AFS60/AFM60 EtherCAT®
Absolute Encoders

Intelligent, powerful, precise

SICK

Sensor Intelligence.

LEDs talk Industrial Ethernet ...
Intelligent, powerful, precise

The trend in the market is increasingly moving towards Industrial Ethernet-based fieldbus systems – the rapid technical developments such as Fast Ethernet, dual-port switches and full-duplex transmission have turned the original Ethernet into a powerful communication system. The benefits of using Industrial Ethernet-based fieldbuses make these networks a future standard in factory, logistics and process automation.
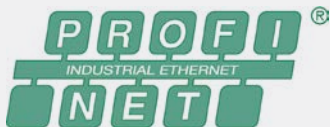
As a trendsetter, SICK has therefore added the three most popular Ethernet variants PROFINET, EtherCAT® and EtherNet/IP to its proven absolute single and multiturn encoders AFS60/AFM60. Extensive diagnostic functions offer here real added value:

- Maximum system availability via minimum/maximum values for position, velocity, temperature and operating hours counters
- Optimum work results thanks to precise positioning with optical 18-bit single turn resolution (multiturn total resolution: 30 bit)
- Visible security via status displaying using five Duo LEDs
- Cost savings during installation thanks to rotary axis function (resolution also for nonbinary and decimal values)

EtherCAT® is registered trademark and patent technology, licensed by Beckhoff Automation GmbH, Germany.

A face mount flange, servo flange and blind hollow shaft are available as mechanical interfaces for all three variants. Thanks to extensive accessories such as universal torque supports, couplings, mounting bells, diverse connector technology and much more, the encoders can be appropriately adapted to almost any application.

Intelligent, powerful, precise

Product description

Intelligent diagnostic functions and rapid on-the-fly data transfer: High-resolution AFS/AFM60 EtherCAT® absolute encoders represent high-precision measurement of absolute position and speed for applications in 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 modifica-tion 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 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 plug
- Up to 125 µs on-the-fly data transfer speed
- 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 and device identification

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

Additional information

→ www.mysick.com/en/AFS_AFM60_EtherCAT

For more information, just 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

Max. number of steps per revolution, AFS60 and AFM60	262,144 (18 bit) (Maximum speed consideration, see page 6)
Max. number of revolutions, AFM60	4,096 (12 bit)
Error limits	± 0.03°
Repeatability	± 0.002°
Cycle time	125 µs up to 100 ms

Interfaces

Bus interface	EtherCAT® COE (CIA DS-301)
Transmission rate	10/100 Mbit/s
Initialization time	Approx. 12 s
Transmission medium	CAT-5e cable
Round axis functionality	✔
Encoder device profile	CIA DS-406

Mechanical data

Operating speed [1]	
Solid shaft	9,000 min⁻¹ (Maximum speed consideration, see page 6)
Blind hollow shaft	6,000 min⁻¹ (Maximum speed consideration, see page 6)
Mass	0.2 kg
Max. shaft loading solid shaft	80 N (radial); 40 N (axial)
Permissible movement of the drive element, blind hollow shaft	± 0.3 / ± 0.05 mm (radial, static/dynamic) ± 0.5 / ± 0.1 mm (axial, static/dynamic)
Moment of inertia of the rotor	
Solid shaft	≤ 6.2 gcm²
Blind hollow shaft	≤ 40 gcm²
Bearing lifetime	3×10^9 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	5×10^5 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"
Material shaft	Stainless steel
Material flange	
Solid shaft	Aluminium
Blind hollow shaft AFM60	Aluminium
Blind hollow shaft AFS60	Zinc
Material housing	Aluminium

[1] Self-warming. 3.3 k/1,000 min⁻¹, when applying note working temperature.

Electrical data

Max. power consumption	3.0 W
Operating voltage range with inverse-polarity protection	10 ... 30 V

Ambient data

Protection class acc. IEC 60529	
Housing with mating connector fitted	IP 67 only with mating connector or sealing cap
Shaft	IP 65
Permissible relative humidity [1]	90 %
Working temperature range	–30 ... +85 °C
Storage temperature range (without packaging)	–40 ... +100 °C
Resistance	
to shocks (EN 60068-2-27)	100 g/6 ms
to vibration (EN 60068-2-6)	30 g/10 ... 2,000 Hz
EMC	EN 61000-6-2 and EN 61000-6-3

[1] Condensation of the optical scanning not permitted.

Maximum speed consideration

The maximum singleturn resolution (= 18 bit) can be operated with the respective maximum operating speed (hollow shaft 6,000 min^{-1} and solid shaft 9,000 min^{-1}).

Ordering information

Type code AFS Absolute Encoder Singleturn, solid shaft
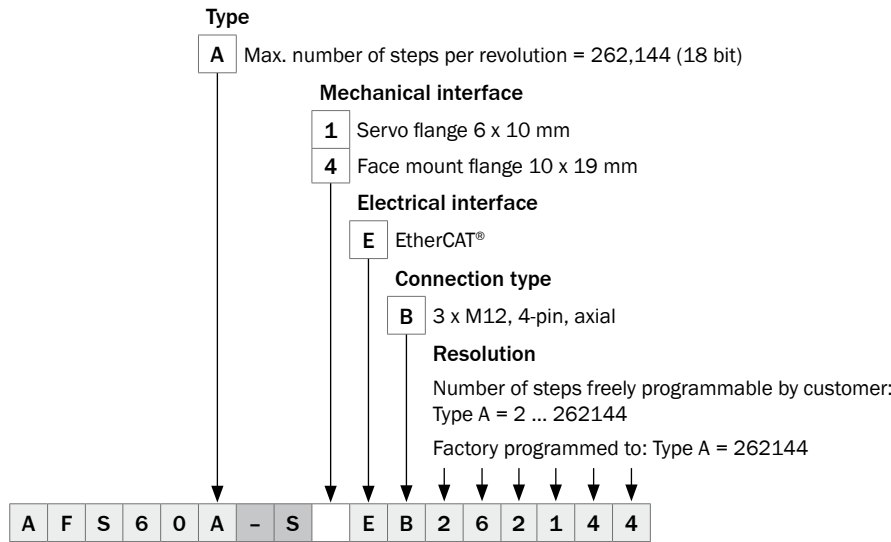
Type

A Max. number of steps per revolution = 262,144 (18 bit)

Mechanical interface

1 Servo flange 6 x 10 mm
4 Face mount flange 10 x 19 mm

Electrical interface

E EtherCAT®

Connection type

B 3 x M12, 4-pin, axial

Resolution

Number of steps freely programmable by customer:
Type A = 2 ... 262144

Factory programmed to: Type A = 262144

| A | F | S | 6 | 0 | A | – | S | | E | B | 2 | 6 | 2 | 1 | 4 | 4 |

Ordering examples

Mechanical interface	Model name	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 Absolute Encoder Multiturn, solid shaft
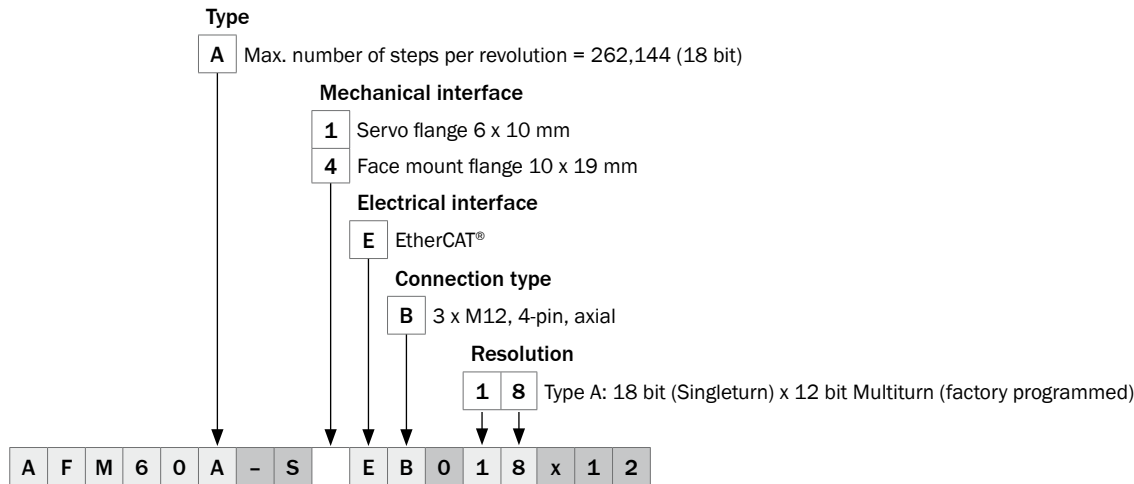
Type

A Max. number of steps per revolution = 262,144 (18 bit)

Mechanical interface

1 Servo flange 6 x 10 mm
4 Face mount flange 10 x 19 mm

Electrical interface

E EtherCAT®

Connection type

B 3 x M12, 4-pin, axial

Resolution

1 8 Type A: 18 bit (Singleturn) x 12 bit Multiturn (factory programmed)

| A | F | M | 6 | 0 | A | – | S | | E | B | 0 | 1 | 8 | x | 1 | 2 |

Ordering examples

Mechanical interface	Model name	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

