



SKS/SKM36

COMPACT DIMENSIONS COMBINED WITH HIGH RESOLUTION FOR THE STANDARD PERFORMANCE RANGE

Motor feedback systems rotary HIPERFACE®

SICK
Sensor Intelligence.

COMPACT DIMENSIONS COMBINED WITH HIGH RESOLUTION FOR THE STANDARD PERFORMANCE RANGE



CE, UL, and safety certification are not valid for all models. See the type label on the motor feedback system.



Additional information

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Product description

The SKS36/SKM36 encoder is the first of a new generation of optical motor feedback systems. With 128 sine/cosine signals per revolution, this family represents the standard solution among the MFB systems with HIPERFACE® interface. So what's so special about this generation? A very small code disk with a code track of just 2 mm in radius allows for holistic scanning. The unavoidable eccentricity errors of the code disk, ball bearing and shaft that occur with conventional systems can thus be compensated for by the system. Since the code disk is now positioned

in the center of the axis of rotation, high angular speeds are no longer limited by it. Absolute position indication is based on an increment count of 4,096 increments per revolution and a maximum of 4,096 revolutions. Storage of motor-specific data in the electronic type label and the programming are important features of this product family. The motor feedback systems certified to SIL2/PL d meet current requirements with regard to safety technology and make the certification process easier.

At a glance

- Motor feedback system for the standard performance range
- 128 sine/cosine periods per revolution
- Absolute position with a resolution of 4,096 increments per revolution and 4,096 revolutions with the multiturn system
- Programming of the position value and electronic type label
- HIPERFACE® interface
- Built-in version and stand-alone design
- Certified according to SIL2/PL d (only valid for SKS36S/SKM36S-H...)
- RoHS-compliant

Your benefits

- The compact design allows manufacturers of low-power and minimal-power motors to considerably reduce the size of their motors
- The stand-alone version is ideally suited for use as a master encoder or path encoder
- The SKS/SKM36 motor feedback systems have achieved significant market penetration in the drive technology sector
- The consistent mechanical components of the SEK/SEL37 motor feedback system optimize its compatibility for use with different encoder systems

→ www.mysick.com/en/SKS_SKM36

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

	Built-in	Stand-alone
Number of sine/cosine periods per revolution	128	
Total number of steps	Singleturn SKS 4,096 Multiturn SKM 16,777,216	
Measurement step	2.5 angular seconds for interpolation of the sine/cosine signals with, e.g., 12 bits	
Integral non-linearity	± 80 angular seconds (error limits for evaluating sine/cosine signals)	± 120 angular seconds (error limits for evaluating sine/cosine signals)
Differential non-linearity	± 40 angular seconds (non-linearity of a sine/cosine period)	–
Working speed	Singleturn SKS 12,000 rpm, up to which the absolute position can be reliably determined Multiturn SKM 9,000 rpm, up to which the absolute position can be reliably determined	
		6,000 rpm, up to which the absolute position can be reliably determined 6,000 rpm, up to which the absolute position can be reliably determined

Interfaces

Code type for the absolute value	Binary
Code sequence	Ascending for clockwise shaft rotation, looking in direction "A" (see dimensional drawing)
Interface signals	Process data channel SIN, REFSIN, COS, REFCOS: analog, differential Parameter channel RS 485: digital
Available memory space in E²PROM 2,048	1,792 bytes

Electrical data

Operating voltage range/supply voltage	7 V DC ... 12 V DC
Recommended supply voltage	8 V DC
Operating current (no load)	60 mA
Output frequency for sine/cosine signals	0 kHz ... 65 kHz

Mechanical data

	Built-in	Stand-alone
Shaft type	Tapered shaft	Solid shaft
Dimensions	See dimensional drawing	
Mass	0.07 kg	0.14 kg
Rotor moment of inertia	4.5 gcm ²	6 gcm ²
Maximum angular acceleration	≤ 500,000 rad/s ²	
Operating torque	0.2 Ncm	0.6 Ncm
Startup torque	0.3 Ncm	0.9 Ncm
Permissible shaft movement, radial, static	± 0.1 mm	–
Permissible shaft movement, radial, dynamic	± 0.05 mm	–
Permissible shaft movement, axial, static	– 0.4/+ 0.2 mm	–

	Built-in	Stand-alone
Permissible shaft movement, axial, dynamic	± 0.1 mm	–
Permissible shaft loading	–	10 N (radial) 5 N (axial)
Service life of ball bearings	3.6 x 10 ⁹ revolutions	2.0 x 10 ⁹ revolutions
Connection type	Male connector, 8-pin, radial	M12 male connector, 8-pin, radial Cable, 8-wire, 1.5 m

Ambient conditions

	Built-in	Stand-alone
Working temperature range	–20 °C ... +110 °C	–20 °C ... +100 °C
Storage temperature range	–40 °C ... +125 °C, without packaging	
Relative humidity / condensation	90%, condensation not permitted	
Resistance to shocks	100 g / 6 ms / according to EN 60068-2-27	
Resistance to vibrations	50 g / 10 Hz ... 2,000 Hz / according to EN 60068-2-6	
EMC	According to EN 61000-6-2 and EN 61000-6-4 ¹⁾	According to EN 61000-6-2 and EN 61000-6-4
Enclosure rating	IP 50 with mating plug connected and cover closed (according to IEC 60529)	IP 65 with mating plug connected (according to IEC 60529)

¹⁾ EMC according to the standards cited is achieved when the motor feedback system is mounted in an electrically conductive housing that is connected to the central grounding point of the motor controller via a cable screen. The GND (0 V) connection of the supply voltage is also grounded here. If other screening concepts are used, users must perform their own tests.

