master's clock.
The position forming begins 20 µs after the last clock pulse of a pulse train and is then made available after 125 µs. The position is then formed again 20 µs after the previous pulse train. The interval between two pulse train 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.
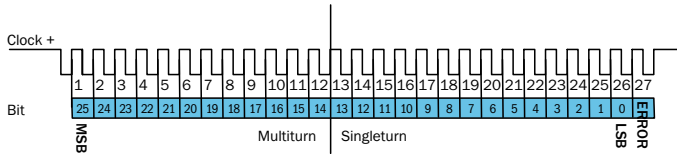
Operating mode: binary
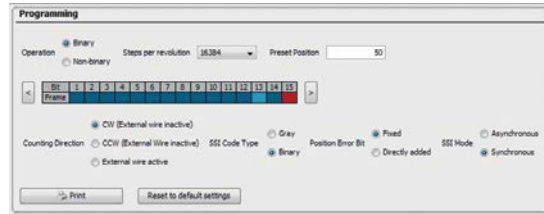
Operating mode: non binary
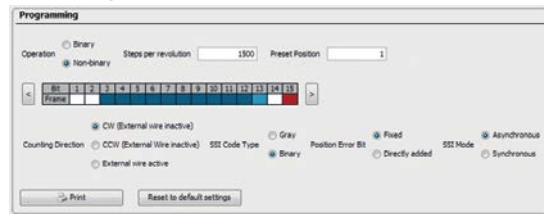
Multiturn signal outputs

Multiturn SSI data format

Cycle 1-12: multi-turn position bits
Cycle 13-26: single-turn 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. On encoders that are not programmable, the error bit is always output as bit number 27. On programmable encoders, it can also be output "fixed" as bit number 27 or "directly added" 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 error bits 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.

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 2^n 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.

SSI mode:

Non-programmable encoders operate in asynchronous SSI mode.
Asynchronous and synchronous SSI modes can be selected for programmable encoders using the programming interface. Asynchronous SSI mode is selected as the default setting.

Asynchronous SSI mode:
The position is formed on a constant basis every 125 µs and made available. The time at which the position is calculated is not linked to the master's clock. In asynchronous mode, the interval between two pulse trains must be of a constant equal length, with a maximum variance of +/- 20%, and may not be longer than 600 ms.

Synchronous SSI mode:
The position is formed synchronously to the master's clock output, i.e., the position values at any one point are temporally linked to the master's clock.
The position forming begins 20 µs after the last clock pulse of a pulse train and is then made available after 125 µs. The position is then formed again 20 µs after the previous pulse train. The interval between two pulse train must be at least 150 µs. Programming interface and legend.

Multiturn signal outputs

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

Programming

Operation	○ Binary	Steps per revolution	16384
	○ Non-binary	Number of revolutions	4096
	○ Round Axis	Total measuring range	67108864	Preset Position	1

Bit Frame: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

Counting Direction
○ CW (External wire inactive)
○ CCW (External Wire inactive)
○ External wire active

SSI Code Type
○ Gray
○ Binary

Position Error Bit
○ Fixed
○ Directly added

SSI Mode
○ Asynchronous
○ Synchronous

[Print] [Reset to default settings]

Operating mode: non binary

Programming

Operation Mode
○ Binary
○ Non-binary
○ Round Axis

Scaling Parameter
Steps per revolution: 3000
Number of revolutions: 15
Total measuring range: 45000   Preset Position: 1500

Clock Bit: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

Counting Direction
○ CW (Encoder wire/pin inactive)
○ CCW (Encoder wire/pin inactive)
○ Encoder wire/pin active

SSI Code Type
○ Gray
○ Binary

Position Error Bit
○ Fixed
○ Directly added

SSI Mode
○ Asynchronous
○ Synchronous

[Print] [Reset to default settings]

Operating mode: rotary axis

Programming

Operation Mode
○ Binary
○ Non-binary
○ Round Axis

Scaling Parameter
Number of revolutions Numerator: 50
Number of revolutions Denominator: 4   = 12.5 Number of revolutions
Total measuring range: 100   = 8   Steps per revolution   Preset Position: 1

Clock Bit: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Counting Direction
○ CW (Encoder wire/pin inactive)
○ CCW (Encoder wire/pin inactive)
○ Encoder wire/pin active

SSI Code Type
○ Gray
○ Binary

Position Error Bit
○ Fixed
○ Directly added

SSI Mode
○ Asynchronous
○ Synchronous

[Print] [Reset to default settings]