Type code AFS Absolute Encoder Singleturn, blind hollow shaft

Type

| A | Max. number of steps per revolution = 262,144 (18 bit) |

Mechanical interface

B	Blind hollow shaft 8 mm
C	Blind hollow shaft 3/8"
D	Blind hollow shaft 10 mm
E	Blind hollow shaft 12 mm
F	Blind hollow shaft 1/2"
G	Blind hollow shaft 14 mm
H	Blind hollow shaft 15 mm
J	Blind hollow shaft 5/8"
K	Blind hollow shaft 1/4"

Electrical interface

| E | EtherCAT® |

Connection type

| B | 3 x M12, 4-pin, axial |

Resolution

Number of steps freely programmable by customer:
Type A = 2 ... 262144

Factory programmed to: Type A = 262144

| A | F | S | 6 | 0 | A | – | B | | E | B | 2 | 6 | 2 | 1 | 4 | 4 |

Ordering examples

Mechanical interface	Model name	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

Type code AFM Absolute Encoder Multiturn, blind hollow shaft

Type

| A | Max. number of steps per revolution = 262,144 (18 bit) |

Mechanical interface

B	Blind hollow shaft 8 mm
C	Blind hollow shaft 3/8"
D	Blind hollow shaft 10 mm
E	Blind hollow shaft 12 mm
F	Blind hollow shaft 1/2"
G	Blind hollow shaft 14 mm
H	Blind hollow shaft 15 mm
K	Blind hollow shaft 1/4"

Electrical interface

| E | EtherCAT® |

Connection type

| B | 3 x M12, 4-pin, axial |

Resolution

| 1 | 8 | Type A: 18 bit (Singleturn) x 12 bit Multiturn (factory programmed) |

| A | F | M | 6 | 0 | A | – | B | | E | B | 0 | 1 | 8 | x | 1 | 2 |
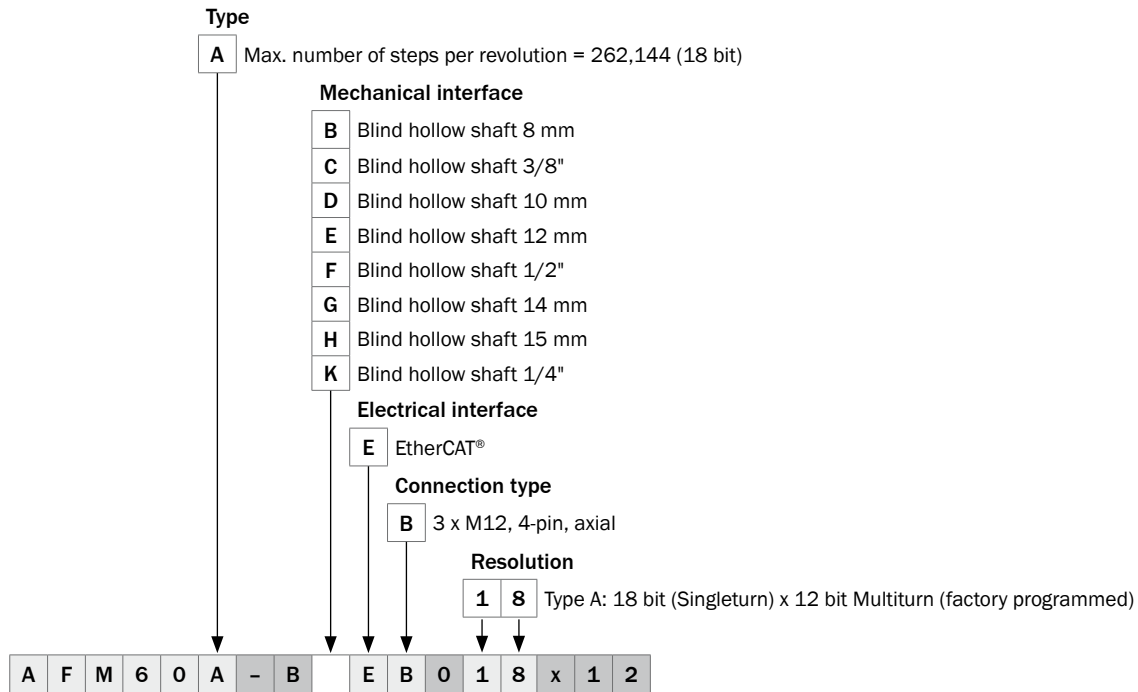
Ordering examples

Mechanical interface	Model name	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

Dimensional drawings

Face mount flange
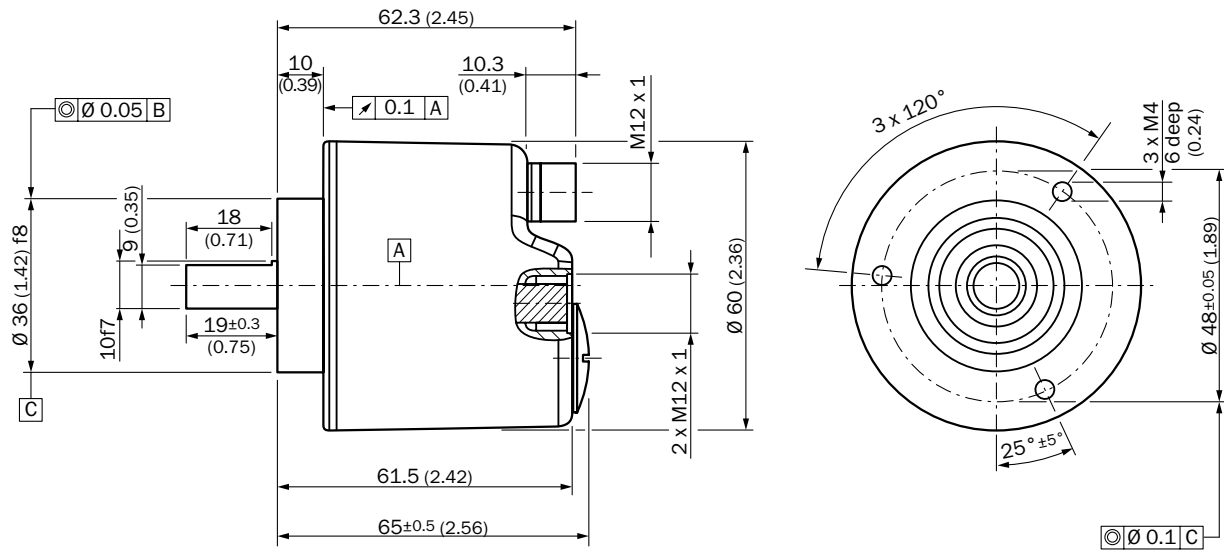
All dimensions in mm (inch)

Servo flange
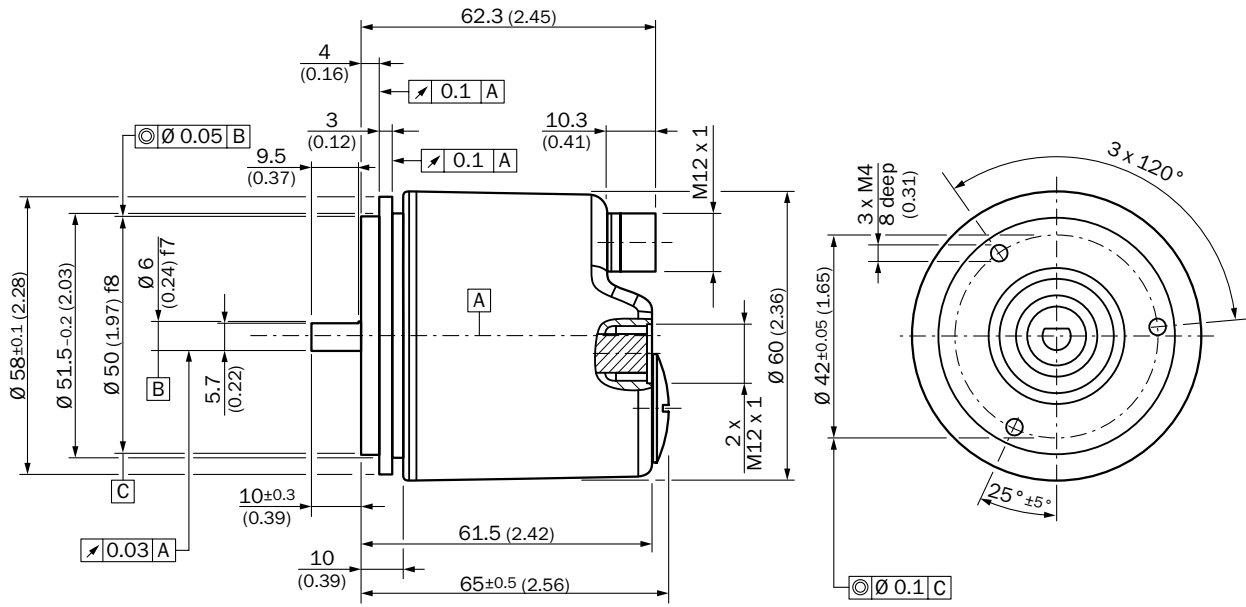
All dimensions in mm (inch)