Safety-related characteristics (valid for SIL2-certified versions only) ^{*)}

Safety integrity level	SIL2 (IEC 61508), SILCL2 (EN 62061)
Category	3 (EN ISO 13849)
Performance level	PL d (EN ISO 13849) ¹⁾
PFHd: Probability of dangerous failure per hour	1.3 x 10 ⁻⁸ ²⁾
T _M (Mission Time)	20 years (EN ISO 13849)
MTTFd: mean time to dangerous failure	874 years (EN ISO 13849)

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

²⁾ The stated values apply to a diagnostic degree of coverage of 90%, which must be achieved by the external drive system.



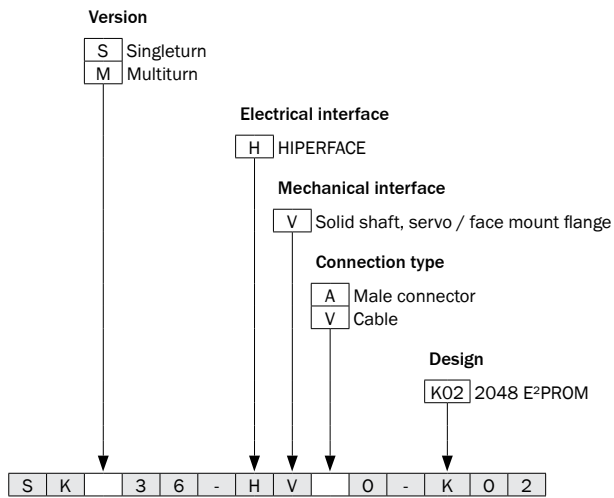
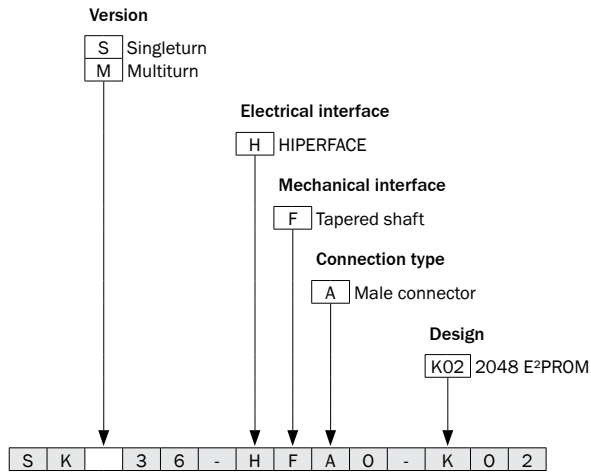
^{*)} The motor feedback system can be used in safety-relevant drive systems. It meets the requirements of Category 3 (EN ISO 13849), PL d (EN ISO 13849) and SILCL2/SIL2 (EN 62061 and IEC 61508). Implementation handbook 8014120 must be followed when using safety-certified HIPERFACE® motor feedback systems in safety-relevant drive systems.

Ordering information

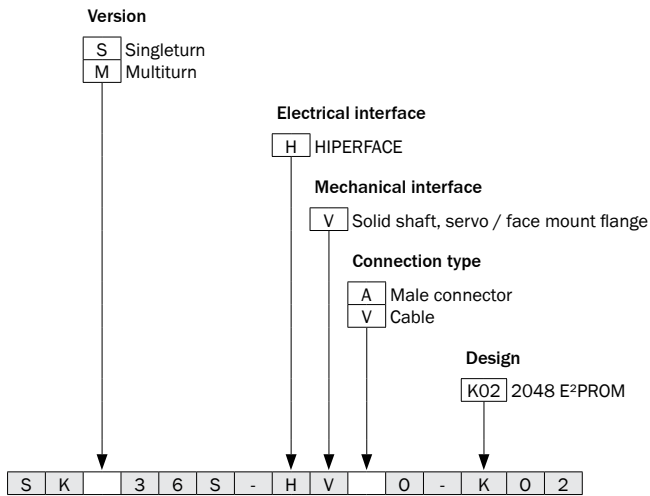
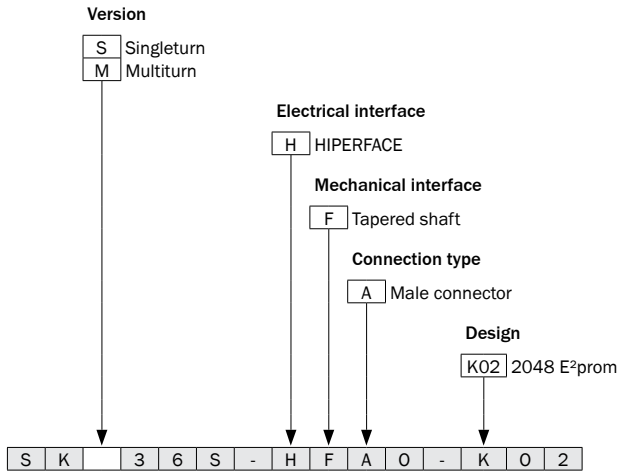
Other device versions are available at www.mysick.com/en/SKS_SKM36