Accessories

Connection Technology

Plug connectors and cables

Figure	Brief description	Model name	Part no.
	Connecting cable, screened, 2 m	DOL-1208-G02MAC1	6032866
	Connecting cable, screened, 5 m	DOL-1208-G05MAC1	6032867
	Connecting cable, screened, 10 m	DOL-1208-G10MAC1	6032868
	Connecting cable, screened, 20 m	DOL-1208-G20MAC1	6032869
	Female connector, M12, 8-pin, straight, A-coded, -, incremental, SSI, screened	DOS-1208-GA01	6045001
	Female connector, M23, 12-pin, straight, -, HIPERFACE®, SSI, incremental, screened	DOS-2312-G	6027538
	Data cable by the meter 4 x 2 x 0.15 mm² with shielding, diam. 5.6 mm	LTG-2308-MWENC	6027529
	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, UV and salt water resistant, diam. 7.8 mm	LTG-2612-MW	6028516
	Male connector, M12, 8-pin, straight, A-coded, -, incremental, screened	STE-1208-GA01	6044892
	Male connector, M23, 12-pin, straight, -, HIPERFACE®, SSI, incremental, RS-422, screened	STE-2312-G	6027537

Mounting systems
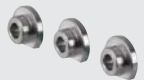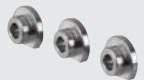
Mounting brackets/plates

Figure	Brief description	Model name	Part no.
	Mounting angle including mounting kit for face mount flange included	BEF-WF-20	2066393

Flanges

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

Other mounting accessories

Figure	Brief description	Model name	Part no.
	Measuring wheel, circumference 0.2 m, hole ø 6 mm, surface O-ring NBR70	BEF-MR006020R	2055222
	Measuring wheel, circumference 0.3 m, hole ø 6 mm, surface O-ring NBR70	BEF-MR006030R	2055634
	O-ring for measuring wheels (circumference 200 mm) with O-ring	BEF-OR-053-040	2064061
	O-ring for measuring wheels (circumference 300 mm) with O-ring	BEF-OR-083-05	2064076
	Servo clamps, small, for servo flange (clamps, eccenter fastener), (3 pcs.), without fastening material	BEF-WK-RESOL	2039082

Shaft adaptation

Figure	Brief description	Model name	Part no.
	Bellows coupling, shaft diameter 6 mm/6 mm	KUP-0606-B	5312981
	Bellows coupling, shaft diameter 6 mm/10 mm	KUP-0610-B	5312982
	Double loop coupling, shaft diameter 6 mm/10 mm	KUP-0610-D	5326697
	Spring disc coupling, shaft diameter 6 mm/10 mm	KUP-0610-F	5312985
	Double loop coupling, shaft diameter 8 mm/10 mm	KUP-0810-D	5326704
	Bellows coupling, shaft diameter 10 mm/10 mm	KUP-1010-B	5312983
	Double loop coupling, shaft diameter 10 mm/10 mm	KUP-1010-D	5326703
	Spring disc coupling, shaft diameter 10 mm/10 mm	KUP-1010-F	5312986
	Bellows coupling, shaft diameter 10 mm/12 mm	KUP-1012-B	5312984
	Double loop coupling, shaft diameter 10 mm/12 mm	KUP-1012-D	5326702

Other accessories

Programming and configuration tools

Figure	Brief description	Model name	Part no.
	Programming unit USB, for programmable SICK Encoders AHS36, AHM36, AFS60, AFM60, DFS60, VFS60, DFV60 and wire draw encoders with programmable encoder.	PGT-08-S	1036616
	Male connector, D-Sub, 9-pin, straight, female connector, M12, 8-pin, straight, SSI PUR, halogen free, screened, 0.5 m	DSL-2D08-G0M5AC2	2048439
	Male connector, D-Sub, 9-pin, straight, female connector, M23, 12-pin, straight, SSI, suitable for drag chain, PUR, halogen free, screened, 0.5 m	DSL-3D08-G0M5AC2	2048440

Dimensional drawings for connections, plug connectors and cables

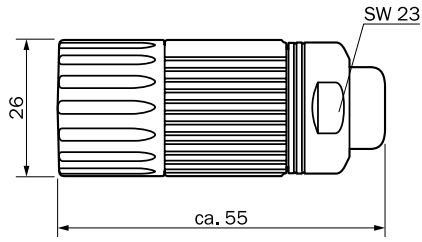DOL-1208-G02MAC1
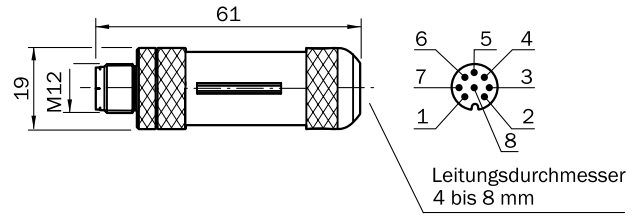DOL-1208-G05MAC1
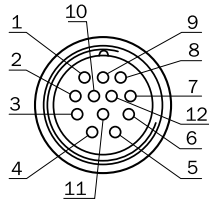DOL-1208-G10MAC1
DOL-1208-G20MAC1
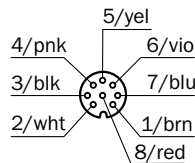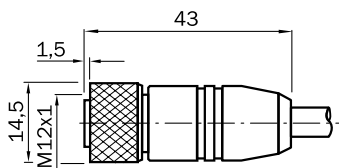
DOS-1208-GA01