Proposed customer fitting for servo clamp small (part no. 2029166)
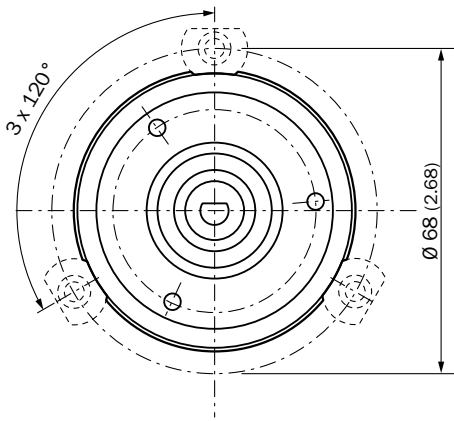
All dimensions in mm (inch)

Proposed customer fitting for servo clamp half-shell (part no. 2029165)
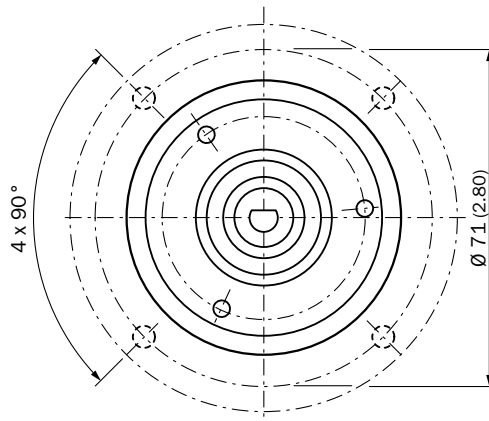
All dimensions in mm (inch)

Blind hollow shaft
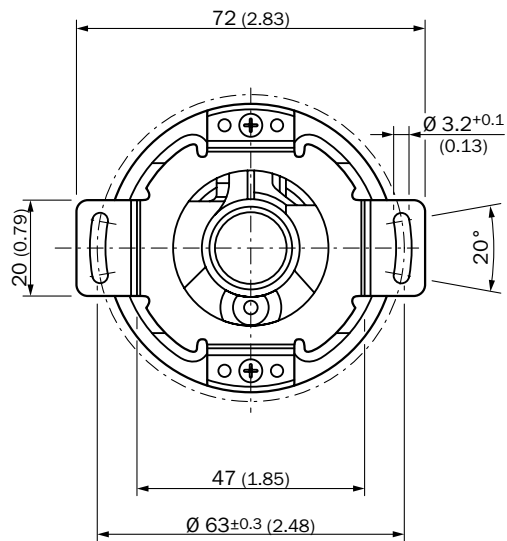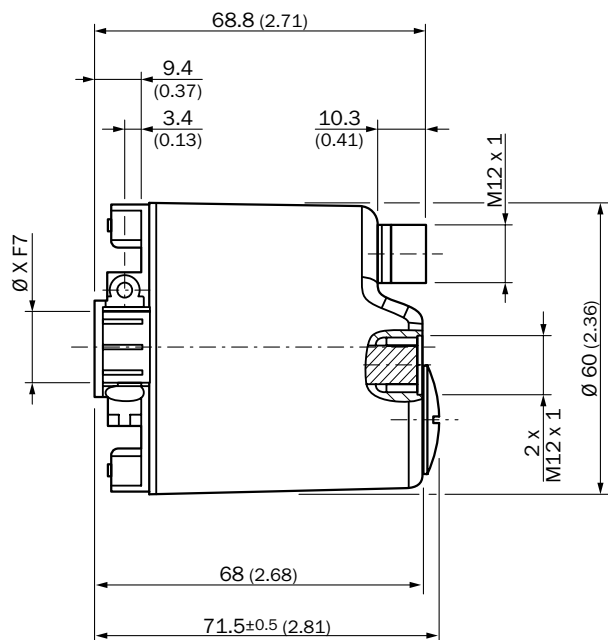
All dimensions in mm (inch)

Proposed customer fitting
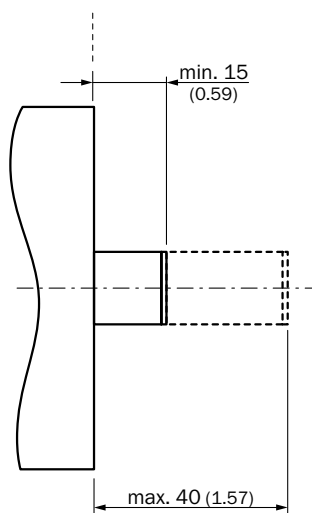
All dimensions in mm (inch)

Diameter X F7	
Absolute Encoder Singleturn AFS60	**Absolute Encoder Multiturn AFM60**
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 allocation

M12 – 4-pin (D coding)
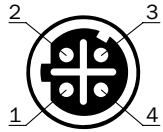
Port 1

Signal	T x D+	R x D+	T x D–	R x D–
Pin	1	2	3	4
Color wires	Yellow	White	Orange	Blue

Port 2

Signal	T x D+	R x D+	T x D–	R x D–
Pin	1	2	3	4
Color wires	Yellow	White	Orange	Blue

Decade switches: out of operation
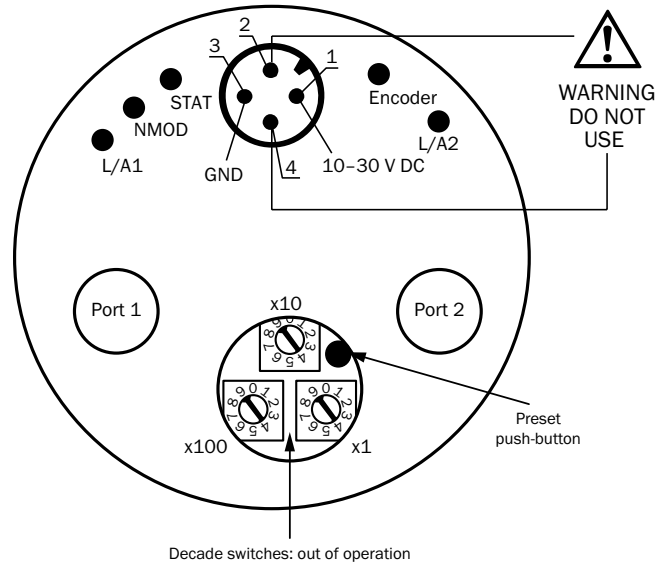
M12 – 4-pin (A coding)
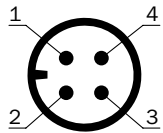
Power supply

Signal	U$_s$ 10 ... 30 V	Not connected	GND	Not connected
Pin	1	2	3	4
Color wires	Brown	White	Blue	Black

Sales kits

Sales kit 01

EtherCAT® encoder

- + Female connector power supply angled (DOS-1204-W, part no. 6007303)
- + Male connector EtherCAT®-signal angled (STE-1204-WZ, part no. 6048262)

Encoder type (singleturn)	Description	Model name	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	Model name	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 connector power supply angled, pre-wired with cable 5 m (DOL-1204-W05MC, part no. 6025904)
- + Male connector EtherCAT®-signal angled, pre-wired with cable 5 m (STL-1204-W05MZ90, part no. 6048257)

Encoder type (singleturn)	Description	Model name	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	Model name	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

Sales kit 03

EtherCAT® encoder

- + Female connector power supply angled (DOS-1204-W, part no. 6007303)
- + 2 male connectors EtherCAT®-signal angled (STE-1204-WZ, part no. 6048262)

Encoder type (singleturn)	Description	Model name	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	Model name	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 connector power supply angled, pre-wired with cable 5 m (DOL-1204-W05MC, part no.6025904)
- + 2 male connectors EtherCAT®-signal angled, pre-wired with cable 5 m (STL-1204-W05MZ90, part no. 6048257)

Encoder type (singleturn)	Description	Model name	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	Model name	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

Accessories

Plug connector and cables

	Data line
Mechanical characteristics	
Number of poles	4
Coding	D coding
Cable diameter	6.50 mm
Smallest bending radius, fixed installation	19.5 mm
Smallest bending radius, flexible installation	45.5 mm
Length of cable, between the participants max.	100 m
Material	
External sheath	PVC
Conductor	Tin-coated CU-litz wire
Color external sheath	Green RAL 6018
Electrical characteristics	
Transmission characteristics (category)	CAT5 (IEC 11801:2002), CAT5e (TIA 568B:2001)
Characteristics of cable	
Signal type	EtherCAT®
Cable structure	1x4xAWG22/7; SF/Q
Wire colors	White, yellow, blue, orange
Conductor cross section	0.34 mm^2
Conductor resistance	≤ 120 Ω/km
Shielding	Tinned copper braided shield
Temperature range	
Connector pre-wired with cable	
Fixed installation	–25 °C ... +60 °C
Flexible installation	–5 °C ... +50 °C
M12 connector	
Ambient temperature (operation)	–40 °C ... +85 °C
RJ45 connector	
Ambient temperature (operation)	–10 °C ... +60 °C
Special properties	
Flame resistance	In accordance with IEC 60332-1