Type code

Standard



Safety



Data acquisition Singleturn

- **Electrical interface:** HIPERFACE
- **Programmable/configurable:** ✓

Mechanical version	Connection type	Model name	Part no.
Tapered shaft; spring plate support	Male connector	SKS36-HFA0-K02	1034095
6 mm solid shaft, servo / face mount flange	Male connector	SKS36-HVA0-K02	1035603
	1.5 m cable	SKS36-HV0-K02	1035604

Data acquisition Singleturn

- **Safety system:** ✓
- **Connection type:** Male connector
- **Electrical interface:** HIPERFACE
- **Programmable/configurable:** ✓



Mechanical version	Model name	Part no.
Tapered shaft; spring plate support	SKS36S-HFA0-K02	1036556
6 mm solid shaft, servo / face mount flange	SKS36S-HVA0-K02	1036557

Data acquisition Multiturn

- **Electrical interface:** HIPERFACE
- **Programmable/configurable:** ✓

Mechanical version	Connection type	Model name	Part no.
Tapered shaft; spring plate support	Male connector	SKM36-HFA0-K02	1034094
6 mm solid shaft, servo / face mount flange	Male connector	SKM36-HVA0-K02	1035601
	1.5 m cable	SKM36-HV0-K02	1035602

Data acquisition Multiturn

- **Safety system:** ✓
- **Connection type:** Male connector
- **Electrical interface:** HIPERFACE
- **Programmable/configurable:** ✓

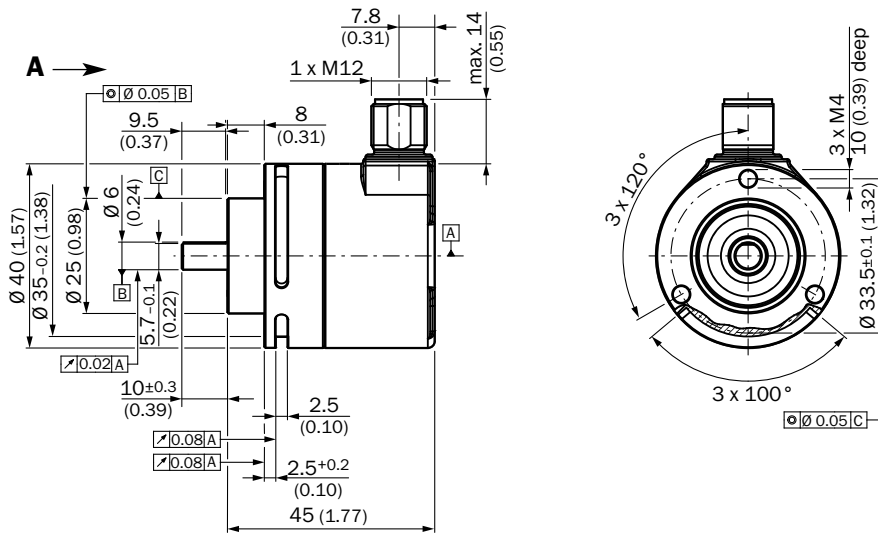


Mechanical version	Model name	Part no.
Tapered shaft; spring plate support	SKM36S-HFA0-K02	1036558
6 mm solid shaft, servo / face mount flange	SKM36S-HVA0-K02	1036559

Dimensional drawings (dimensions in mm (inch))

Solid shaft

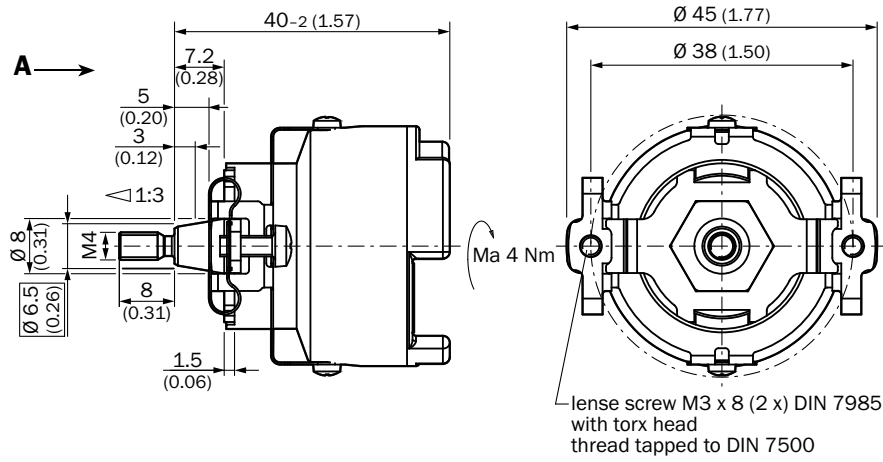
General tolerances according to ISO 2768-mk



These dimensional drawings also apply to the SIL2 variants.