Alle Maße in mm

DOS-2312-G
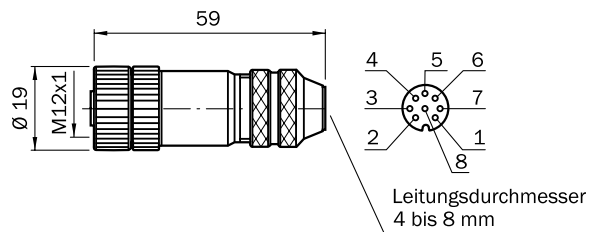
STE-1208-GA01

SW 23

26

ca. 55

9
10
1
8
2
7
3
12
6
4
5
11

61

19
M12

6
5
4
7
3
1
2
8

Leitungsdurchmesser
4 bis 8 mm

STE-2312-G

25

58

1
10
9
2
8
3
7
12
4
6
5
11
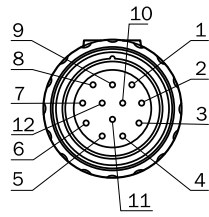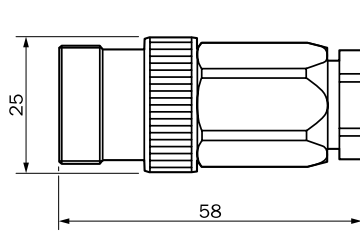
Dimensional drawings for mounting systems, mounting bracket/plates