Description	Cable length	Model name	Part no.
Round screw system M12 connector straight to M12 straight connector, shielded	2.0 m	SSL-1204-G02MZ90	6048241
	5.0 m	SSL-1204-G05MZ90	6048242
	10.0 m	SSL-1204-G10MZ90	6048243

SSL-1204-G02MZ90
SSL-1204-G05MZ90
SSL-1204-G10MZ90
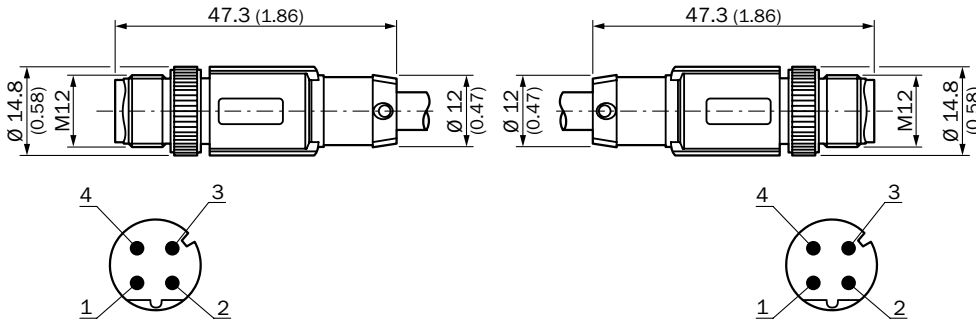
All dimensions in mm (inch)

Description	Cable length	Model name	Part no.
Round screw system M12 connector straight to RJ45 straight connector, shielded	2.0 m	SSL-2J04-G02MZ60	6048244
	5.0 m	SSL-2J04-G05MZ60	6048245
	10.0 m	SSL-2J04-G10MZ60	6048246

SSL-2J04-G02MZ60
SSL-2J04-G05MZ60
SSL-2J04-G10MZ60
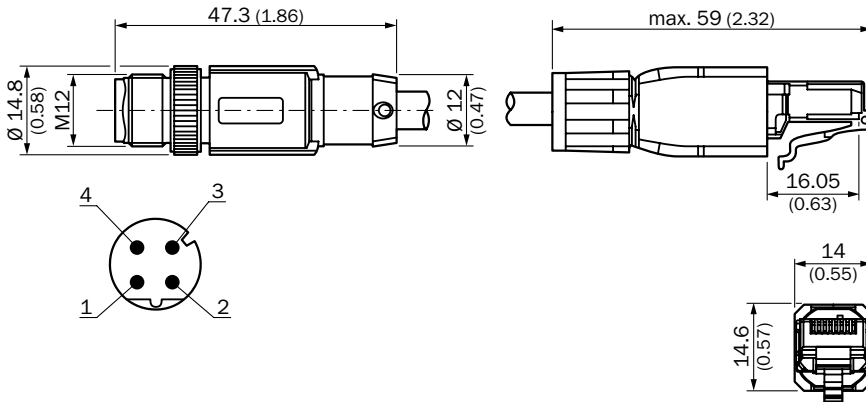
All dimensions in mm (inch)

Description	Cable length	Model name	Part no.
Round screw system M12 connector straight to open end, shielded	2.0 m	STL-1204-G02MZ90	6048247
	5.0 m	STL-1204-G05MZ90	6048248
	10.0 m	STL-1204-G10MZ90	6048249

STL-1204-G02MZ90
STL-1204-G05MZ90
STL-1204-G10MZ90
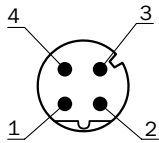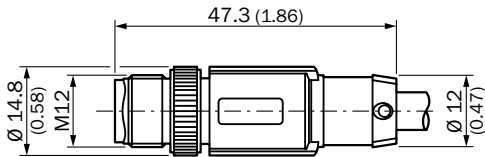
All dimensions in mm (inch)

Description	Cable length	Model name	Part no.
Round screw system M12 connector angled to M12 connector straight, shielded	2.0 m	SSL-1204-F02MZ90	6048250
	5.0 m	SSL-1204-F05MZ90	6048251
	10.0 m	SSL-1204-F10MZ90	6048252

SSL-1204-F02MZ90
SSL-1204-F05MZ90
SSL-1204-F10MZ90
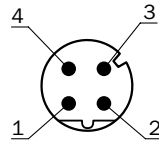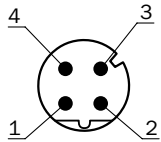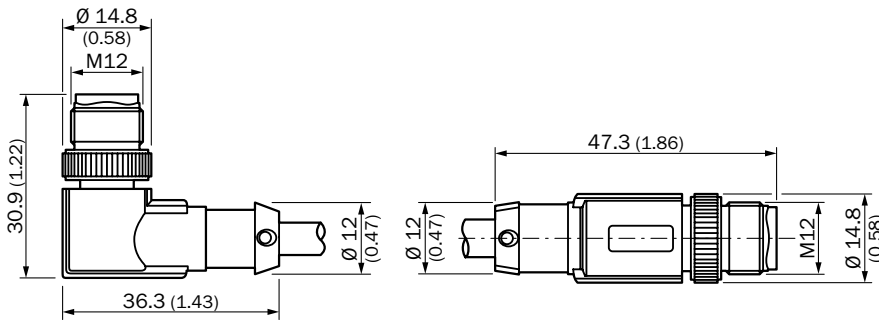
All dimensions in mm (inch)

Description	Cable length	Model name	Part no.
Round screw system M12 connector angled to RJ45 straight connector, shielded	2.0 m	SSL-2J04-F02MZ	6048253
	5.0 m	SSL-2J04-F05MZ	6048254
	10.0 m	SSL-2J04-F10MZ	6048255

SSL-2J04-F02MZ
SSL-2J04-F05MZ
SSL-2J04-F10MZ
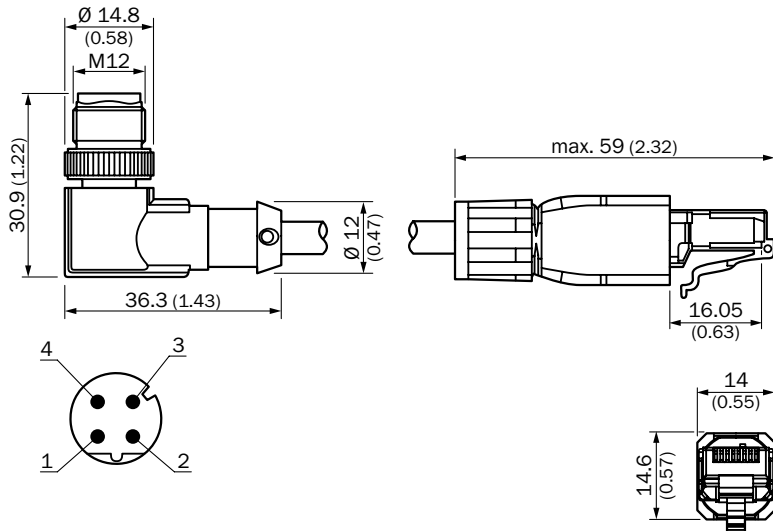
All dimensions in mm (inch)

Description	Cable length	Model name	Part no.
Round screw system M12 connector angled to open end, shielded	2.0 m	STL-1204-W02MZ90	6048256
	5.0 m	STL-1204-W05MZ90	6048257
	10.0 m	STL-1204-W10MZ90	6048258
	20.0 m	STL-1204-W25MZ90	6048259

STL-1204-W02MZ90
STL-1204-W05MZ90
STL-1204-W10MZ90
STL-1204-W25MZ90
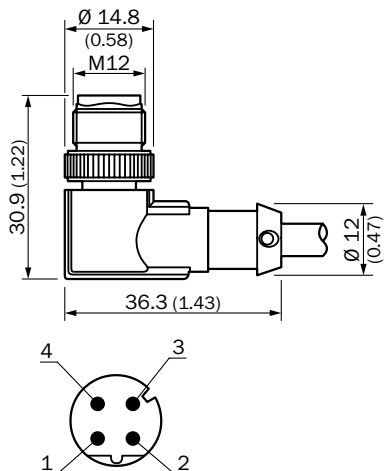
All dimensions in mm (inch)

Description	Contacts	Type of connector	Model name	Part no.
Round screw system M12 straight, screened	4	Male connector	STE-1204-GZ	6048261
		Female connector	DOS-1204-GZ	6048263