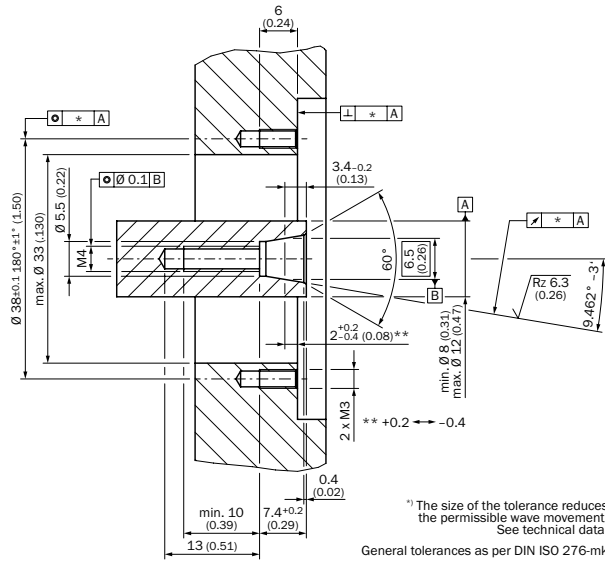
Tapered shaft

General tolerances according to ISO 2768-mk



Mounting suggestion

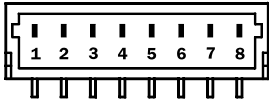
General tolerances according to ISO 2768-mk



These dimensional drawings also apply to the SIL2 variants.

Pin and wire assignment

Tapered shaft



View of the plug-in face

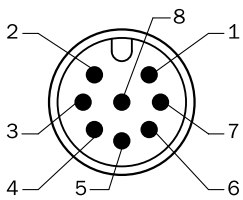
Pin	Wire colors	Signal	Explanation
1	Red	U_s	7 ... 12 V supply voltage
2	White	+ SIN	Process data channel
3	Brown	REFSIN	Process data channel
4	Pink	+ COS	Process data channel
5	Black	REFCOS	Process data channel
6	Blue	GND	Ground connection
7	Gray or yellow	Data +	RS-485 parameter channel
8	Green or violet	Data -	RS-485 parameter channel

The electrical connection between the housing and the motor housing is established via the stator coupling. The GND (0 V) connection of the supply voltage is not connected to the housing.

Solid shaft

Male connector, 8-pin

8-pin A coded

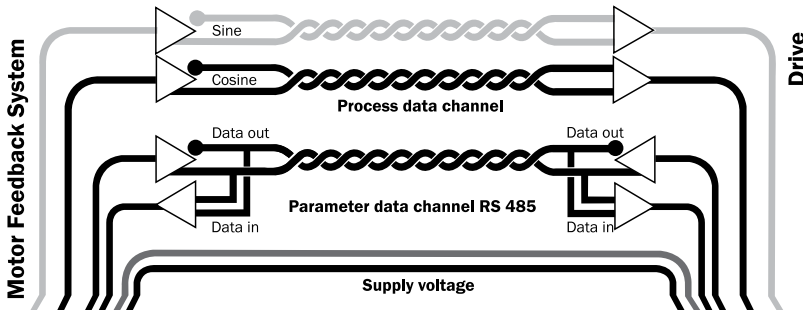


View of the plug-in face

Pin	Wire colors	Signal	Explanation
1	Brown	REFSIN	Process data channel
2	White	+ SIN	Process data channel
3	Black	REFCOS	Process data channel
4	Pink	+ COS	Process data channel
5	Gray or yellow	Data +	RS-485 parameter channel
6	Green or violet	Data -	RS-485 parameter channel
7	Blue	GND	Ground connection
8	Red	$+U_s$	Encoder supply voltage
-	-	Screen	Housing potential. Screen via housing male connector.

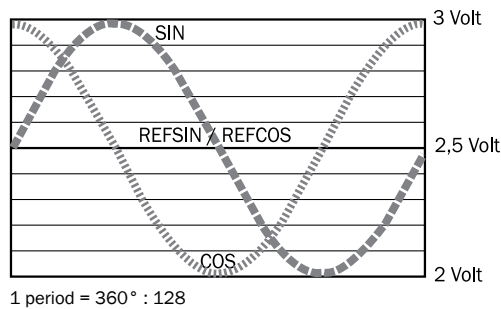
Electrical interface

- Secure data transmission
- High information content
- Electronic type label
- Just 8 leads
- Bus-compatible parameter channel
- Process channel in real time



Signal specification of the process channel

Signal diagram for clockwise rotation of the shaft looking in direction "A"



Access to the process data used for speed control, i.e., to the sine and cosine signals, is practically always "online". When the supply voltage is applied, the speed controller has access to this information at any time. Sophisticated technology ensures stable amplitudes of the analog signals across all specified environmental conditions, with a maximum variation of only 30 %.