BEF-WF-20

A

2 x 45°

Ø 33,5 +0,1

45

120°

A

6

3 x Ø 4,2 ±0,1

Ø 25 H8
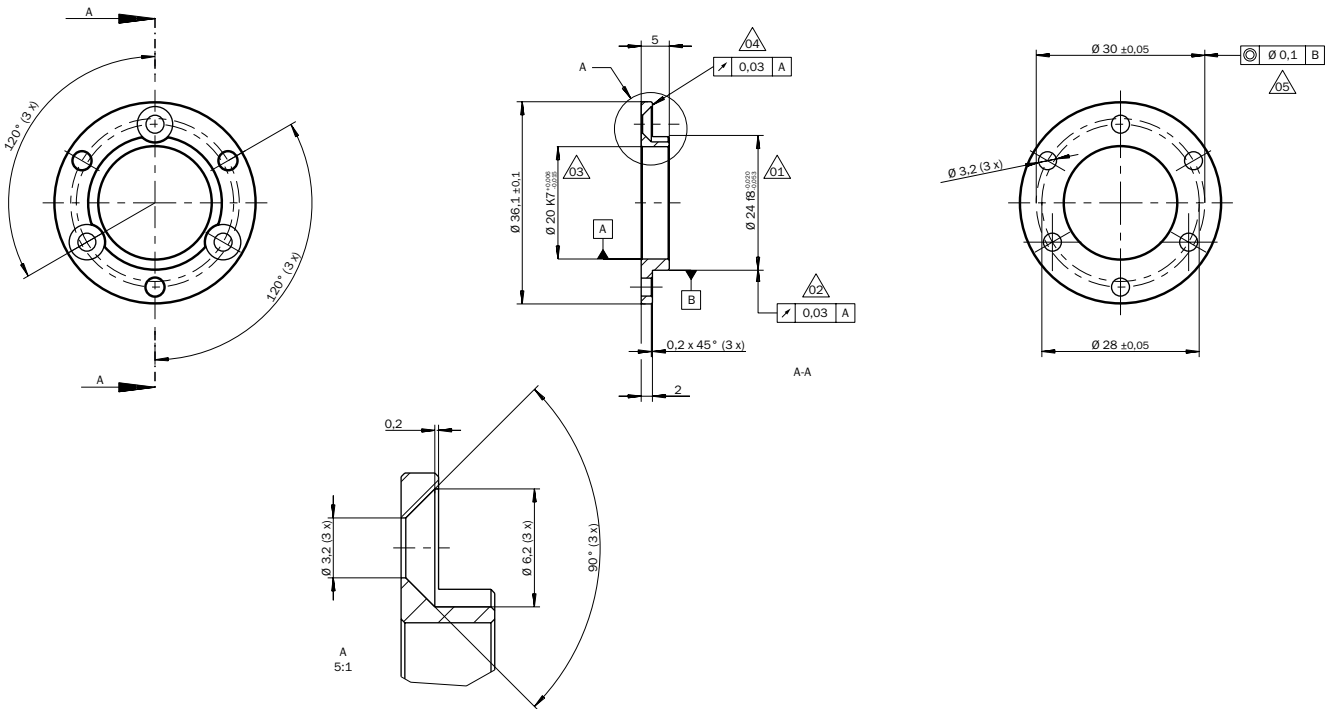
Ø 8 +0,1

72

45°