STE-1204-GZ
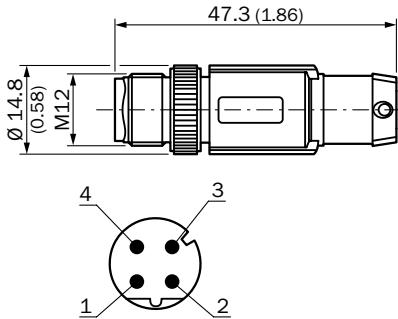
DOS-1204-GZ

All dimensions in mm (inch)
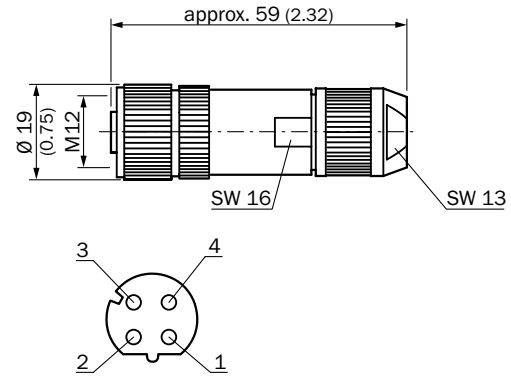
All dimensions in mm (inch)

Description	Contacts	Type of connector	Model name	Part no.
Round screw system M12, angled	4	Male connector	STE-1204-WZ	6048262
		Female connector	DOS-1204-WZ	6048264

STE-1204-WZ
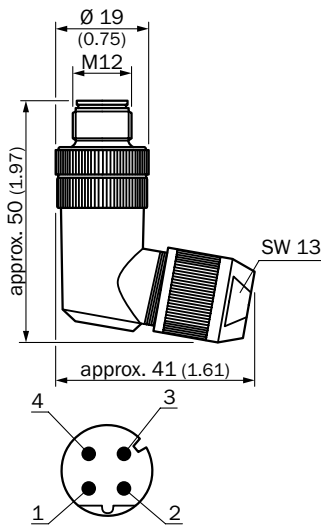
DOS-1204-WZ

All dimensions in mm (inch)
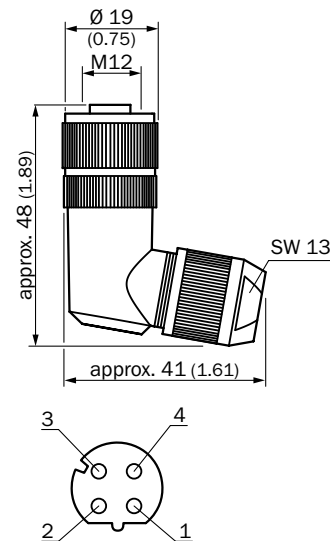
All dimensions in mm (inch)

RJ45 connector

Description	Contacts	Type of connector	Model name	Part no.
RJ45 connector	4	Male connector	STE-0J04-GZ	6048260

STE-0J04-GZ

max. 59 (2.32)

16.05 (0.63)

14 (0.55)

14.6 (0.57)

7 5 3 1
8 6 4 2

All dimensions in mm (inch)
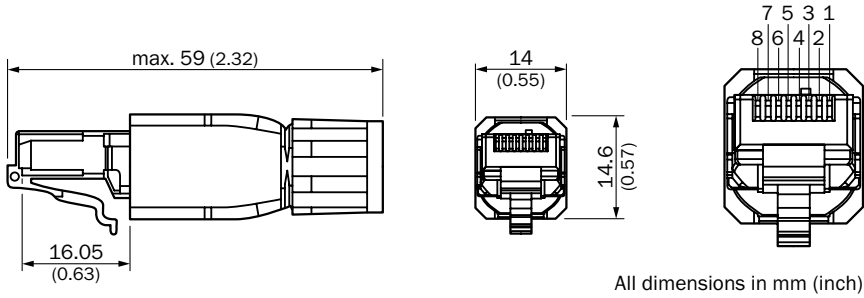
Power supply

	Power supply (A coding)
Mechanical characteristics	
Number of positions	4
External cable diameter	4.7 mm
Smallest bending radius, fixed installation	47 mm
Smallest bending radius, flexible installation	47 mm
Length of cable, between the participants max.	100 m
Material	
External sheath	PUR
Conductor	Bare Cu litz wires
External sheath, color	Black RAL 9005
Characteristics of cable	
AWG sense cable	22
Conductor cross section	0.34 mm^2
Wire colors	Brown, white, blue, black
Conductor resistance	≤ 58 Ω/km
Temperature range	
Fixed installation	−50 °C ... +80 °C
Flexible installation	−25 °C ... +80 °C
Special properties	
Flame resistance	UL Horizontal Flametest/CSA FT2
Halogen-free	PUR halogen-free
Microbe resistance	Excellent
Hydrolysis resistance	Excellent

Description	Cable length	Model name	Part no.
Round screw system M12 straight connector female on open end	2.0 m	DOL-1204-G02MC	6025900
	5.0 m	DOL-1204-G05MC	6025901
	10.0 m	DOL-1204-G10MC	6025902
	25.0 m	DOL-1204-G25MC	6034751

DOL-1204-G02MC
DOL-1204-G05MC
DOL-1204-G10MC
DOL-1204-G25MC

All dimensions in mm (inch)
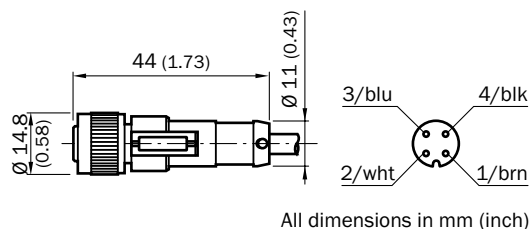
Description	Cable length	Model name	Part no.
Round screw system M12 angled connector female on open end	2.0 m	DOL-1204-W02MC	6025903
	5.0 m	DOL-1204-W05MC	6025904
	10.0 m	DOL-1204-W10MC	6025905
	25.0 m	DOL-1204-W25MC	6034754

DOL-1204-W02MC
DOL-1204-W05MC
DOL-1204-W10MC
DOL-1204-W25MC
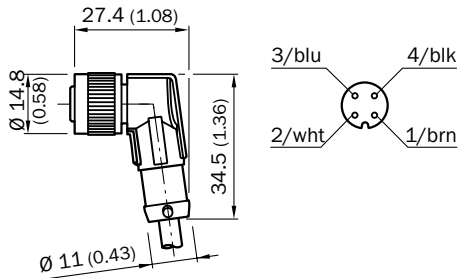
All dimensions in mm (inch)

Description	Model name	Part no.
Angled connector female M12, 4-pin, power supply	DOS-1204-W	6007303

DOS-1204-W
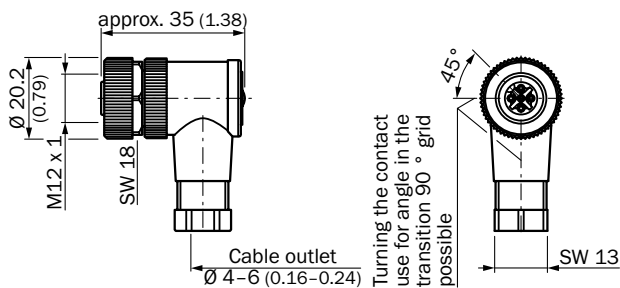
All dimensions in mm (inch)

Connector for wall mounting RJ45 on M12

Description	Model name	Part no.
Cabinet through M12, 4-pin, D-coded on RJ45 jack, input jack 90, IP 65 / 67	Passage jack Ethernet RJ45	6048180

Passage jack Ethernet RJ45
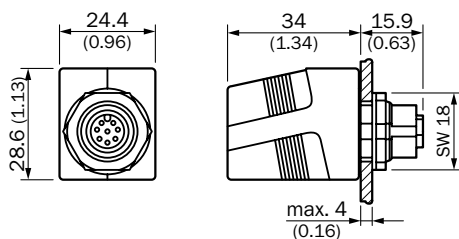
Mounting cutout

All dimensions in mm (inch)
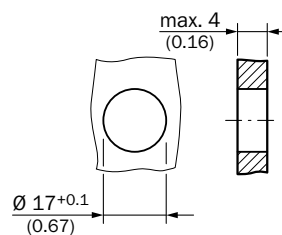
All dimensions in mm (inch)

Mounting technology

Couplings

- Bellows coupling, max. shaft offset radial ± 0.3 mm, axial 0.4 mm, angle ± 4 degrees, torsion spring stiffness 120 Nm/rad, bellows of stainless steel, hubs of aluminium.