Characteristics applicable to all stated ambient conditions	
Signal	Values/units
Signal peak, peak V_{pp} of SIN, COS	0.8 ... 1.1 V
Signal offset REFSIN, REFCOS	2.2 ... 2.8 V

Type-specific settings	SKS	SKM
Type ID (command 52h)	32h	37h
Free E ² PROM [bytes]	1,792	1,792
Address	40h	40h
Mode_485	E4h	E4h
Codes 0 to 3	55h	55h
Counter	0	0

Overview of supported commands			SKS	SKM
Command byte	Function	Code 0 ¹⁾	Comment	Comment
42h	Read position		12 bits	24 bits
43h	Set position	■		
44h	Read analog value		Channel number 48 h	Channel number 48 h
			Temperature [°C]	Temperature [°C]
46h	Read counter			
47h	Increase counter			
49h	Delete counter	■		
4Ah	Read data			
4Bh	Store data			
4Ch	Determine status of a data field			
4Dh	Create data field			
4Eh	Determine available memory area			
4Fh	Change access code			
50h	Read encoder status			
52h	Read out type label		Encoder type = 32h	Encoder type = 37h
53h	Encoder reset			
55h	Allocate encoder address	■		
56h	Read serial number and program version			
57h	Configure serial interface	■		
6Ah	Set position with synchronization to process data channel			

¹⁾The commands thus marked include the parameter "Code 0". Code 0 is a byte inserted into the protocol to provide additional protection of vital system parameters against accidental overwriting. When the device is delivered, "Code 0" = 55h.

Overview of status messages			SKS	SKM
	Status code	Description		
Error type	00h	The encoder has not detected any faults	■	■
Initialization	01h	Incorrect alignment data	■	■
	02h	Incorrect internal angular offset	■	■
	03h	Data field partitioning table destroyed	■	■
	04h	Analog limit values not available	■	■
	05h	Internal I ² C bus not operational	■	■
	06h	Internal checksum error	■	■
Protocol	07h	Encoder reset occurred as a result of program monitoring	■	■
	09h	Parity error	■	■
	0Ah	Checksum of transmitted data is incorrect	■	■
	0Bh	Unknown command code	■	■
	0Ch	Number of transmitted data is incorrect	■	■
	0Dh	Transmitted command argument is not allowed	■	■
Data	0Eh	The selected data field must not be written to	■	■
	0Fh	Incorrect access code	■	■
	10h	Size of specified data field cannot be changed	■	■
	11h	Specified word address lies outside the data field	■	■
	12h	Access to non-existent data field	■	■
Position	01h	Analog signals outside specification		
	1Fh	Speed too high, no position formation possible		
	20h	Singleturn position unreliable	■	■
	21h	Multiturn position error		■
	22h	Multiturn position error		■
	23h	Multiturn position error		■
Other	1Ch	Value monitoring of the analog signals (process data)		
	1Dh	Transmitter current critical (contamination, transmitter breakage)	■	■
	1Eh	Encoder temperature critical	■	■
	08h	Counter overflow	■	■

For additional information about the interface see HIPERFACE® - description, part no. 8010701.


Accessories

Programming and configuration tools

Brief description	Model name	Part no.
Programming tool for HIPERFACE® motor feedback systems	PGT-03-S	1034252






Mounting systems

Mounting brackets/plates

Figure	Brief description	Usable for	Model name	Part no.
	Mounting bracket for encoder with 25 mm centering collar including mounting kit for face mount flange	Stand-alone	BEF-WF-25	2032621

Flanges

Mounting flange

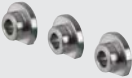
Figure	Brief description	Usable for	Model name	Part no.
	Flange adapter, adapts face mount flange with 25 mm centering collar to size 60 face mount flange with 36 mm centering collar, aluminum	Stand-alone	BEF-FA-025-036	2034226
	Flange adapter, adapts face mount flange with 25 mm centering collar to 50 mm servo flange, aluminum	Stand-alone	BEF-FA-025-050	2032622
	Flange adapter, adapts face mount flange with 25 mm centering collar to 60 mm square mounting plate, aluminum	Stand-alone	BEF-FA-025-060RCA	2032623
	Flange adapter, adapts face mount flange with 25 mm centering collar to 60 mm square mounting plate with shock absorber, aluminum	Stand-alone	BEF-FA-025-060RSA	2032624
	Flange adapter, adapts face mount flange with 25 mm centering collar to 63 mm square mounting plate, aluminum	Stand-alone	BEF-FA-025-063-REC	2033631