40

A-A

35

Ø 7 +0,1

22

60
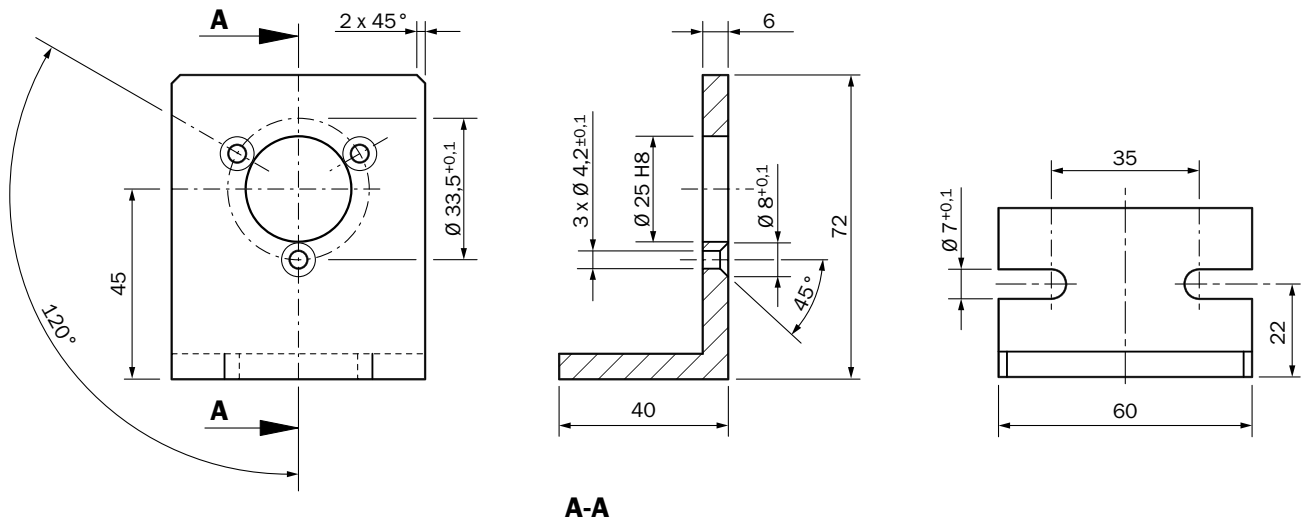
Dimensional drawings for mounting systems, flange