Shaft diameter	Model name	Part no.
6 mm … 6 mm	KUP-0606-B	5312981
6 mm … 10 mm	KUP-0610-B	5312982
10 mm … 10 mm	KUP-1010-B	5312983
10 mm … 12 mm	KUP-1012-B	5312984

KUP-0606-B
KUP-0610-B
KUP-1010-B
KUP-1012-B
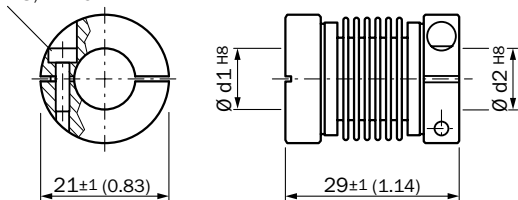
All dimensions in mm (inch)

- Spring-disc coupling, max. shaft offset radial ± 0.3 mm, axial 0.4 mm, angle ± 2.5 degrees, torsion spring stiffness 50 Nm/rad, flange of aluminium, spring-discs of glass-fibre-reinforced plastic

Shaft diameter	Model name	Part no.
6 mm … 10 mm	KUP-0610-F	5312985
10 mm … 10 mm	KUP-1010-F	5312986

KUP-0610-F
KUP-1010-F
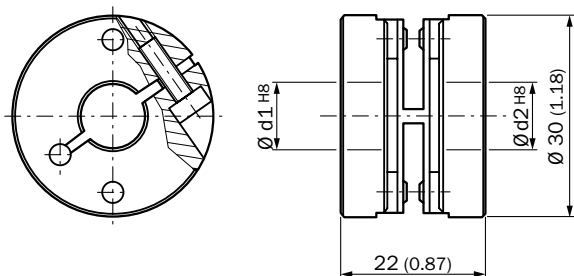
All dimensions in mm (inch)

Mechanical adapters

Adapter flanges

• Adapter flange of aluminium for face mount flange, spigot 36 mm.

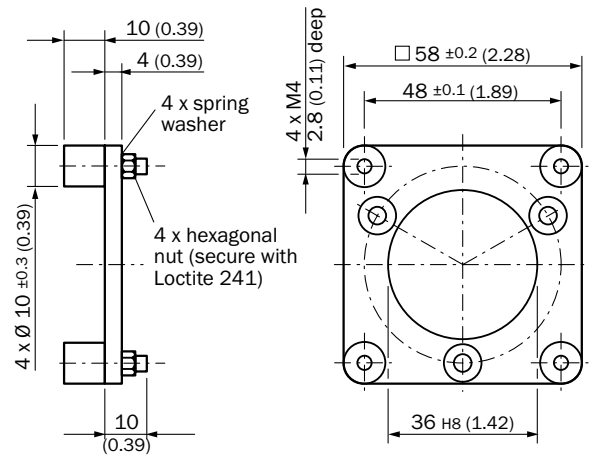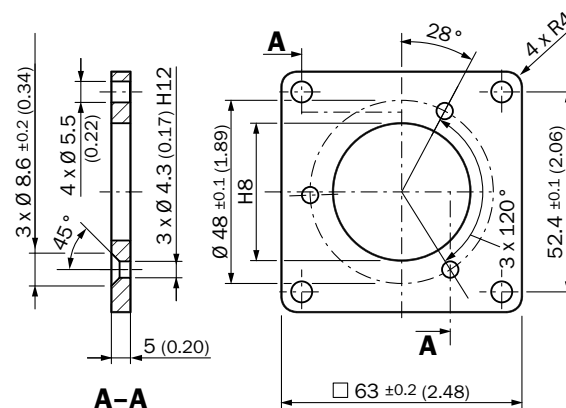| Adaption	Model name	Part no.
To 50 mm servo flange	BEF-FA-036-050	2029160
To 60 mm square mounting plate	BEF-FA-036-060REC	2029162
To 60 mm square mounting plate with shock absorbers	BEF-FA-036-060RSA	2029163
To 63 mm square mounting plate	BEF-FA-036-063REC	2034225

BEF-FA-036-050
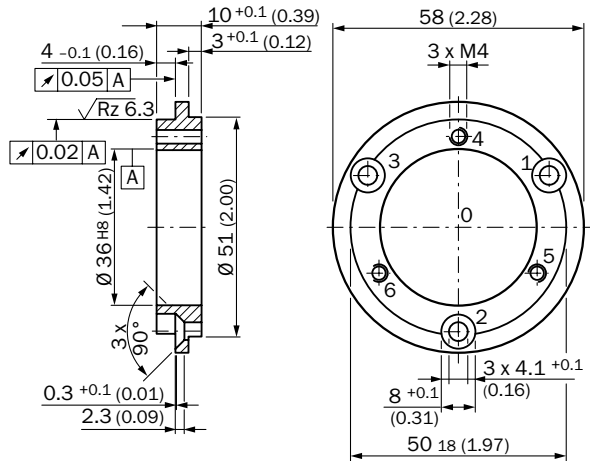
All dimensions in mm (inch)

BEF-FA-036-060REC
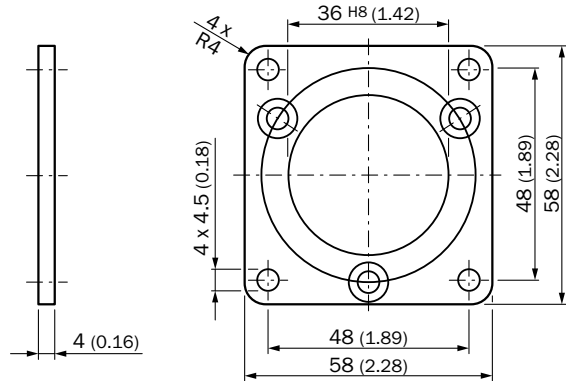
All dimensions in mm (inch)

BEF-FA-036-060RSA

All dimensions in mm (inch)

BEF-FA-036-063REC

All dimensions in mm (inch)

Mounting bells

- Mounting bell incl. fixing set for encoder with servo flange.

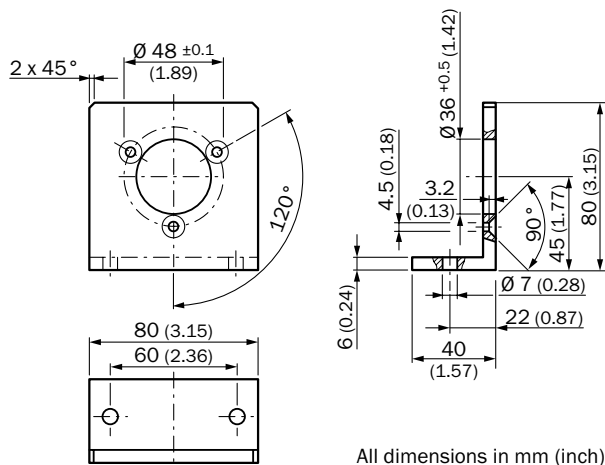| Flange spigot	Model name	Part no.
Diameter 50 mm	BEF-MG-50	5312987

BEF-MG-50
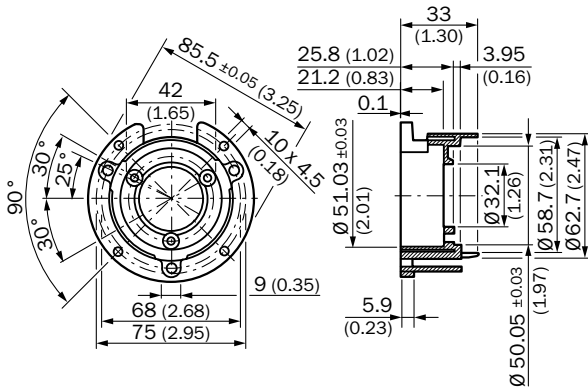
All dimensions in mm (inch)

Mounting angles

- Mounting angle incl. fixing set for encoder with face mount flange.

Flange spigot	Model name	Part no.
Diameter 36 mm	BEF-WF-36	2029164

BEF-WF-36

All dimensions in mm (inch)

Servo clamps

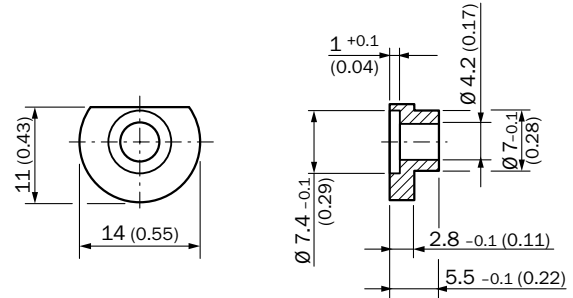| Description	Model name	Part no.
Servo clamps half ring, Set (comprises 2 pieces) for servo flanges with spigot diameter 50 mm	BEF-WG-SF050	2029165
Servo clamps small, Set (comprises 3 pieces) for servo flanges	BEF-WK-SF	2029166

BEF-WG-SF050
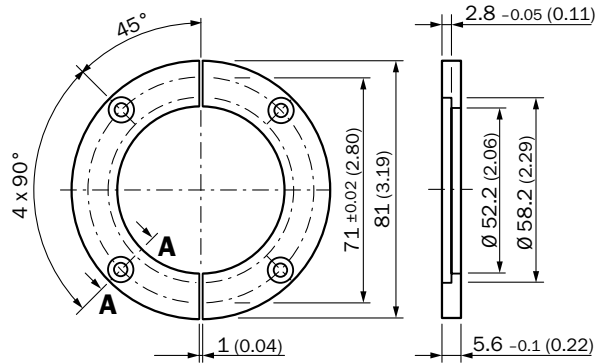
BEF-WK-SF

All dimensions in mm (inch)

All dimensions in mm (inch)

Bearing blocks

Description	Model name	Part no.
Heavy duty bearing block for very large radial and axial shaft loads	BEF-FA-B12-010	2042728