Other mounting accessories

Mounting tools


Brief description	Usable for	Model name	Part no.
SKx36 mounting tool	Built-in	BEF-MW-SKX36	2031079

Servo clamps

Figure	Brief description	Usable for	Model name	Part no.
	Servo clamps, small, for servo flange (clamps, eccentric fastener), (3 pcs.), without fastening material	Stand-alone	BEF-WK-RESOL	2039082


Shaft adaptation

Shaft couplings


Figure	Brief description	Usable for	Model name	Part no.
	Bellows coupling, shaft diameter 6 mm / 6 mm	Stand-alone	KUP-0606-B	5312981
	Bellows coupling, shaft diameter 6 mm/10 mm	Stand-alone	KUP-0610-B	5312982

Plug connectors and cables

Connecting cable (female connector open)

Figure	Brief description	Usable for	Length of cable	Model name	Part no.
	Female cable connector, 8-pin, straight, pre-wired with 8-wire cable, 4 x 2 x 0.25 mm ² , screened, cable diameter 7.0 mm	Stand-alone	0.2 m	DOL-0J08-G0M2XB6	2031086
			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	Usable for	Model name	Part no.
	M12 female cable connector, 8-pin, straight, screened, suitable for cable diameter 4 - 8 mm	Stand-alone	DOS-1208-GA01	6045001

Cable (open-open)

Brief description	Usable for	Model name	Part no.
Cable, HIPERFACE®, suitable for drag chain, PUR halogen-free, screened	Stand-alone	LTG-2708-MW	6028361

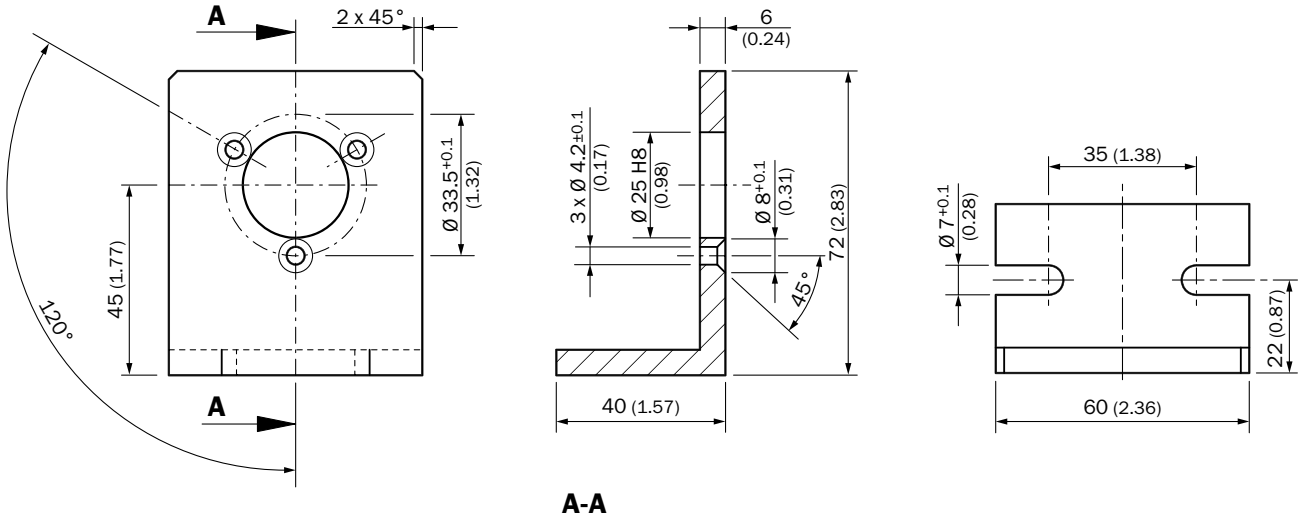
Male connector (ready to assemble)

Figure	Brief description	Usable for	Model name	Part no.
	M12 male cable connector, 8-pin, straight, screened, suitable for assembly with cable diameter 4 - 8 mm	Stand-alone	STE-1208-GA01	6044892

Dimensional drawings, accessories (dimensions in mm (inch))