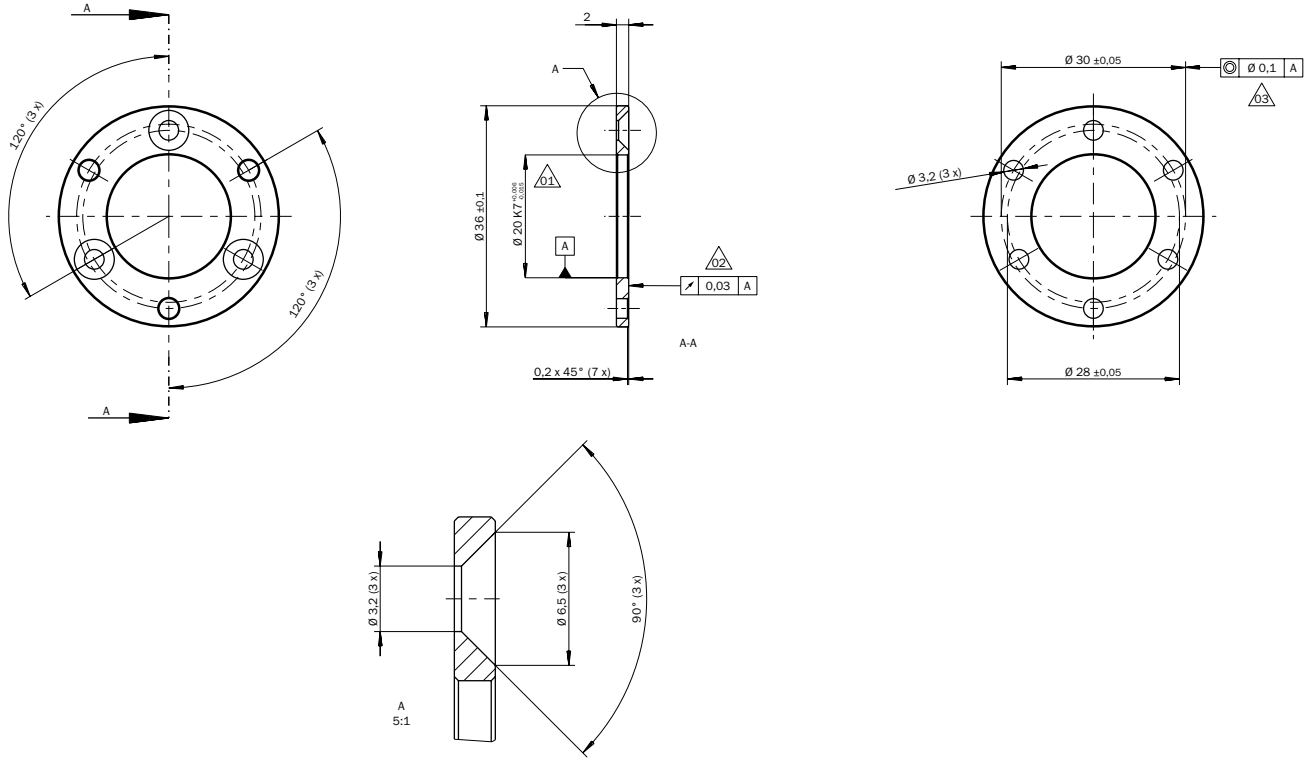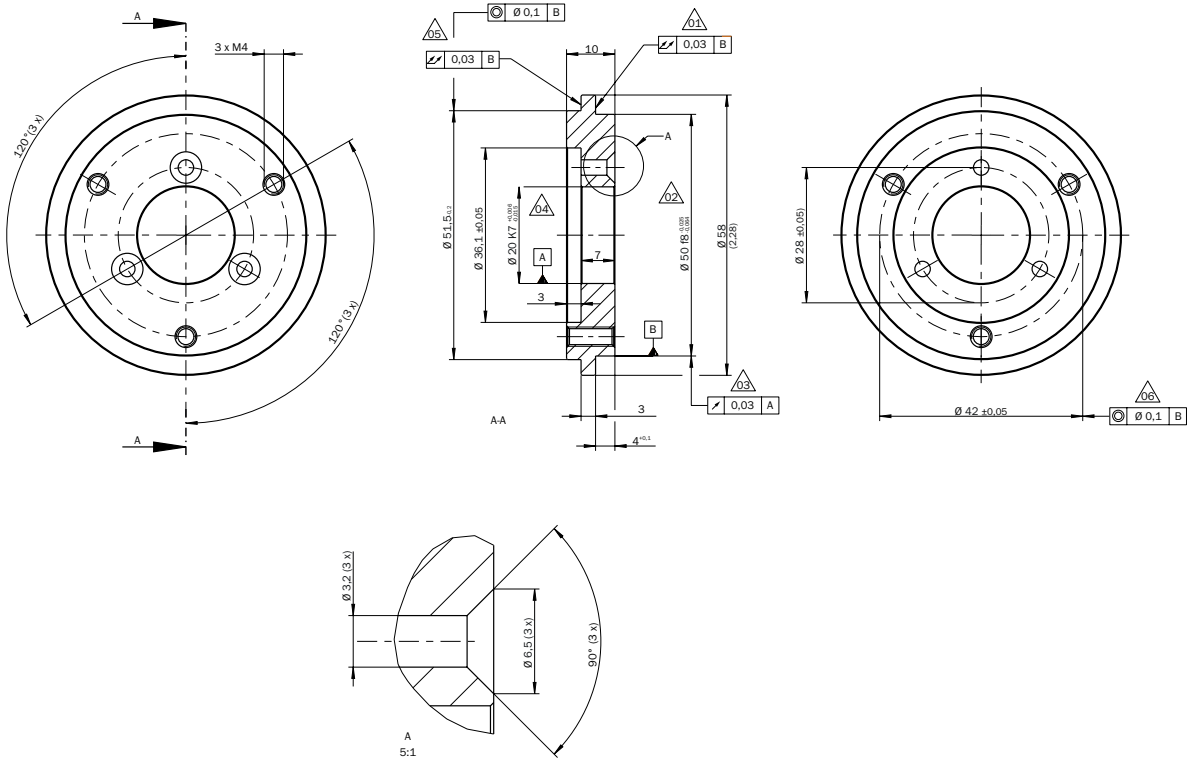
BEF-DS08
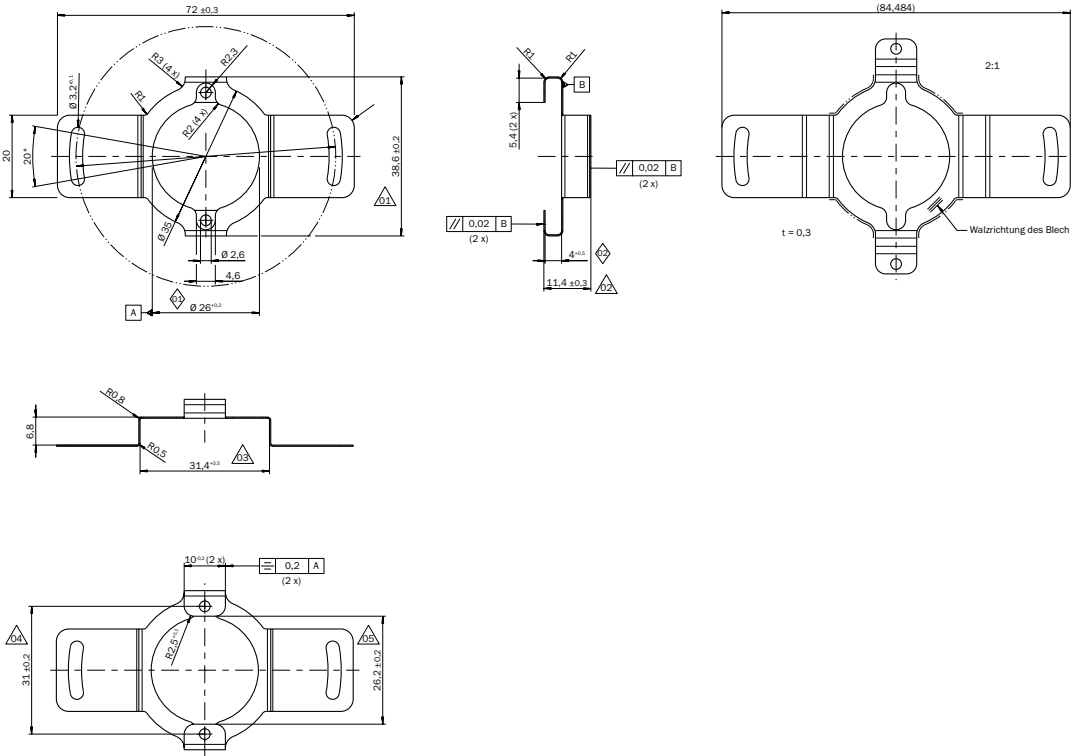
### BEF-FA-020-024