BEF-FA-B12-010
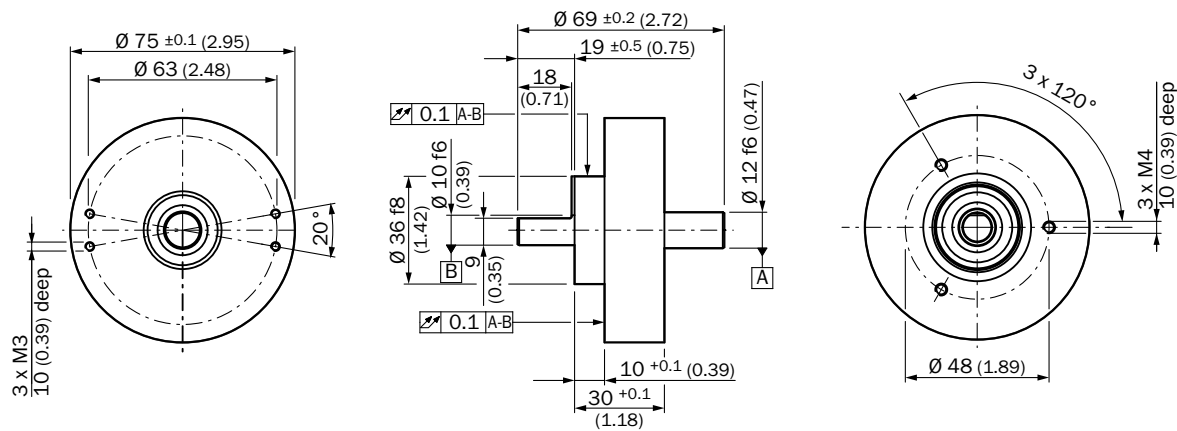
All dimensions in mm (inch)

Measuring wheels

- Circumference 0.2 m

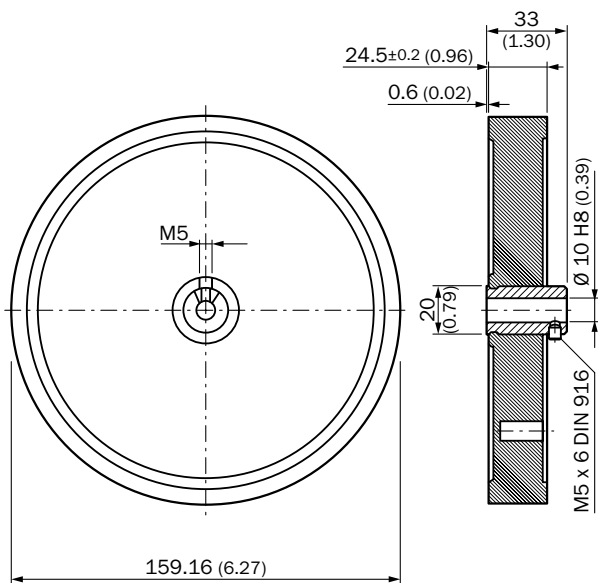| Description	Model name	Part no.
Measuring wheel for encoder shafts with diameter 10 mm, type material plastic (Hytrel), wheel material plastic with aluminium hub, smooth surface	BEF-MR-010020	5312988
Measuring wheel for encoder shafts with diameter 10 mm, type material plastic (Hytrel), wheel material plastic with aluminium hub, knurled surface	BEF-MR-010020G	5318678

BEF-MR-010020
BEF-MR-010020G
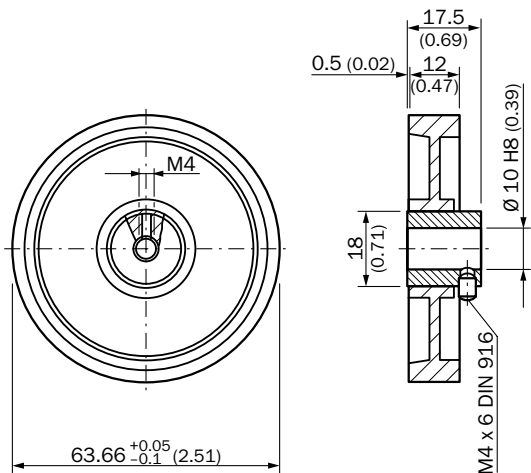
All dimensions in mm (inch)

- Circumference 0.5 m

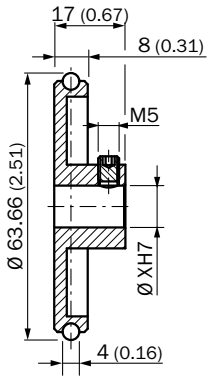| Description	Model name	Part no.
Measuring wheel for encoder shafts with diameter 10 mm, type material plastic (Hytrel), wheel material plastic with aluminium hub, smooth surface	BEF-MR-010050	5312989

BEF-MR-010050

All dimensions in mm (inch)

- Circumference 200 mm

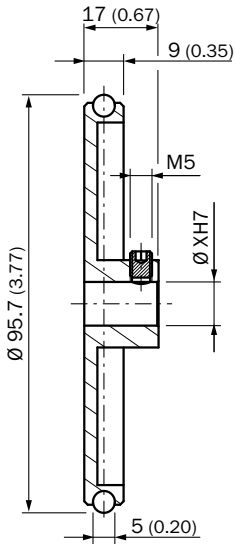| Description	Model name	Part no.
Measuring wheel for encoder shafts with diameter 6 mm, surface O ring NBR70	BEF-MR006020R	2055222
Measuring wheel for encoder shafts with diameter 10 mm, surface O ring NBR70	BEF-MR010020R	2055224

BEF-MR006020R
BEF-MR010020R

All dimensions in mm (inch)

- Circumference 300 mm

| Description	Model name	Part no.
Measuring wheel for encoder shafts with diameter 6 mm, surface O ring NBR70	BEF-MR006030R	2055634
Measuring wheel for encoder shafts with diameter 10 mm, surface O ring NBR70	BEF-MR010030R	2049278

BEF-MR006030R
BEF-MR010030R

All dimensions in mm (inch)

- Circumference 500 mm

| Description	Model name	Part no.
Measuring wheel for encoder shafts with diameter 10 mm, surface O ring NBR70	BEF-MR010050R	2055227

BEF-MR010050R
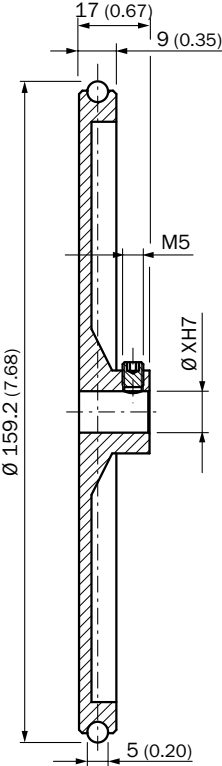
All dimensions in mm (inch)

Further mounting versions for hollow shaft encoders
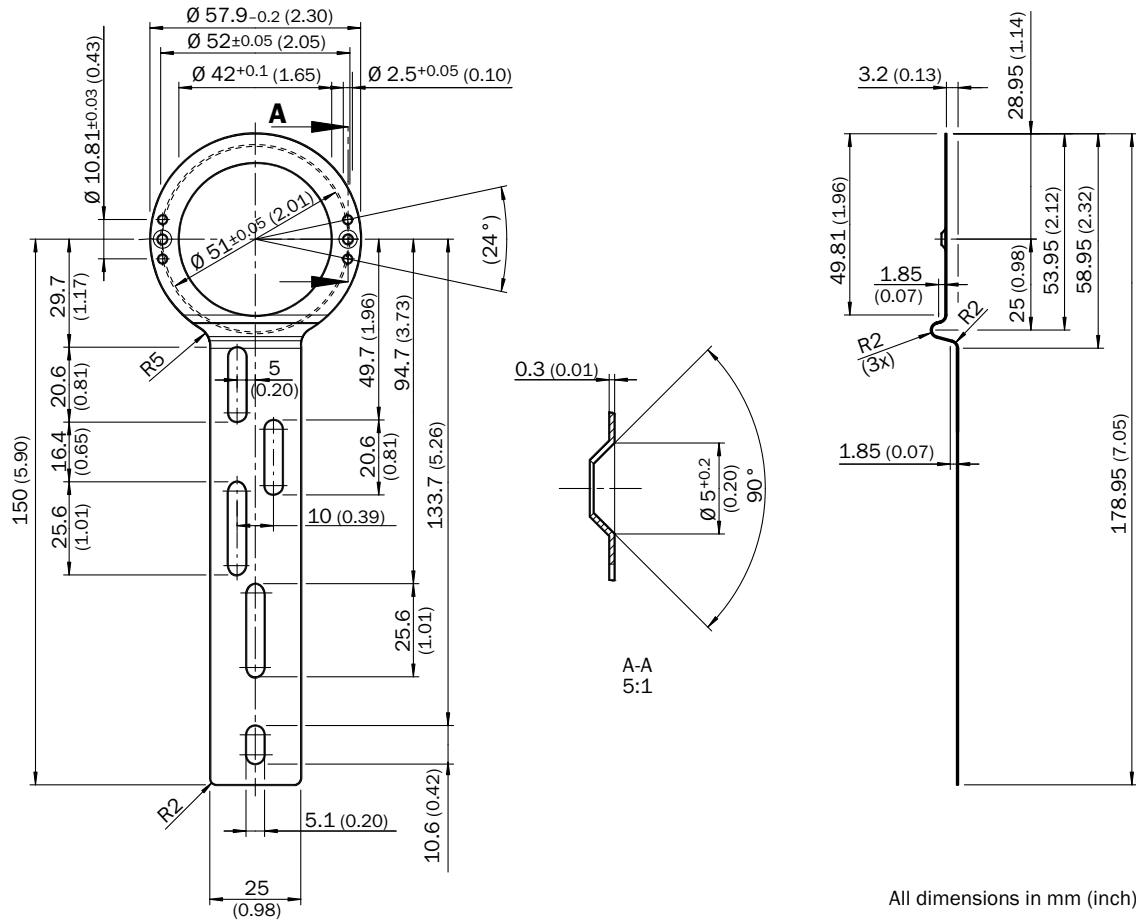
Stator couplings – versions	Model name	Part no.
Version 1	BEF-DS01DFS/VFS	2047428
Version 2	BEF-DS02DFS/VFS	2047430
Version 3	BEF-DS03DFS/VFS	2047431