Mounting brackets/plates

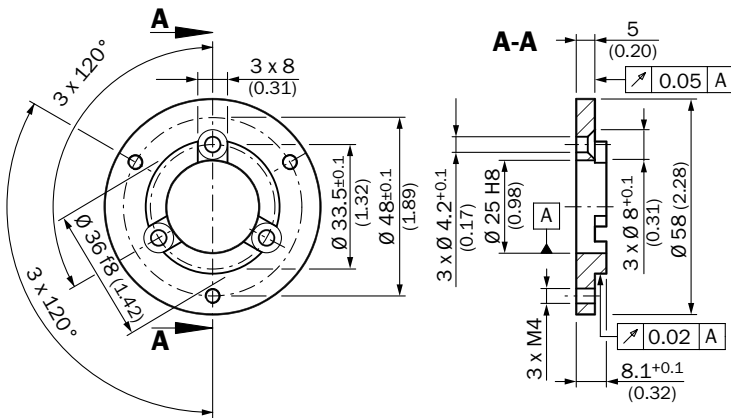
BEF-WF-25



Mounting flange

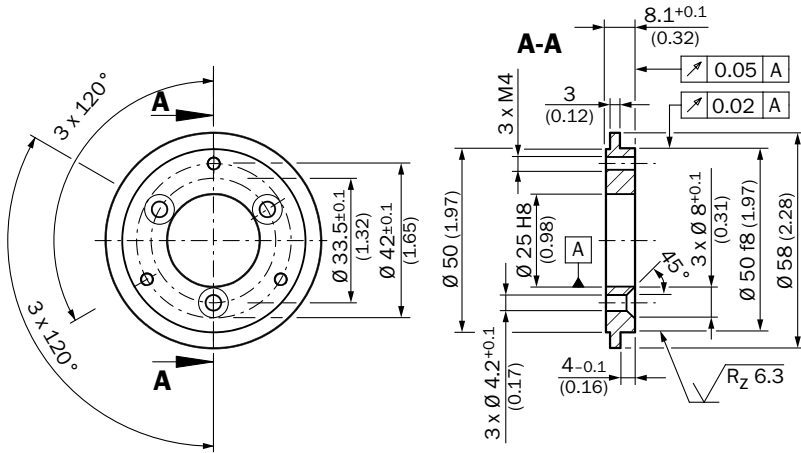
BEF-FA-025-036

General tolerances according to ISO 2768-mk



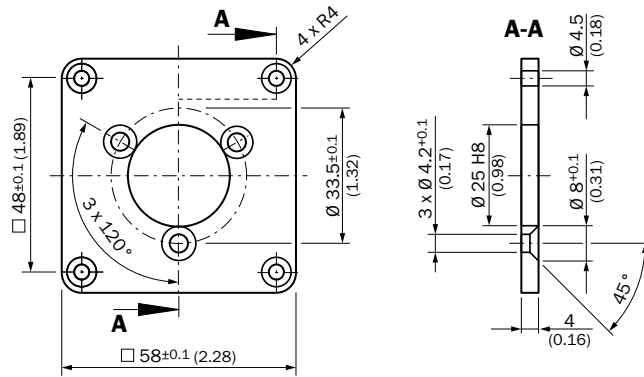
BEF-FA-025-050

General tolerances according to ISO 2768-mk



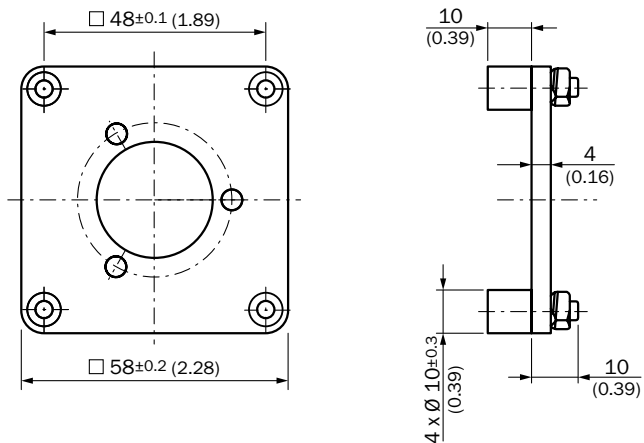
BEF-FA-025-060RCA

General tolerances according to ISO 2768-mk



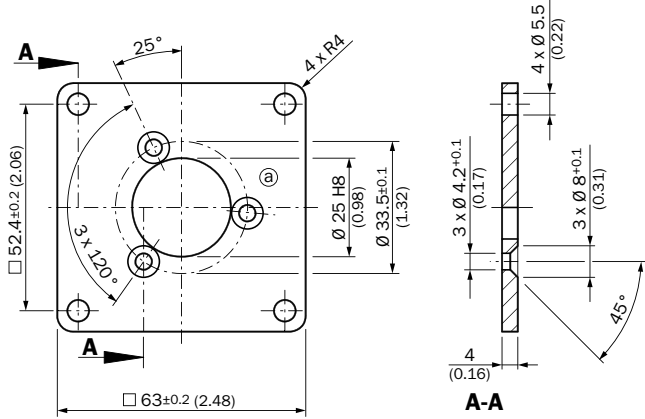
BEF-FA-025-060RSA

General tolerances according to ISO 2768-mk



BEF-FA-025-063-REC

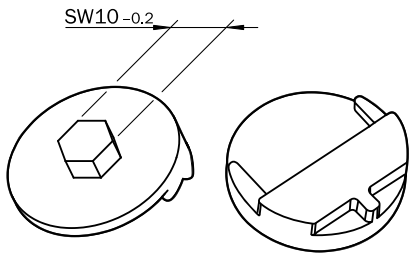
General tolerances according to ISO 2768-mk