BEF-FA-020-030
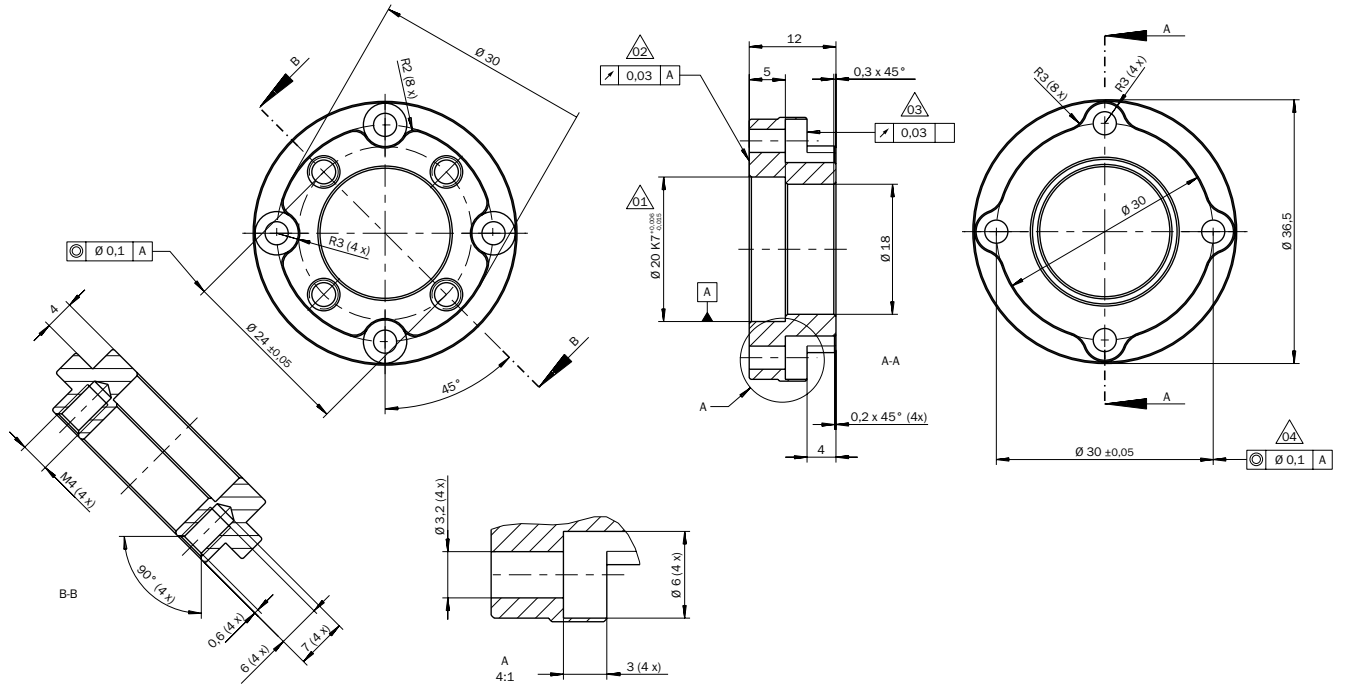
BEF-FA-020-036

BEF-FA-020-036-002

Ø 30 ±0,05

Ø 0,1 | A

2

Ø 36 ±0,1

Ø 20 K7 $^{-0,006}_{-0,035}$

01

A

02

0,03 | A

A-A

0,2 x 45° (7 x)

120° (3 x)

120° (3 x)

Ø 3,2 (3 x)

Ø 28 ±0,05

Ø 3,2 (3 x)

Ø 6,5 (3 x)

90° (3 x)

A
5:1

BEF-FA-020-050

3 x M4

Ø 0,1 | B

05

0,03 | B

10

0,03 | B

01

Ø 51,5±0,2

Ø 36,1 ±0,05

Ø 20 K7 $^{-0,006}_{-0,035}$

04

A

02

Ø 50 f8 $^{-0,025}_{-0,089}$

Ø 58
(2,28)

7

3

A

B

3

0,03 | A

03

4 $^{+0,1}$

A-A

120° (3 x)

120° (3 x)

Ø 28 ±(0,05)

Ø 42 ±0,05

06

Ø 0,1 | B

Ø 3,2 (3 x)

Ø 6,5 (3 x)
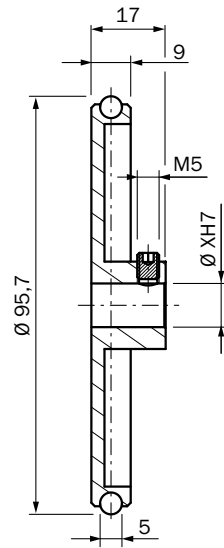
90° (3 x)