BEF-DS01DFS/VFS
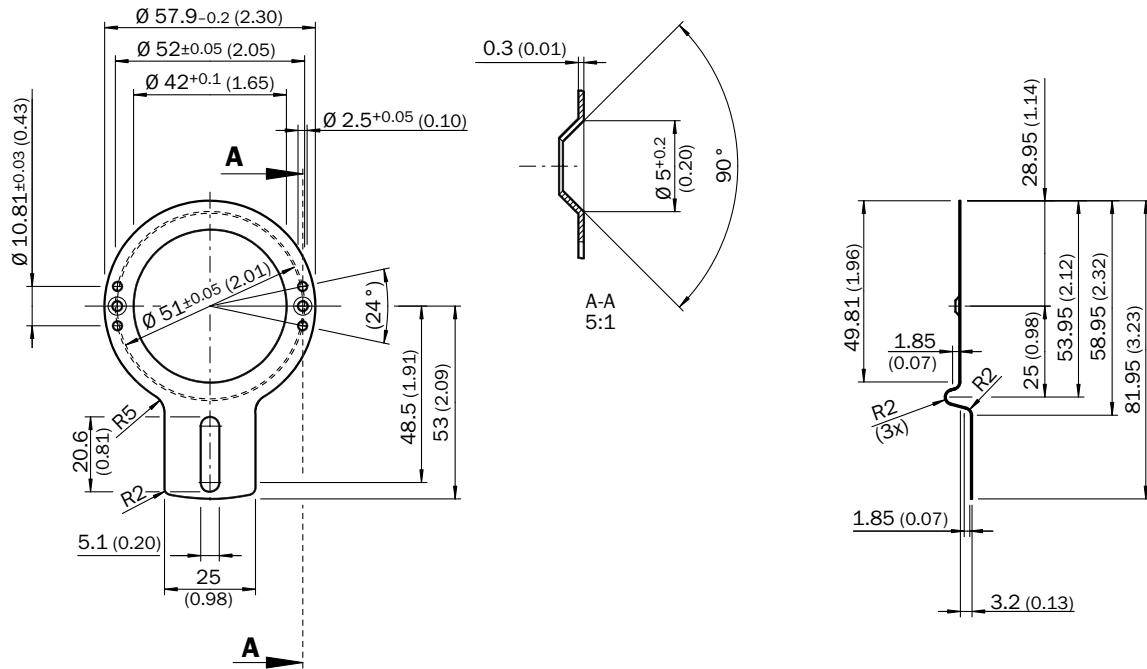
All dimensions in mm (inch)

BEF-DS02DFS/VFS

A-A
5:1

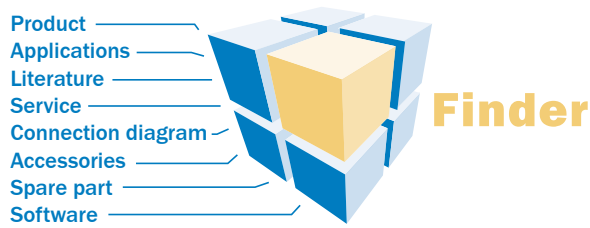All dimensions in mm (inch)

BEF-DS03DFS/VFS

A-A
5:1

All dimensions in mm (inch)

Notes
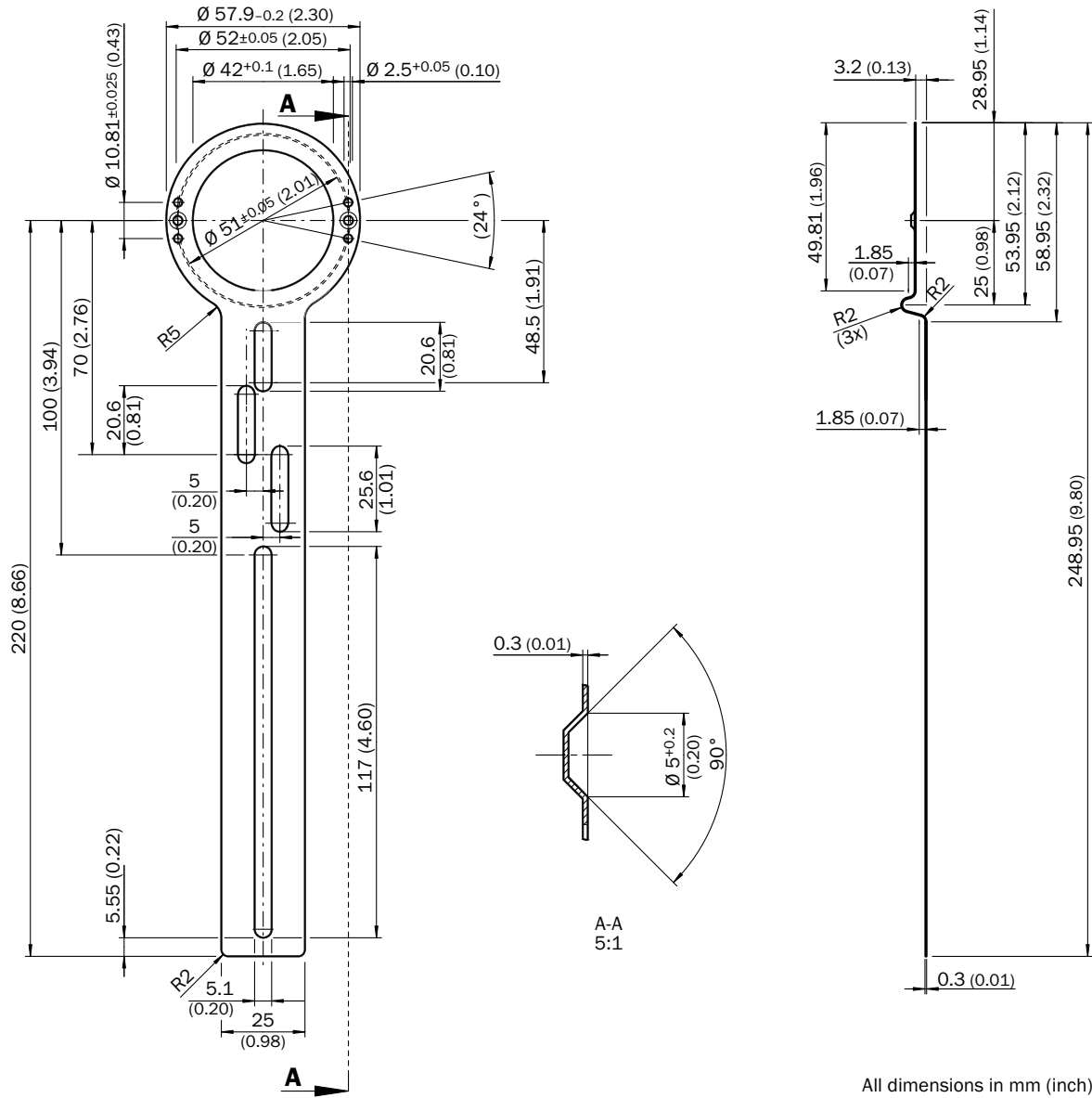
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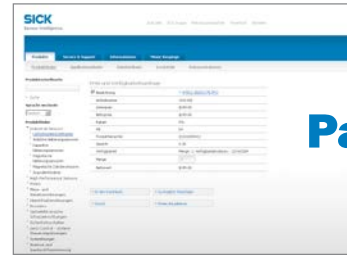
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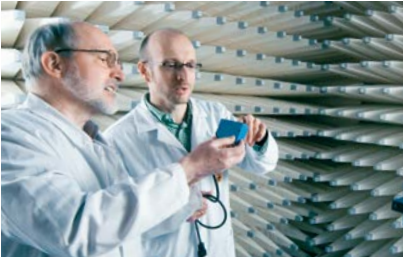Checks and recommendations for increased availability

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