Mounting tools

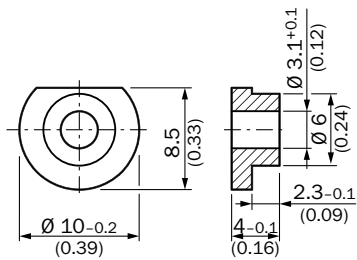
BEF-MW-SKX36

General tolerances according to ISO 2768-mk



Servo clamps

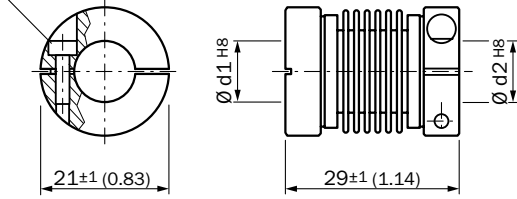
BEF-WK-RESOL



Shaft couplings

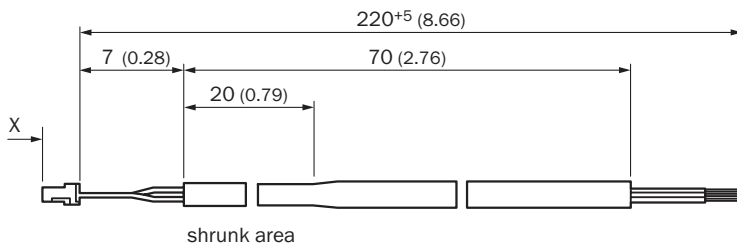
KUP-0606-B
KUP-0610-B

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

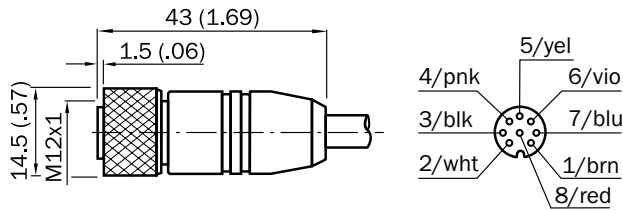


Connecting cable (female connector open)

DOL-0J08-G0M2XB6



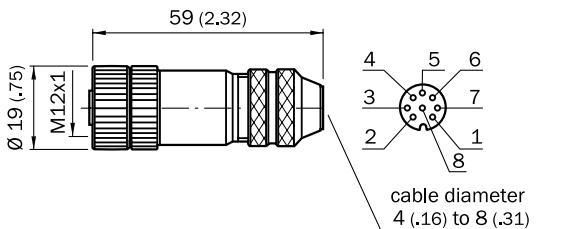
DOL-1208-G02MAC1
DOL-1208-G05MAC1
DOL-1208-G10MAC1
DOL-1208-G20MAC1



All dimensions in mm (inch)

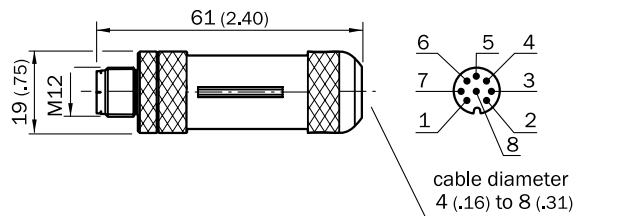
Female connector (ready to assemble)

DOS-1208-GA01



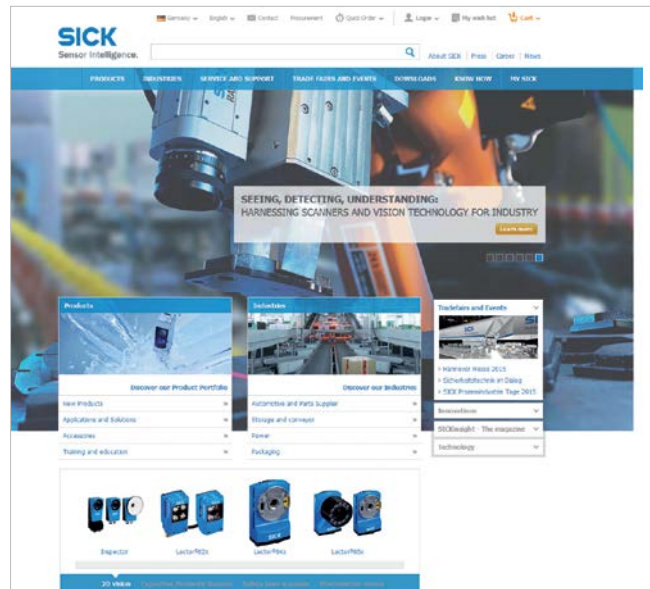
Male connector (ready to assemble)

STE-1208-GA01



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Our comprehensive and versatile LifeTime Services are the perfect addition to the comprehensive range of products from SICK. The services range from product-independent consulting to traditional product services.



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

SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With almost 7,000 employees and over 50 subsidiaries and equity investments as well as numerous representative offices worldwide, we are always close to our customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in various industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

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

For us, that is “Sensor Intelligence.”

Worldwide presence:

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Detailed addresses and additional representatives → www.sick.com