A
5:1
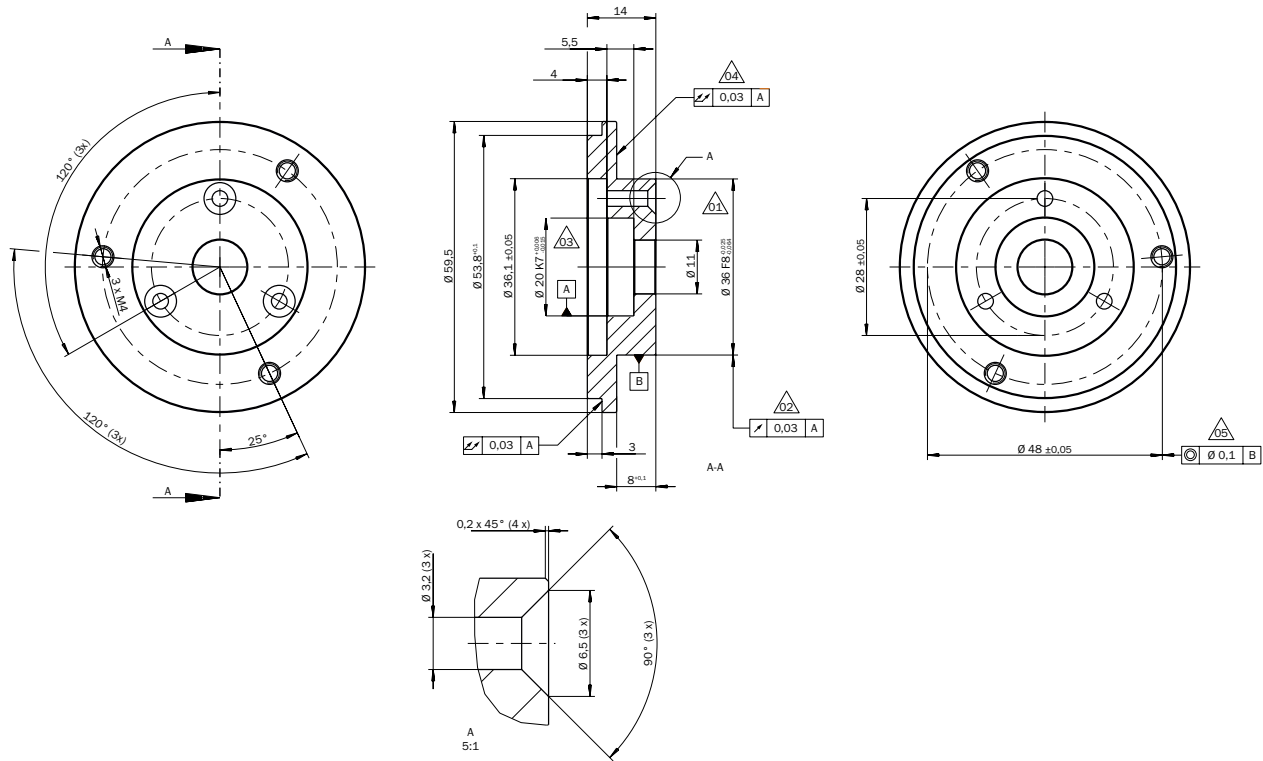
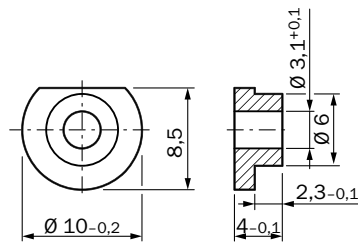## Dimensional drawings for mounting systems, other mounting accessories

BEF-MR006020R
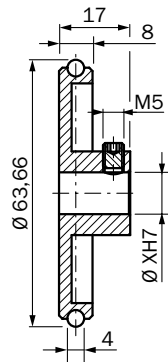
BEF-MR006030R
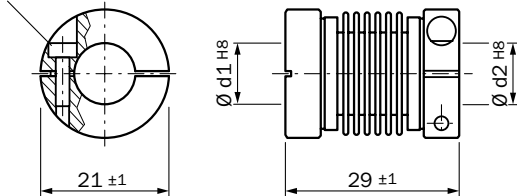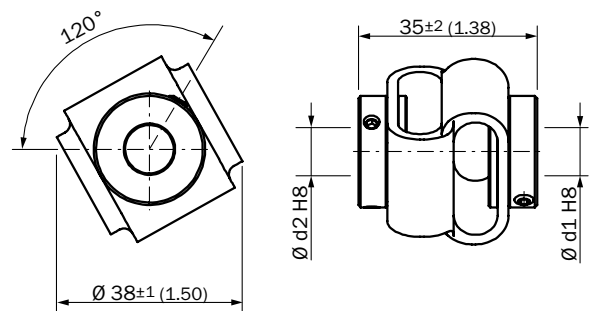
BEF-WK-RESOL

Dimensional drawings for mounting systems, shaft adaptation
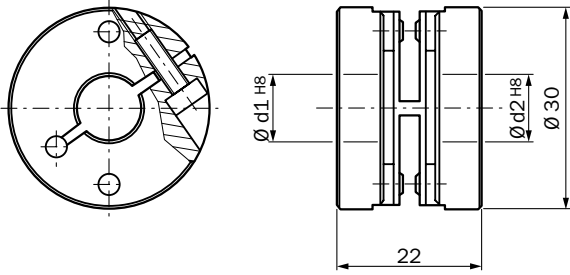
KUP-0606-B
KUP-0610-B
KUP-1010-B
KUP-1012-B

KUP-0610-D
KUP-0810-D
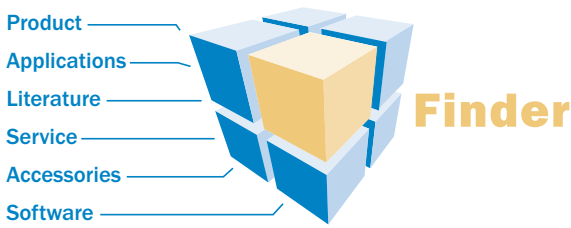KUP-1010-D
KUP-1012-D

Zylinderschraube
M2,5 x 8, DIN 912 A2

KUP-0610-F
KUP-1010-F

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